DRAFT Decision Notice Appendix A – Response to Marshall Woods Restoration Project EA Comments

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Table 1. List of EA Commenters

Comment Letter ID	Date	Name of Commenter
1	2/23/2015	Reneau, Susan
2	3/13/2015	Brown, Jim
3	3/18/2015	Belsky, Jill
4	3/18/2015	Lane, Richard
5	3/18/2015	McDonald, Patti
6	3/18/2015	McGinley, Michael
7	3/18/2015	Moy, Randy & Nancy
8	3/18/2015	Plant, Emily
9	3/18/2015	Roscoe, Matt
10	3/18/2015	Simpson, Neil
11	3/18/2015	Stewart, Cathy
12	3/18/2015	Unknown
13	3/18/2015	Volkman, Sandy
14	3/18/2015	Williams, Jerry & Greta
15	3/18/2015	Wright, Alden
16	3/20/2015	Franke, Rick
17	3/20/2015	Kolppa, Eric
18	3/20/2015	Kurtz, Eric
19	3/21/2015	Decaro, Diane
20	3/21/2015	Vosburgh, Mark
21	3/21/2015	Wollersheim, Tod
22	3/22/2015	Artley,Dick

23	3/23/2015	Dieterle, Shana
24	3/23/2015	Everingham, Dave
25	3/23/2015	Oetinger, John
26	3/23/2015	Slobod, Karen
27	3/23/2015	Tonnessen, Kathy
28	3/24/2015	Hightower, Tom
29	3/24/2015	Hopkins, Robert
30	3/25/2015	Arensberg, Rebecca
31	3/26/2015	Andrus, Genevieve
32	3/26/2015	Blunn, Thomas
33	3/26/2015	Clapp, Jim
34	3/26/2015	Reiter, John and Sharon
35	3/26/2015	Schroeder, Jeff
36	3/27/2015	Brown, Jim and Sue
37	3/29/2015	Artley, Dick
38	3/29/2015	Cook/Coleman, Julie/Mark
39	3/29/2015	Lesica, Peter
40	3/30/2015	Christopherson, Leroy
41	3/30/2015	Cunningham, Bill
42	3/30/2015	Decaro, John
43	3/30/2015	Hall, Deborah
44	3/30/2015	Hoem, Harold & Jan
45	3/30/2015	Ingold, Kurt
46	3/30/2015	Narcisco, Claudia
47	3/30/2015	Ninteman, Wendy

48	3/30/2015	Powell, Edward
49	3/30/2015	Wiener, Jason
50	3/31/2015	Bernofsky, Gene and Jo Ann
51	3/31/2015	Kuhne, David
52	3/31/2015	Lousen, Ken
53	4/1/2015	Herling, Daphne
54	4/1/2015	Walker, Jerome
55	4/1/2015	Worthy, Willie & Jeanne
56	4/2/2015	Bayless, Aurora
57	4/2/2015	Farmer, Dave
58	4/2/2015	Grimm, Douglas
59	4/2/2015	Jackson, David & Kathleen
60	4/2/2015	Roach, Terri
61	4/3/2015	Parnell, Chase
62	4/3/2015	VanDerPoel, W.I.
63	4/3/2015	Ward, Judy
64	4/4/2015	Hinther, Roger & Janet
65	4/5/2015	Cook, Tom
66	4/5/2015	Gaddy, Will
67	4/6/2015	Jangurdesfer, Mary
68	4/6/2015	Smith, Phil
69	4/7/2015	Ambrose, Bob & Rachel
70	4/7/2015	Hayes, Bob
71	4/7/2015	Rothermel, Richard

72	4/8/2015	Reinhardt, Howard & Chin
73	4/10/2015	Clarke, William
74	4/10/2015	Deschamps, Robert
75	4/10/2015	Gaul, Bill
76	4/10/2015	Hillis
77	4/10/2015	Thomas, M
78	4/11/2015	Haggett, Ben
79	4/11/2015	Walker, Annette
80	4/12/2015	Ellison, Julia
81	4/12/2015	Oertli, Donna
82	4/12/2015	Ream, Tarn
83	4/12/2015	Tobias, Cris
84	4/14/2015	Graham, Gary
85	4/14/2015	Autio, Lela
86	4/15/2015	Schwanemann, Fed & Eileen
87	4/16/2015	Hudson, Michael
88	4/16/2015	Lonski, Caroline
89	4/16/2015	Puckett, Melanie
90	4/17/2015	O'Leary, Dan
91	4/18/2015	Rising, Dave
92	4/19/2015	Hoag, Kay
93	4/19/2015	Roy, Tom
94	4/20/2015	Smith, Jeff
95	4/20/2015	Herling, Daphne

96	4/21/2015	Hoem, Jan
97	4/21/2015	Romano, Albert
98	4/21/2015	Ryan, Chris
99	4/22/2015	Abramson, CE.
100	4/22/2015	Athauser, Robert
101	4/22/2015	Childress, Laurie
102	4/22/2015	Ford, Mark
103	4/22/2015	Jackson, Beverly
104	4/22/2015	Landini, Rich
105	4/22/2015	Serra,
106	4/22/2015	Winterburn, David
107	4/23/2015	Parker, Jim
108	4/23/2015	Polichio, Rosemary
109	4/23/2015	Williams, Marcia
110	4/24/2015	Beardsley, Wendell
111	4/24/2015	Benson, Robert
112	4/24/2015	Campbell, Dave
113	4/24/2015	Clark, Mary
114	4/24/2015	Csorosz, Betty
115	4/24/2015	Hansen, L
116	4/24/2015	McQuillan, Jessie
117	4/24/2015	Rose, Stan
118	4/24/2015	Schandelson, Brett
119	4/24/2015	Tahta, Stefne
120	4/24/2015	Tahta, Stephen

121	4/24/2015	Turner, Bill
122	4/24/2015	Young, Bev
123	4/25/2015	Crawford, John
124	4/25/2015	Hutto, Richard
125	4/25/2015	Jakob, Keith
126	4/25/2015	Sims, Bruce
127	4/26/2015	Bernofsky, Gene
128	4/26/2015	Bernofsky, Jo Ann
129	4/26/2015	Everingham, Mark and Bill
130	4/26/2015	Grant, Jimmy
131	4/26/2015	Hagemeier, Jim
132	4/26/2015	Menson, Sharene
133	4/26/2015	Schultz, Bill
134	4/26/2015	Weddle, Lynn
135	4/27/2015	Brown, Ken
136	4/27/2015	Hoem, Harold
137	4/27/2015	Kulla-Farmer, Kimberly
138	4/27/2015	Padgett, Jeffery
139	4/27/2015	Price, Catherine
140	4/27/2015	Zapp, Patricia
141	4/28/2015	Gullny, Tim
142	4/28/2015	Laughlin, Donnie
143	4/28/2015	Miller, Chip
144	4/28/2015	Siebert, Steve
145	4/28/2015	Zapp-Knapp, Mary Louise

146	4/29/2015	Allison, Janet
147	4/29/2015	Atkins, David
148	4/29/2015	Brigham, Tom
149	4/29/2015	Butler, Will
150	4/29/2015	Chinske, Cass
151	4/29/2015	Colwell, Bill
152	4/29/2015	Kent, Robin
153	4/29/2015	Kulla, Andy
154	4/29/2015	Metcalf, Peter
155	4/29/2015	Pape, Taylor
156	4/29/2015	Strong, Harry
157	4/29/2015	Wiesner, Bob
158	4/29/2015	Yonce, J.B.
159	4/30/2015	Arno, Matt
160	4/30/2015	Arnold, Randy
161	4/30/2015	Azzara, Tom
162	4/30/2015	Bader,
163	4/30/2015	Berkoff, David
164	4/30/2015	Brown, Dylan
165	4/30/2015	Clark, Erin
166	4/30/2015	Cleaves, Kendall & Alice
167	4/30/2015	Clemow, Richard
168	4/30/2015	Darcy,
169	4/30/2015	Dill, Sharon
170	4/30/2015	Dutton, Barry

171	4/30/2015	Edlund, Eric
172	4/30/2015	Evans, Larry
173	4/30/2015	Folsom, Loreen
174	4/30/2015	Friess, Jeffrey
175	4/30/2015	Glassy, Joe
176	4/30/2015	Goldman, Derek
	4/30/2015	Grady, Kathryn
178	4/30/2015	Haber, Paul
179	4/30/2015	Horton, John
180	4/30/2015	Hoyt, Pelah
181	4/30/2015	Hudson, Jen
182	4/30/2015	Juel, Jeff
183	4/30/2015	Johnson, Chris
184	4/30/2015	Krelick, Jake
185	4/30/2015	Lousen, Kenneth
186	4/30/2015	Lund, Roger
187	4/30/2015	Malek, Sue
188	4/30/2015	Mikesell, Tracy
189	4/30/2015	Narcisco, Claudia
190	4/30/2015	O'Herron, Mike
191	4/30/2015	Olson, Doug
192	4/30/2015	Peterson, Cindy
193	4/30/2015	Potts, Rick
194	4/30/2015	Pukis, Rick
195	4/30/2015	Rossbach, Bill

196	4/30/2015	Schmitt, Glen
197	4/30/2015	Sigrist, Ellie
198	4/30/2015	Snodgrass, Will
199	4/30/2015	Stangl, Marjorie
200	4/30/2015	Susman, Sahra
201	4/30/2015	Tutskey, Bob
202	4/30/2015	Vander Meer, Mark
203	4/30/2015	Von Lossberg, Bryan
204	4/30/2015	Webster, Joel
205	4/30/2015	Wiener, Jason
206	4/30/2015	Wilson, Carlan
207	4/30/2015	Wilson, Bob

COMPLIANCE WITH LAWS AND REGULATIONS FOR RNRA

1. "The legislation that established the Wilderness and the NRA expressly forbids commercial activities in either…" (54, 1)

FS Response: The Rattlesnake National Recreation Area and Wilderness (RNRAW) was established by law on October 19, 1980 (PL 96-476). This law provides no management direction for the NRA other than speaking to land acquisition and exchange, coal lease and bidding rights, and water rights (Project File, Item N-1). It states that the RNRA be designated for high value municipal watershed, recreation, wildlife habitat, and ecological and educational purposes. The Marshall Woods project maintains all five values identified in PL 96-476. On all federal lands on the Lolo NF we look to the Forest Plan to guide our management activities, and it specifically outlines goals and standards for responsible stewardship including the RNRA. No activities are proposed in the Rattlesnake Wilderness area.

2. The commercial thinning in units 2, 3, 4, 5, and 6 appears to conflict with at least four standards for Management Area 28 (essentially the Rattlesnake National Recreation Area) in the Lolo National Forest Management Plan:

   Standard 3: Tree removal will be limited to that required to eliminate safety hazards or permit construction or expansion of facilities. The management area is classified as unsuitable for timber production.

   Standard 13: Areas will be evaluated periodically for significant insect and disease problems such as mountain pine beetle. Buildups of minor insects and most disease agents do not normally pose threats to adjacent lands and effects of these will be accepted as naturally occurring phenomena.

   Standard 15: Timber removal will be limited to that needed to maintain and improve recreation values,

   Standard 36: The existing roads will be maintained to their present standards with maintenance emphasis on reducing mud holes and improving drainage. (95, 1; 98, 1; 189, 2; 157, 8; 157, 11; 162, 5)

FS RESPONSE: The Marshall Woods project complies with Standard 3. Tree removal within the RNRA in Alternatives B and C is, in part, designed to provide for firefighter and public safety. Firefighter efficiency and safety is measured as the ability to initial attack a fire with direct attack suppression tactics during typical fire season weather patterns and fuel conditions (EA p. 129). Direct attack success is generally higher with flame lengths less than four feet in height allowing firefighters a greater margin for safety (EA p. 129). Alternatives B and C reduce flame lengths and reduce the potential for high severity fire in the RNRA (EA

p. 143). "Tree removal will occur to eliminate safety hazards (around parking areas) and reduce the chance of wildfire and bark beetle infestations both of which would result in multiple hazard trees (dead standing trees) throughout the RNRA, portions of Woods Gulch not in the RNRA, and Marshall Canyon if left untreated" (Recreation Specialist's Report p. 54).

Regarding Standard 13, the field assessment conducted for the Marshall Woods project constitutes the periodic evaluation for significant insect and disease problems such as mountain pine beetle. Mountain pine beetle is the most aggressive bark beetle in the West (EA p. 92). Refer to the Forested Vegetation Specialist's Report pp. 16-18, EA pp. 92-94, and Project File Items M5-7, M5-10, M5-11, M5-12, M5-13, and M5-14 for current insect hazard and risk. In 2009, mountain pine beetle mortality was spread across 27% of the analysis area. An increase of 85% had occurred from 2008. Although infestation has recently decreased, it is expected to increase without active management (EA p. 93). Efforts to protect high value trees near recreation facilities have recently been implemented (carbaryl insecticide) with public approval (EA pp. 93 and 285). Studies have shown the public supports response to active infestations but does not generally support preventative measures (EA p. 285). All stands in the project area are highly susceptible (EA p. 94).

The Marshall Wood project complies with Standard 15. Outdoor recreation is considered a high value for the Missoula community (Recreation Specialist's Report p. 55). The Marshall Woods project area currently has a high existing scenic integrity (EA p. 290). The main impacts to the recreation values of the area stem from recreation use, noxious weeds and past suppression of fires which has led to a high risk for wildfire impacts and shift of natural forest conditions towards overstocked stands at high risk to insects and disease (EA pp. 13, 16, 86 to 96, and 268). Timber removal along with prescribed fire treatments would increase forest resilience, resistance to disease and insects, improve forest function to accommodate fire, insects disease and climate change, maintain species composition and structure of the forest including large trees that are viewed by the public while recreating in the area (EA pp. 97 to 125). The project would maintain the high scenic integrity of the area that is associated with an intact and functioning forest. "The effects from the other treatment units would be short-term and recover within 1 to 5 years of project implementation. These treatments would reduce the risk of disease, insect infestation, and high severity wildfire while increasing vegetation diversity, which would increase sustainability and have some beneficial long-term impacts to the visual quality of the landscape. Other proposed restoration activities would have some minor impacts to scenery but would be beneficial in the long term" (Scenery Specialist's Report p. 21).

Regarding Standard 36, "Maintenance and BMP work will be performed on the first 3.7 miles of the main Rattlesnake corridor road 99/Trail 515 and includes:..." (EA pp. 27-28). "This work is needed regardless of any possible timber haul activities included in the Marshall Woods project and is categorized as routine maintenance" (EA p. 28). Also see response to comment #3 below.

3. Regarding standard 36, the proposed action appears to include upgrades of Trail 515/Road 99 that go well beyond maintaining the trail/road to its present standard and "reducing mud holes and improving drainage." The chapter recognizes the need to protect existing infrastructure, such as the bridge at Spring Gulch. However, smoothing the road/trail as proposed does not appear to be required for administrative vehicular access by the Forest Service and Mountain Water Co. (95, 2; 98, 2)

FS Response: As described in the EA on pp. 27 and 28, the work proposed on Road 99/Trail 515 is road maintenance and best management practices (BMP) application, and it is included in all alternatives (including the No Action). EA p. 27 also discusses Alternative N, which was considered but not in detail stating, "This alternative was created in response to a comment that expressed the desire to leave Road 99/Trail 515 "as is", and it does not include any road maintenance or BMP work as is included in Alternatives A, B, C, and D. This alternative was considered, but not in detail because road maintenance is necessary to prevent damage to facilities, maintain safety, and to preclude adverse impacts to resources. The Forest Service conducts routine road maintenance activities based on prioritization and available funding. Road99/Trail515 is within a priority watershed and routine maintenance is necessary." The Recreation Specialist's Report identifies impacts of the road improvements on page 24 and the cumulative impacts of the road improvements on page 25 (pp. 276 – 277 of the EA).

4. The 'Congressional Report 'language (designating the Rattlesnake NRA) clearly states that the area is 'unsuitable for timber harvest' and the Lolo Forest Plan standard clearly states that the area is 'unsuitable for timber production. (194; 189, 3; 162, 4)

FS Response: A discussion on suitability is located in the Project File, Item M5-48: "Identification of lands generally suitable for timber harvest and timber production is made at the land management plan level (36 CFR 219.11(a)(2)). Timber harvest on lands not suitable for timber production can occur for purposes other than timber production throughout the plan area, or portions of the plan area, as a tool to assist in achieving or maintaining one or more applicable desired conditions or objectives of the plan in order to protect other multiple-use values, and for salvage, sanitation, or public health or safety. Examples of using timber harvest to protect other multiple use values may include improving wildlife or fish habitat, thinning to reduce fire risk, or restoring meadow or savanna ecosystems where trees have invaded (36 CFR 219.11(c)). This project is consistent with 16 USC 1604 (k) and 36 CFR 219.11 the implementing regulations of the National Forest Management Act of 1976."

There is no specific wording in the Act establishing the RNRA that prohibits the cutting or removal of trees. The RNRA and Wilderness were both established on October 19, 1980 by Public Law 96-476 (Recreation Specialist's Report, p. 5). Section 1(a) of the Act differentiates Wilderness from the NRA and qualifies that the NRA, while not predominately

of wilderness quality, has high value for municipal watershed, recreation, wildlife habitat, and ecological and educational purposes. Section 2 of the Act summarizes designation and management of the Rattlesnake Wilderness Area in accordance with the provisions of the Wilderness Act (Recreation Specialist's Report, p. 6). Section 3 designates the RNRA based on an October 1, 1980 date but provides no further description. Forest Service directives in the Forest Service Manual 2370 (Recreation Specialist's Report, pp. 5-6) provide the latitude for how the NRA is to be managed to the Forest Service through its Forest Plan or in a comprehensive management plan that gives specific management direction for all resource values within the area (this is Appendix O-4 of the Forest Plan).

Management Area 28 is not considered as suitable forest land in the Lolo Forest Plan. Suitable land is defined as Forest land for which technology is available that will ensure timber production without irreversible resource damage, that can be restocked, and for which there is management direction that timber production is an appropriate use (Forest Plan pg.VII-43). Timber production refers to purposeful growing, tending, harvesting, and regeneration of rotational crops of trees to be put for industrial or consumer use (Forest Plan pg. VII-41). In the Forest Plan timber production does not include production of fuelwood or harvest of unsuitable lands (such as in the case of the proposed treatments in Alternatives B and C). Timber harvest on lands not suitable for timber production can occur when harvest is necessary or appropriate for other multiple use purposes and to achieve the desired vegetation conditions (16 U.S.C. 1604(k), 36 CFR 219.12(a)(2)(D)(ii)). This is consistent with 16 U.S.C. 1604(k) and 36 CFR 219.12(a)(2)(D)(ii) the implementing regulations of the NFMA of 1976.

5. "The EA's description of the Regulatory Framework (page 126) contains no discussion of the Rattlesnake National Recreation and Wilderness Act or the specific management standards for the area contained in the Forest Plan." (162, 3)

FS Response: This comment regarding EA page 126 is referring to the regulatory framework for fire and fuels. As was noted in the EA Summary, the EA is a concise summary and the full specialist's reports are posted on the Lolo NF's website (Marshall Woods EA). The complete regulatory framework for the Fire and Fuels section of the EA is included in the Fire and Fuels Specialist's Report which includes the direction for the RNRA (pp. 5 – 6). The regulatory framework for the Recreation section of the EA is included in the Recreation Specialist's Report (pp. 5 – 15). Similarly the regulatory framework for other resource areas regarding the RNRAW can be found in the other resource specialist reports.

6. Alternative B does not comply with "MA28 Standard 27 states: "Programs will not entail site modification or the construction of facilities that would violate the natural appearance of the area." (162, 6)

FS Response: None of the alternatives propose construction of facilities. The analysis of impacts on visual resources (visual quality) determined the need for a Forest Plan

amendment. This is acknowledged on pp. 32 – 33 of the EA and pp. 21-22 of the Scenery Resources Specialist's Report.

7. "…a long-established process for the RNRAW through the Limits of Acceptable Change (LAC) has been brushed aside. For example, the EA at page 288 states the LAC standard for clearance on Trail 515 will be violated, unilaterally raising it 10 feet to 14 feet to accommodate log trucks. Brushing and removal of mature trees to accommodate these trucks is also envisioned." (162, 7)

FS Response: The fact that the LAC standard for clearance on Trail 515 would be violated in Alternative B is acknowledged on p. 288 of the EA. EA p. 276 discusses that road "upgrades"…such as the brushing…"would be noticeable to the recreating public but would more than likely be favorable to the recreational experience…brushing would allow a greater line of sight and width for passing, especially in congested areas…improvements would result in minor to moderate, short-term negative impacts during the implementation phase; however the improvements would last beyond a single recreation use period and would eventually have long-term beneficial impacts to recreational users and their experience."

8. Prior to 2011 "commercial logging and road building was understood and applied as not allowed in the RNRA. Please disclose your rationale for this abrupt change in the interpretation that commercial logging is now allowed in the RNRA…RNRAW Issues and Concerns page 8 Item N VEGETATION…does not mention commercial logging or log removal." (153, 3 and 15)

FS Response: **See response to comment #s 2, 4 and 5. The management of the RNRA has not changed since its inception citing wording of LAC and Forest Plan. Additionally in 1997, the Sawmill Fuels project was implemented which included 79 acres of commercial harvest in the RNRA (Project File, Item N-15).**

9. "Please disclose the date and comments your Regional NRA Manager had on the MW EA and recreation analysis in relation to the LNF Plan MA 28 and LAC standards and your response to those comments. Please include the LNF and Regional NRA specialists tenure in that job, Grade level, their professional recreation education and professional experience in NRA management. If you overlooked that review, why?" (153, 4)

FS Response: There is no specific direction requiring consultation with the Regional Office. Forest Service Manual (FSM) 2370 assigns the responsibilities for the management of a NRA. The FSM does not require the Forest to consult with a Regional Manager or define tenure, grade, or the professional recreation education and experience of personnel in NRA management. In addition, there is no one specifically assigned as a Regional NRA Manager in Region One.

10. "The 1986 LNF Plan page i, lists all the LNF Plan Management Areas (MAs) and says whether roads are allowed in that MA. Under MA 28, for roads, it says "no". Road building in MW EA alternatives B and C violate that "no" roads statement in the LNF Plan…RNRAW Issues and Concerns page 6 Item L. ROADS AND TRAILS…includes no mention of new road construction either permanent or temporary…because they were not allowed in the RNRA (LNF Plan page i)." (153, 7 and 14)

FS Response: The page that the commenter is referring to is not a page in the Lolo NF Forest Plan (1986); it is a document that was written in May, 1987 to provide employees with a quick reference to be used when initially considering activities within a management area. This "quick reference" does not replace or in any way contradict the contents of the Forest Plan which provides a more thorough explanation of the standards of the management areas. The Forest Plan as amended by the Limits of Acceptable Change-based Management Direction do not state that road construction is prohibited. MA 28 Standard 14 states, "Road access may be provided to meet administrative, recreation, and education objectives." The actions proposed in the Marshall Woods project are administrative intended to maintain restore vegetation and address fuels. In addition the roads proposed to accomplish these objectives are temporary and would be removed from the landscape following use.

11. "MA 28 Standard 15 says: Timber removal will be limited to that needed to maintain and improve recreation values. The commercial logging and road building in MW alternatives B and C does not improve recreation values. The MW recreation report says outdoor recreation is considered a high value for the Missoula community, but how does that relate to commercial logging and road building in the RNRA? Has the Missoula community told you that you have to log and build roads in the RNRA to maintain or improve recreation values in the RNRA?" (153, 9)

FS Response: In June of 2014, the City of Missoula initiated a comprehensive study to develop a growth policy for the City known as the OUR MISSOULA project. They conducted 30 Listening Session which interviewed multiple sectors of the Missoula community to address economic development to social services and considered other topics like art and culture as well as aging needs (Project File, Item O-414). All the groups identified outdoor recreation as an important part of the Missoula lifestyle (Recreation Specialist's Report, p. 22). While commercial logging and temporary road building is not specifically stated as a value, the indirect result of improving the ecological integrity to ensure future generations can enjoy the benefits of outdoor recreation as experienced today could be considered an implied aspiration of the community (in general). Additionally, refer to response to comment #22 which summarizes the public involvement conducted for the Marshall Woods project.

12. "MA 28 Standard 39 says The Homestead Meadows will be treated by burning, hand-piling, and/or cutting to remove invading trees and noxious weeds to retain the typical cleared homestead appearance"...Previously…"we only hand cut and hand piled encroaching trees

in Strawberry Meadows. The meaning of this standard from 1991 to 2011 had already been decided and implemented in the RNRA. If commercial logging was allowed, we would have logged Strawberry Meadows and the adjacent hillsides when we did the tree encroachment cutting project there. What has changed in relation to application of this standard since 2011?" (153, 12)

FS Response: As is stated on EA p. 12, that interpretation of the standard was implemented through the Rattlesnake NRA Wildlife Habitat Improvement and Ecosystem Maintenance Burning Decision Notice (1997). As discussed in the Forested Vegetation Specialist's Report p. 41 and EA pp. 38-39 and 119, all action alternatives (B-D) propose the same meadow and aspen restoration treatments "along the main Rattlesnake Trail and in the Poe Meadows area (Units 100A and 100B). Tree encroachment is converting these homestead meadows into forested areas and resulting in the decline of small aspen groves. To maintain meadows and aspen, the proposal would reduce or remove conifer encroachment. Trees would be cut and left on site. The slash would be treated by lopping and scattering, hand piling and burning, and/or chipping. Where aspen are present, parent trees would be retained and surrounding conifers would be felled to provide sufficient light to stimulate aspen regeneration. Felled trees would be jack-strawed around aspen clumps to reduce browsing pressure on regenerating sprouts. Light jackpot burning and construction and maintenance of small exclosures may also occur to stimulate suckering and protect young aspen trees from big game browsing. Integrated weed treatments would continue in these areas." Page 36 of LAC allows the manager to "select which management action(s) will be taken on site specific review of the degree and circumstances…"

13. "MA 28 Standard 40 says The ponderosa pine flat between Spring Creek and Poe Meadow bordered by Strawberry Ridge and Rattlesnake Creek will be treated by cutting and/or prescribed fire to encourage a mosaic of old-growth pine with interspersed openings and thickets…If "cutting" meant commercial logging, the standard should have said treated logging or commercial timber cutting or log removal. Cutting doesn't mean commercial logging. Why would this standard have been written to allow commercial logging but not plainly and transparently state that?" (153, 13)

FS Response: The Marshall Woods EA considered a range of alternatives which conducts the needed treatments using either non-commercial and commercial treatments. Through analysis, we found that the alternatives which use only non-commercial treatments are not as effective as the commercial treatments and only partially achieve the objectives for fuels and stand health. Tree cutting is not defined by the Forest Plan. It is also not defined by the LAC. Page 36 of LAC allows the manager to "select which management action(s) will be taken on site specific review of the degree and circumstances…"

14. "Area-Wide Policies LAC Direction page 15 states in the area wide policy about vegetation treatment direction for the Homestead Meadows and the Flat between Spring Creek and Poe Meadows, "direction" means a vegetation management prescription consistent with the

RS Act and other LNF Plan and LAC standards. Any such direction couldn't over ride other LNF Plan or LAC standards unless that objective clearly stated in the MW EA, conducted with transparent public involvement that that's your objective and included as a decision to be made in the MW analysis. This objective isn't included in the MW EA or four objectives of the MW project. If implementing this area wide policy was one of the objectives of the MW project, why wasn't that clearly and transparently stated as one of the objectives of the MW analysis in the EA?...Also note that site specific analysis according to the LAC Direction (which is part of the LNF Plan) would apply only to the Homestead Meadows and the Flat between Spring Creek and Poe Meadows, not any other Opportunity Classes or geographic areas of the RNRA." (153, 16)

FS Response: **Under FIRE AND LADDER FUELS (Appendix O-4 of the Forest Plan (LAC) p. 30) the vegetation treatments are extended to OC 3, 4, 5, and 6 where tree cutting will be allowed to reduce high hazard ladder fuels and to facilitate prescribed burning (Table V- 1, p. 30 of the LAC). The "Area-wide Policies" on p. 15 of the LAC (Appendix O-4) states, "vegetation treatment direction for Homestead meadows and the flat between Spring Creek and Poe Meadows will be determined through future site specific analysis with public involvement". The Marshall Woods EA is a site-specific analysis with public involvement as is summarized in the response to comment #22. The LAC standards allow us to complete risk surveys before setting standards. They also allow us to compare composition. Even though a veg standard was not set, page 36 allows the manager to determine what management actions are needed.**

15. "LAC Direction page 36: MANAGEMENT ACTIONS FOR THE PREFERRED ALTERNATIVE Table VIII-1 lists recommended management actions and states that generally management strategies that are least intrusive will be implemented first. You haven't tried "least intrusive" management actions such as those included in MW Alternative D OR other suggestions for less obtrusive management actions." (153, 17)

FS Response: **As included in the FAQs p. 6, "The proposed action, Alternative B, was designed to increase resilience of vegetative communities and decrease high intensity wildfire potential, and enhance firefighter efficiency and safety within the wildland urban interface. The Rattlesnake was identified as the second highest wildfire risk in the Missoula County Community Wildfire Protection Plan. The 225 acres proposed for commercial harvest along the main Rattlesnake corridor are the most at-risk areas to stand-replacing wildfire…Alternative B was designed to reduce highly hazardous conditions…all treatments were designed to employ the lightest-touch approach to effectively meet the purpose and need of the project. For example, if hand thinning or prescribed burning alone would effectively reduce the hazard, that is the treatment proposed in Alternative B. Within Units 2 and 3, the trees are simply too large and stand conditions too dense to effectively reduce the extreme hazard in the area without the use of machinery" (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11). Also refer to response to comment #97.**

In addition, page 36 of the LAC allows for managerial discretion. In this case, we have conducted an analysis to determine needs. We have offered different approaches to achieving those needs with our alternatives. The Line Officer has the discretion to skip over the less intrusive actions if they feel that they would not be effective based on past experience and knowledge, or the Line Officer can select the less intrusive alternative that does not do commercial harvest at this time.

GENERAL COMMENTS ABOUT THE NEPA PROCESS

16. …"this predecisional EA is not based on best available science." (22, 1)

FS Response: A decision has not been made. Various alternatives were developed to compare different approaches to meeting the projects purpose and need, therefore it is not predecisional. The scientific methodology that was used in the analysis is discussed in the methodology sections of each specialist's report and the literature used is listed in EA Appendix B. The ID Team also reviewed the literature submitted and/or cited by the commenters.

17. "…please post your responses to public comments on line as well as maintaining a hard copy in the Project File." (22, 4)

FS Response: The response to public comment will be included as an appendix to the DRAFT Decision Notice, which will be posted on-line as has been our standard practice for many years.

18. "Please analyze in detail an alternative that does not construct or re-construct any new roads." (22, 8)

FS Response: Alternatives A and D, both analyzed in detail, do not include any temporary road construction.

19. "…you propose to amend your forest plan to allow you to commercially log a portion of the Rattlesnake NRA. This will violate your forest plan scenery standards." (22, 9)

FS Response: As discussed on EA pp. 32-33, Alternatives B and C would require a Forest Plan amendment for visual quality standards; however long term scenery objectives would be met and improved upon as stated in Scenery Specialist's Report and EA. The Forest Plan allows for site specific amendments to achieve management objectives.

20. The environmental effects disclosures are flawed…"each IDT member still has time to modify the text they authored." (37)

FS Response: The commenter fails to demonstrate how the effects analysis is insufficient and therefore no supporting reasons are raised for the Responsible Official to consider.

21. The comment period needs to be extended. (41)

FS Response: The comment period was extended from its original end date of April 6 to April 30, 2015; this extension along with the early posting of the EA on the Lolo NF website (February 25) provided a comment period of 61 days which is two times longer than the regulations require (36 C.F.R. 218.24 (b)(4)).

22. "…there has been a lack of public engagement on this project." (52, 2)

FS Response: The following summarizes the public involvement and collaboration efforts for the Marshall Woods project (EA p. 24 and supplemented by activities following the EA's release):

- **Selected for restoration activities by the Lolo Restoration Committee (LRC) in 2008. Purpose and Need was developed collaboratively with the LRC.**
- **Missoula District and LRC jointly hosted two pre-scoping open houses on February 3 and 24, 2010. News releases were sent to the Missoulian on January 25 and February 16, 2010 (Project File, Items B-4 and 11). Notification was sent to 1,724 residences including 664 homes in the Fox Farm, Lincoln Hills, and Rattlesnake Drive areas; 410 residences in the Upper Rattlesnake; and, 650 homes mostly located up Duncan Drive (Project File, Items B-12 and 13). Approximately 61 people attended (Project File, Items B-8 and 15).**
- **An article about the project was published in the Missoulian on February 2, 2010 which included notification of the open house February 3 (Project File, Item B-3).**
- **Missoula District and LRC jointly hosted two public field trips on August 3 and 5, 2010. A news release was sent to the Missoulian on July 30, 2010 (Project File, Item B-31). Notification was sent to 145 individuals/groups who had expressed interest in the project or projects of this type (Project File, Items B-25 and 27-30). Approximately 40 people attended (Project File, Items B-34 and 37).**
- **Informational material with descriptions of the proposed treatments including before and after photos along with how to be involved in the project planning was posted at the Rattlesnake Trailhead and at proposed Units 2 and 3 and 4-6 in September 2010 (Project File, Items C-6-8). As discussed in the Recreation Specialist's Report (p. 16) the estimated traffic count along the main corridor in September 2010 was approx. 6,536 counts suggesting this information could have been widely viewed.**
- **Scoping letter was sent to 91 individuals/groups who had expressed interest in the project or projects of this type on August 23, 2010 (Project File, Items C-1-4). The Forest received 39 scoping comments (Project File, Items D-1-45).**
- **The Missoulian published a front page article on its Sunday edition about the proposed project on September 12, 2010 (Project File, Item C-9).**

- **A webpage dedicated solely to the Marshall Woods project went live on January 20, 2015.**
- **The EA was posted on-line (i.e., a "soft-release") on February 25, 2015; notification was sent to 35 individuals/groups who had expressed interest in the project and provided their contact information (Project File, Items E-3-6).**
- **EA comment period was March 6 – April 6, 2015; an extension was granted until April 30 making the EA available for study by reviewers for more than twice as long as the regulations require (Project File, Item E-25)**
- **Informational materials about the project and EA comment period were posted at the Rattlesnake Main Trailhead, Rattlesnake Horse Trailhead, Sawmill Gulch Trailhead and Woods Gulch Trailhead on March 17, 2015 (Project File, Items E-15 and 17).**
- **Articles were published in the Missoulian on March 15 and 19, 2015 (Project File, Items E-14 and 22).**
- **Public Meeting was held March 18, 2016. Notification sent to 35 individuals/group who had expressed interest in the project and provided their email addresses. The meeting was attended by approx. 70 people (Project File, Item E-21).**
- **Numerous meetings and presentations including LRC, Conservation Lands Advisory Council, Audubon Society, Missoula Nordic Club, Missoula Mayor's Office and Ward 1 Aldermen, Mountain Bike Missoula, City Parks and Recreation Committee, Backcountry Horsemen, Society of American Foresters, and Missoula Fire Protection Association, Montana Wilderness Association, and Air Quality Board (Project File, Item E-41).**
- **News Release announcing comment period extension was sent on April 2, 2015 (Project File, Item E-25).**
- **News Release announcing public field trips was sent on April 8, 2015 (Project File, Item E-28).**
- **Radio interview (KGVO) by team leader discussing the project occurred on April 9, 2015.**
- **Pubic Field Trips on April 14 and 18, 2015. Approximately 41 people attended (Project File, Items E-33 and 35).**

23. The FS "should make a better public relations effort in stressing that the point of the project isn't logging, but habitat improvement and fire reduction." (186)

FS Response: Please see response to comment #22 above.

24. "Why is the project area so large?...The proposed logging makes sense in Marshall Canyon and especially on section 31…so why does the project boundary include the main Rattlesnake Creek and all the private lands all the way down to I-90?" (74, 2; 147, 4)

FS Response: At each project's initiation, the ID Team delineates an adequate, logical boundary for their analyses. The project area boundary encompasses all proposed

activities. The boundary may be expanded to allow for consideration of effects of the project on various resources including fish, wildlife, water, fire, and human uses. For the Marshall Woods project, the project boundary was developed to allow for the assessment of the cumulative effects of the project on the NRA, watersheds, wildlife habitat, etc. The EA specifically displays the effects of the project on the NRA. Analysis is also conducted to display the effects on individual resources.

25. "The Project Boundary Includes Areas of Land Not Included in the Project…The project boundary includes more than 1,000 acres of City of Missoula Open Space lands...The project boundary also includes the lower Rattlesnake residential area, miles away from the project's treatment units…The actual treatment units, when summed, are less than 5,000 acres. Artificially expanding the project area boundary also skews the figures presented for how much of the project area is within the NRA. NEPA requires a clear and understandable analysis for public review and comment and manipulation of numbers does not comply." (162, 14)

FS Response: Please see response to comment #24 above. The EA (p.12) is also clear regarding how the acreages are divided amongst ownerships.

26. "Stated objectives, third bullet, p. 18—Instead of providing '…education opportunities to build support for restoration,' why not provide '…education opportunities to build support for increasing the level of home safety so that when the inevitable fire does burn in the Rattlesnake, we can then celebrate the natural role of mixed-severity fire in a system born and maintained by such fire?'" (124, 7)

FS Response: As discussed on EA pp. 23-24, the purpose and need and project objectives were developed through working with the LRC. EA p. 126 discusses how representative stakeholders are working together across various lands and jurisdictions to create fire-adapted communities.

27. "Regarding the EA document itself, I was particularly aware that the map of the alternatives (pages 82, 83 and 84) did not show slope gradients… Also helpful would be a glossary of terms and acronyms." (136, 3)

FS Response: Thank you for your careful examination of the analysis. Generally it is cost-prohibitive to include maps addressing every feature of the landscape; however, the ID Team's analysis includes using numerous maps and spatial tools (e.g., GIS). As a practice, additional information can be requested by the public, and it is typically posted on the Lolo NF's website for public viewing. Regarding including a glossary, terms are defined and acronyms spelt out the first time they are used in the text; it then becomes the reader's responsibility to remember them through subsequent text. Searchable electronic versions of planning documents, such as the Marshall Woods EA, are posted on the Lolo's website and/or available on CD and can aid the reader in searching for specific text.

28. "Politically and historically, the "do nothing" or "do as little as possible" strategy for managing forest health is quite frequently the most popular one -- it offers many in the public the satisfaction of having stopped another misguided attack on a beloved resource, and it offers managers a welcome respite from criticism and ultimately, litigation. But as landscapes like the Marshall-Woods and NRA are unaware of how they've been classified by man (as "NRA", vs." federal forest", "wilderness, "national park", "city or county open space", etc.), their ecosystem dynamics trundle along over time pretty much subject to the larger forces of climate, thousand year old fire regimes and fire ecology, and pathogen population dynamics they share with any similar region. As we legitimately set certain areas --like the NRA -- aside for particular purposes, we still have to recognize and respond to these natural ecosystem dynamics…" (175, 1)

FS Response: The project analyzes a range of proposed activities through the four alternatives ranging from doing nothing to doing little to taking more aggressive management actions. The EA displays the effects of past management and natural processes and the outcomes of this past as the existing situation. The project is designed to respond to these past events and restore and maintain conditions which respond to both natural and human needs.

29. "…the boundary should be expanded to include the area in area just north of the Mountain Water Co. pond (sec. 2), Sawmill and Spring Gulches. These areas lay to the west of many rattlesnake residences and given prevailing winds the lack of treatment on a portion of these lands, contributes significant wildfire risk to residences in the Rattlesnake." (147, 3; 147, 25)

FS Response: Please see the response to comment #24 above.

30. The objectives in the purpose and need statements in the EA should be re-worded to better tie to management direction and provide clarification. (147, 5)

FS Response: Please see response to comment #26 above.

31. "I suggest analysis of alternative C & D units requiring the cutting, piling and burning of the larger trees, resulting in the same prescription as alternative B should be displayed. As surfaced in the field tours, many people do not know why that is so difficult and costly and the EA does not address this alternative. The effects should show how much CO2 and methane would be released, the tons of particulate matter released, the added invasive weed treatment that would be necessary as the large piles of slash would scorch a much larger area of soil, the large piles would likely scorch and kill some of the larger trees that were left and display the additional cost that would be involved to achieve the desired condition." (147, 6)

FS Response: While this would be interesting to display, the alternatives were developed in response to the issues brought forward during scoping in 2010. Since this was not suggested at that time, it was not included in any alternatives, and will not be addressed in this analysis. In addition, this range of effects was already displayed in Alternative B. Also see responses to comment #s 103 and 104.

32. "…the map legend shows two shades of yellow for land ownership as BLM and Plum Creek. These are very hard to differentiate. Also I believe all the former PCTC land on the maps are now TNC. Also the Missoula Co open space lands on Mt Jumbo and the North Hills are in yellow and that ownership is not in the legend." (147, 7)

FS Response: Thank you for your comment. The BLM and Plum Creek colors in the legend are an error; there is no BLM or Plum Creek ownership in the vicinity of the project. We will correct this on subsequent maps. The Missoula County Open space lands that show up as a yellowish-tan are in the legend near the top.

33. "...if the Forest Service intends to implement Alternative B or its chief components, it must prepare a Full Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). The Forest Service would also be required to conduct a full-scale watershed effects analysis pursuant to INFISH. Due to the complexity of the issues, the high level of controversy, the threatened resources at stake, and reasonably foreseeable cumulative effects, NEPA requires preparation of a full EIS." (162, 1)

FS Response: As stated on EA p. 10, "the purpose of the Environmental Assessment is to comply with the National Environmental Policy Act (NEPA) and to provide sufficient evidence, analysis and basic conclusions for the Deciding Officer to determine whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI)". Also, please see the response to comment # 133.

34. "The Forest Service Has Done a Poor Job on Public Process, Unilaterally Departed the Collaborative Process and Has Undermined Public Trust… The Lolo Restoration Committee has been the collaborative partner on this project for several years…there were several commercial units proposed within the Rattlesnake NRA outside of the main corridor and on the Woods Gulch side of the project area that surprised at least some members of the LRC. This was also the first time that temporary road building in the NRA was proposed." (162, 8)

FS Response: The commercial units within the NRA outside of the main corridor on the Woods Gulch side of the project area as well as the temporary roads proposed there have been a part of the Proposed Action (Alternative B) since the project was scoped in August 2010. Anyone with internet access can verify this by going to the Lolo NF NEPA Projects Webpage and looking at the scoping letter (http://www.fs.usda.gov/project/?project=31552). The LRC jointly hosted and presented at the public meetings with the Lolo NF when this

project was scoped; the Proposed Action was presented to the public. Furthermore, as a result of scoping, the LRC submitted comments suggesting Alternative C which also includes the commercial units within the NRA outside of the main corridor on the Woods Gulch side of the project area as well as the temporary roads proposed there (Project File Item C-42). Also refer to response to comment #22.

35. "There are several aspects of the NEPA process which have been inadequate. There was a sudden notification to the broader public since the Forest Service only did a large mailing to residents in the very northern edge of Missoula within the Rattlesnake drainage." (162, 9)

FS Response: Please see response to comment #22 above.

36. "There is also the issue of a perceived 'pre-decisional bias' that is prohibited by NEPA. At the March 18th public meeting, the Lolo Restoration Committee was not allowed to speak as previously agreed to. No alternative viewpoints were presented and only maps of Alternative B, the Proposed Action, were made available to the public and they were the wall maps that were shown as well...Now the Forest Service is claiming it has no preferred alternative (District Ranger Jen Hensiek, field trips). NEPA requires that an EA or EIS contain a reasonable range of alternatives including a clearly identified preferred alternative." (162, 10)

FS Response: Alternative B was presented at the public meeting because it includes the greatest extent of activities, and it was explained that Alternatives C and D include sub-sets of these activities (Project File Item E-20). The Forest Service has never identified a "preferred alternative" for the Marshall Woods project. Furthermore the identification of a preferred alternative for an EA is not required (FSH 1909.15(16)).

37. "…the Forest Service did not adequately incorporate many scoping comments in its preferred alternative, rendering Alternative B non-responsive to the public comment." (162, 11)

FS Response: The Forest Service does not have a "preferred alternative". As described on EA p. 25, "Based on comments received during scoping, preliminary issues were identified as well as potential effects that might result from implementing the proposal. Further analysis and project development addressed comments either by developing project design criteria and resource protection measures to avoid, offset, or reduce any potential effects of the project; developing and evaluating alternatives; incorporating the comment into the analysis to check and confirm that no significant effects would be caused by the treatments; or explaining why the comments did not warrant further agency response…A content analysis of the comments and the disposition or summary of the analysis of those comments is located in Appendix C."

38. "We are glad that the Forest Service has made a 'decision' to treat <Section 31> like the RNRA, so we suggest the agency follow further its values by including a forest plan amendment "Decision" with this project, to administratively set the management of this area identical to the RNRA." (182, 5)

FS Response: The majority of Section 31, except a very small piece in the SE corner which is MA 23 (winter range), has already been designated as Forest Plan MA 28. While the area is being managed as such, Congress has not acted upon this by amending the boundary of the NRA.

39. "Thank you for making the alternative maps larger than the standard 8 ½" x 11". Unfortunately, the Forest Service made those maps hard to read. The symbols in the key for the various treatments are so small it's almost impossible to find their corresponding locations on the map. The same with the linear features such as roads. They're all so small you can hardly discern the color…It would also be useful to show the location of the RNRA on at least one map in the EA." (182, 38)

FS Response: Please note that on EA p. 27, the reader is directed to the Lolo NF's website for "larger, easier to view maps on-line". The RNA boundary is shown on Figure 1 (EA, p. 11).

40. "We incorporate our September 23, 2010 scoping comments within these EA comments, since they raise many issues that this EA fails to address. They are included in the Appendix of these comments, so please respond to them." (182, 39)

FS Response: Please see EA Appendix C – Marshall Woods Project Comment Tracking and Issue Analysis. All scoping comments were responded to. Also see response to comment #37 above.

41. "Please disclose: 1) why the MW recreation specialist representation was reduced / downgraded in and after 2011 2) why the next most experienced recreation specialist on the MRD was not assigned to the MW IDT in and after 2011 to emphasize the importance of the recreation resource in the RNRA 3) how the current MW recreation specialist compares to other MW IDT members in relation to experience and education in their respective specialties and grade and 4) why the new recreation specialist was put under the direct supervision and control of the most vocal commercial timber harvesting proponent on the MW IDT." (153, 5)

FS Response: Commonly, and the Forest Service is no exception, organizational structure continually changes and adapts. Retirements, resignations, and employee transfers provide excellent opportunities to re-evaluate organizational structure. Forest Service ID Team formation is directed by FSH 1909.15 which requires that the "team has the expertise to identify and to evaluate the potential direct, indirect, and cumulative social, economic, physical and biological effects of the proposed action and its alternatives." At the individual

team level, the Responsible Official is responsible for ensuring the team includes the necessary skill mix to complete an adequate analysis. The background and credentials of the Marshall Woods ID Team are briefly summarized in EA Appendix A. It should also be noted that Appendix A includes the "core" team of preparers; input and review was provided by other employees as is per usual in the interdisciplinary team setting (FSH 1909.15.12.2).

42. "How can you propose a project as controversial, divisive and as large as this in the only NRA in the Region and have NO OBJECTIVES or purpose and need that support or even mention recreation values anywhere in the RNRA? (EA summary at page 9). Since this is the only NRA in the Region, why isn't maintaining and improving recreation values the primary or even a stated objective or purpose and need of the MW project throughout the NRA where commercial logging and road building are proposed? (EA summary at page 9). Why is the only recreation related objective in the MW project limited to "diverse trail-based recreation opportunities" and only in Section 31 which is outside the NRA? (EA summary at page 9)" (153, 6)

FS Response: As discussed on EA pp. 23-24, the purpose and need and project objectives were developed through working with the LRC. As discussed on p. 23, "In 2008 as part of the LNF's collaborative efforts with the MFRC, then Forest Supervisor Deborah Austin agreed to provide an opportunity for the LRC to select a project area for restoration activities. Project area selection was identified by the MFRC as an important tool for developing community support for forest restoration and management. Developing projects that are consistent with the MFRC's 13 Restoration Principles was also identified as important to gaining support for forest management activities. In response, LNF resource specialists and LRC members examined several areas across the Missoula and Ninemile Ranger Districts for restoration opportunities. After careful deliberation, the Marshall Woods project area was selected by the LRC because of its close proximity to the City of Missoula and unique opportunities to conduct forest restoration treatments within a National Recreation Area (NRA)." The project area was also selected to provide educational opportunities as discussed on EA p. 18.

43. "Please provide literature or the any references you have to document or support that the public goes to the RNRA to reduce their risk of being caught in a forest fire, to see ecological integrity (or that there is even any common public understanding as to what that means) or avoid the sight of dead trees. "Why aren't there any specific objectives in the MW EA that deal with and state the specific LNF Plan MA 28 standards (including but not limited to standard 15) throughout the NRA? For example: Why are the objectives being driven by logging instead of by recreation enhancement in the NRA?" (153, 7)

FS Response: The project is driven by restoration objectives and the protection of recreation values for the long-term. Also refer to the response to comment #42.

44. "Please include and document in the MW EA the establishment and management history in the RNRA, why the citizens group initiated designation of the RNRAW, the Forest Service position on designation in 1979, and how the RS Act, LNF Plan standards and LAC standards have been applied (with examples) in the RNRA from 1980 to 2015 prior to the release of the MW EA." (153, 9)

FS Response: There is no requirement to include the establishment and management history of the RNRA in the Marshall Woods EA. Past activities in the project area are summarized in EA Appendix D. Compliance with Lolo NF Plan standards and LAC standards are addressed in each specialist's report. The RNRAW Act is included in the Project File (Item N-1). Also see response to comment #1.

45. "You shouldn't change standards to meet allow logging and road building…However, if you would like to change all the standards that are not met with commercial logging in the RNRA to clearly allow / include logging as a management tool in the RNRA… you should do it transparently with full public involvement." (153, 10)

FS Response: Standards have not been changed (see response to comment #s 2, 8, and 10-13). The proposed action (Alternative B) was scoped with "full public involvement" in 2010 as is explained in detail in the response to comment #22.

46. "Was the FOR invited into the collaborative group for MW and if not why? If the FOR was not invited into the MW collaborative effort, what efforts did you make to invite, involve or get their comments during the scoping and public involvement phases of the MW project prior to roll out? Have you invited the FOR in to meet with you since rollout to discuss the project?" (153, 18)

FS Response: As described on EA p. 23, the "collaborative group" that the Forest Service worked with on this project was the Lolo Restoration Committee (LRC). The LRC is a diverse group of local volunteers and is a private initiative not convened or managed by the Forest Service. All of the contacts and communications from this group to the general public or other organizations are not known by the Forest Service; however in a statement made by Jake Krelick (LRC Chair) on 4/27/2015, he says that in 2010 "the LRC held selected meetings with key stakeholders including the Friend of the Rattlesnake"…"to seek their input on the proposed project" (Project File, Item K-39).. The membership of the FOR is also not known by the Forest Service; however we are aware that the contact for the group is Cass Chinske. The mailing for the August 2010 field trips was sent to Mr. Chinske (Project File Item B-29), but he did not attend. Since the roll-out of the EA, Forest Service staff members have communicated with Mr. Chinske multiple times, and the Lolo NF Forest Supervisor met with him in person on March 20, 2015 (Project File Item E-41). Also please see the response to comment #22 above regarding the public outreach and involvement that occurred for this project.

VEGETATION

47. "Opening up the forest is desirable but not to the exclusion of all thickets of small-sized trees. Some thickets of small DF and PP should be left as they are important habitat niches for various wildlife species such as ground and lower canopy nesting songbirds." (2, 1)

FS Response: As disclosed in the analysis, EA p. 116 and Forested Vegetation Specialist's Report p. 39: "Changes attributable to fire-induced mortality, bark beetle predation, and natural disturbances result in greater pattern variation and the creation of clumps, openings and regeneration over time and Alternative B is designed provide such heterogeneity (Churchill et al., 2013). Stand-based average BA and spacing based silvicultural prescriptions, especially over contiguous stands, do not restore the variation and pattern that existed when frequent fire occurred (Churchill et al., 2013). Under Alternative B the prescription would thin stands to a target average of 50-80 square feet BA per acre, but provide a greater density range across the stand (30-100 variance), and retain clumps of regeneration and small openings that are important elements of restoration and resilience (Churchill et al., 2013). Spatial heterogeneity at multiple scales, in addition to forest structure and composition, are essential to ecosystem resilience and varying the BA throughout the stand, coupled with prescribed fire mortality would provide a more resilient forest (Levin 1998, Mortitz et al. 2011, North et al. 2009, Stephens et al. 2008). Fine-scale mosaic pattern is considered a key component of resilience in dry forest ecosystems (Churchill et al., 2013; Binkley et al., 2007; Stephens et al., 2010; Stephens et al., 2008). Irregular patterns created by groups, clumps, openings and variation in fuels and canopy can reduce the potential and spread of crown fire (this pattern is analogous to strategically placed fuel treatments at the landscape scale) (Finney et al., 2007)."

48. "The 21 inch dbh cutoff limit for no cutting seems too high. It is not apparent how that limit was arrived at but it would exclude many large important trees. A limit considerable smaller, such as 16-18 inches is needed to retain valuable large trees on the landscape. How will leave trees be determined in the harvest units?" (2, 2)

FS Response: The reason 21" dbh trees were identified in the EA p. 104 and Forested Vegetation Specialist's Report pp. 27-28, under the section titled 'Treatments Affecting Large Tree Retention', is based old growth criteria identified by the Forest Plan and Green and others (1992). The 'thin and use prescribed fire' treatments analyzed in the EA do not include a "21 inch dbh cutoff limit" as you suggest, rather, as disclosed in the EA p. 104 and Forested Vegetation Specialist's Report p. 27, "All treatments, in all alternatives, are designed to retain large, fire-resistant ponderosa pine and western larch where they occur within the limits of the treatment design (i.e. diameter limits in Alternatives C and D would prevent removing trees competing with larger, remnant trees in Units 70, 71, 2, and 3 and Units 70, 71, and 1-6, respectively, leaving them susceptible to bark beetles, fire and other stressors). Treatments in Alternative B (Units 1-6) were designed to protect large diameter (>21" dbh) ponderosa pine and western larch from the risk of stand-replacing wildfire due

to ladder fuel accumulations, historically atypical stand densities, and high surface fuel loading."

For clarification, in all proposed treatments, the largest, healthiest trees present would be featured irrespective of stand diameter distributions. As stated in the EA p. 106 and Forested Vegetation Specialist's Report p. 29, "Silvicultural prescriptions would favor the retention of the largest, healthiest dominant/codominant trees to the degree possible to meet unit objectives. To ensure this, a Certified Silviculturist would prepare or review site-specific prescriptions and marking guides. Site-specific silvicultural prescriptions and/or marking guides may include terms such as "thin from below" or specify an upper diameter limit of trees eligible for harvest to meet this objective. This would retain large, healthy trees to the degree the practice is consistent with the objective of maintaining or restoring a given stand." Please refer to the EA pp. 113-116 and Forested Vegetation Specialist's Report pp. 36-39 for greater detail on leave tree selection. Additionally, the FAQs pp. 6-7 provide additional information about tree diameters within the Main Rattlesnake corridor that would be removed under Alternative B, "Most of the trees that would be removed are less than 100 years old and between 7 and 16 inches in diameter" (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File Item E-11).

In addition, as stated on EA p. 166 and Forested Vegetation Specialist's Report pp. 38-39, "A key element of restoration and resilience involves retaining large, fire-tolerant trees (Agee and Skinner, 2005; Hessburg and Agee, 2003; Taylor and Skinner, 2003). Conversely, diameter limits, as included in Alternative D and in Alternative C in Units 2 and 3, without the flexibility for young tree establishment or in-stand age class variation and heterogeneity may actually conflict with restoration of spatial patterns and other objectives (Churchhill et al., 2013; Abella et al.; 2006; North et al., 2007)".

49. "Commercial harvest in some of Unit 5 is appropriate but not everywhere. The more southerly aspects are not over crowded with understory fir and the overstory is not overly dense. Understory burning would be appropriate but not commercial harvest. It is not worth the risk of weed invasion to put heavy equipment on much of Unit 5 to harvest even a few trees." (36, 1)

FS Response: Unit 5 is characterized by a ponderosa pine and Douglas-fir overstory with an average BA of 140 square feet and high canopy cover on a predominately Douglas-fir/ninebark habitat type. Considerable bark beetle mortality has occurred due to high hazard and stress complexes within the unit. There is considerable variability in the stocking levels within the unit (Forested Vegetation Specialist's Report p. 13; Project File, Items M5-47 and M5-50). The entire unit area would likely not be harvested, rather under Alternatives B and C the unit is proposed for cable yarding; therefore, heavy equipment would be restricted to the top of the unit on or near the proposed temporary road. Cable yarding with skyline systems involves full suspension of the leading edge of the logs with minimal ground disturbance. It is anticipated that the area below the 513.1 trail within Unit

5 would not be harvested due to logging systems restrictions and would be treated non-commercially (EA p. 36 and 114 and Forested Vegetation Specialist's Report p. 36). Weed treatments are incorporated in project design and treatments may be modified if necessary to mitigate noxious weeds (EA pp. 60-61)

50. "I do not want this area to resemble a park. There needs to be underbrush and old wood for habitat." (42)

FS Response: Please refer to responses to comment #s 53 and 55 below.

51. "I'm aware that the Forest Service may believe that logging and thinning activities are necessary to the continued health of a forest but I would urge you to consider that forest management may well be optimized by allowing the forest to manage itself in the long run. For example, consider the work of Diana Six, a leading forest entomologist at the UM Department of Ecosystems and Conservation Sciences and Eric Biber at UC Berkley, whose research showed that the Forest Service's beetle control and suppression efforts have reduced tree mortality only marginally." (120, 1)

FS Response: As disclosed and considered in the EA p. 107 and Forested Vegetation Specialist's Report p. 30, "Recently, Six et al. (2014) questioned whether relevant science supports MPB 'outbreak suppression'. 'Outbreak suppression' is not the intent or objective of the Marshall Woods project, nor the management strategies implemented for MPB on NFS lands in the western United States as suggested by the paper (Egan et al., 2014, Project File Item O-532; Fettig et al., 2014, Project File Item O-535)". "Direct control is not the purpose or goal of any treatments proposed in the Marshall Woods project. Rather, silvicultural commercial thinning treatments in Alternatives B and C are intended to enhance the vigor of trees and stands to make them less susceptible to insect attack. This approach provides long-term benefits in reducing beetle depredations; it is not a 'quick fix'."

52. "Stated objectives, p. 13—I think that your first stated objective of "restoring functioning ecosystems by enhancing natural ecological processes" is overly vague. Is the ecosystem not currently functioning? How, exactly, does one "enhance" an ecological process? Which ecological process? Should we ever be "enhancing" or should we be "maintaining" ecological processes, as directed by the NFMA? I hope you see the absurdity of these kinds of statements. I would stick with the safety arguments for logging in the WUI and ditch the ecological arguments because the ecological justification is inappropriately applied to a mixed-conifer forest born of mixed-severity rather than low-severity fire." (124, 1)

FS Response: As discussed in the EA pp. 13-15 subheadings a-c identified more specific objectives that were analyzed. For example, as disclosed in the Forested Vegetation Specialist's Report pp. 4-7, Purpose and Need subheading a, "Maintain and enhance resilience and resistance of vegetative communities", was discussed and the effects analysis indicators were described in detail.

53. "Vegetation Treatment Descriptions, p. 35—Prescribed fire (here and p. 116) does not "emulate natural processes" or the kinds of fires that burned here historically. Prescribed fires burn at much lower severities than historical mixed-severity fires did and they are generally conducted out of season, so they do NOT emulate natural mixed-severity fires typical of mixed-conifer forests like those in the project area (Sherriff and Veblen 2006, Baker et al. 2007, Hessburg et al. 2007, Sherriff and Veblen 2007, Klenner et al. 2008, Amoroso et al. 2011, Perry et al. 2011, Schoennagel et al. 2011, Heyerdahl et al. 2012, Williams and Baker 2012, Marcoux et al. 2013, Odion et al. 2014, Marcoux et al. 2015). Accordingly, prescribed fires will not "promote ecosystem health," as stated under the second stated objective; only a mixed-severity fire can do that. The use of thinning and prescribed fire is also said to "…mimic the mortality caused by surface fire or inter-tree competition and concentrate the site resources to the largest, dominant ponderosa pine and western larch trees," but the natural fire regime of mixed-conifer forests in the Rattlesnake and elsewhere in western Montana consists of mixed-severity fire, not low- severity fire. Thus, I would suggest re-focusing the goal toward safety through the creation of more readily defensible space during a wildfire; the ecological justification is unsound." (124, 2)

FS Response: On EA p. 35, the variety of prescribed fire treatment types are described; any, all, or a combinations of treatment may occur as described. The seasonality, burn intensity, and burn parameters are not specified. It's unclear what the commenter attempts to reference on EA p. 35. On EA p. 36, under the description 'thin and prescribed fire', the EA states that "thinning from below (low thinning) involves removing trees from the lower part of the forest canopy, leaving the largest, healthiest trees to occupy the site. The treatment mimics the mortality caused by surface fire or inter-tree competition…" Thinning from below is just one of the types of treatments described on EA pp. 35-37. The definition is a standard term used in forestry and was included to assist the reader. The commenter cites the statement out-of-context regarding what that means and how the treatment may or may not be applied to stands. The description is about one proposed thinning treatment, not prescribed fire application, or how prescribed fire treatment may or may not be applied to stands.

Mixed or variable severity fire regimes within the Marshall Woods area were discussed in the Forested Vegetation Specialist's Report on pp. 9-11, "habitat type groups are assemblages of habitat types with similar disturbance response, potential stocking density, potential productivity, potential down wood accumulation, fire frequency, species composition and stand structures. They are also based on environmental temperature and moisture regimes. The groups used in this analysis are based on the Western Montana Zone, which generally encompasses the area from the Bitterroot Mountain Divide to the Continental Divide in the Rocky Mountains, Montana (Green et al, 1992, errata 2008). Habitat types stratify site conditions on the potential for a site to support plant communities. Within any given habitat type group, inclusions of non-forested sites and riparian areas exist where fire occurrence, intensity, and responses may differ from the majority of the area. References to historic conditions describe typical ecological conditions that existed prior to the period of fire suppression, which for the Marshall Woods area is approximately 1650 to 1880 (Heyerdahl et al., 2008). The use of historic conditions provides insight on altered fire regimes that serve as stressors to fire-dependent forests such as ponderosa pine (Joyce et al., 2008).

Nearly all the area proposed for treatment under Alternatives B, C, and D is occupied by Habitat Group B: (moderately warm and dry) including: the main Rattlesnake corridor, Woods Gulch, Marshall Creek, and Sections 31 and 33. This habitat type group is similar to Habitat Group A (warm and dry) in that it supports relatively open grown ponderosa pine and Douglas-fir forests. However, these sites occur further along moisture and temperate gradient resulting in key vegetation differences. Increased moisture availability on these sites allows them to support greater tree densities. Shrubs and moist site forbs dominate the understory; pinegrass, elksedge, ninebark and snowberry are often well represented. The dominant fire groups are dry Douglas-fir habitat types (Fire Group 4) and the moister Douglas-fir habitat types (Fire Group 6) (Fischer and Bradley, 1987). On many of these sites, Douglas-fir is a vigorous member at stand initiation as well as of mature forests. Ponderosa pine and lodgepole pine are intolerant species whose abundance varies by habitat type phase. Western larch is often a seral dominant on moist Douglas-fir habitat types. Within this habitat type group, significant environmental differences may occur. On cooler sites, such as frost pockets, lodgepole pine is more prevalent (Pfister et al., 1977).

Average fire frequency ranged between 5 and 50 years. Historically fires were mixed with variable intensities ranging from frequent, low intensity, non-lethal, understory fires to infrequent, high intensity, stand-replacement fires. Downed, dead fuel loads averaged about 12 tons per acre, but may have been much higher as they ranged from 1 to 74 tons per acre (Fischer and Bradley, 1987). In the absence of fire disturbance the corresponding increase in stand density and age may result in high levels of insect and disease mortality, blowdown, natural thinning, and snow breakage. With the exception of recently acquired lands (Section 33 and 31), much of the area occupied by Habitat Type Group B within the Marshall Woods area currently supports dense, continuous, closed canopy stands. Mature overstocked Douglas-fir stands with dense understories often result in moderate to high burn severities (Fischer and Bradley, 1987). Many of these sites within the Marshall Woods area presently support dense, Douglas-fir dominated stands with a declining ponderosa pine component."

EA p. 116 states, "Prescribed fire application would emulate natural processes (by) stimulating forage production, creating microsites for natural regeneration, and increased resilience to fire in the future". Again this statement is cited out-of context as it was included in the effects disclosed on EA pp. 115-117.

54. "Vegetation Treatment Descriptions, p. 37—It says that treatments will make stands "…more resilient to natural fire occurrences." A "resilient" landscape is, by definition, one that can return to a pre-disturbance condition at some point after it is disturbed. Most western forest landscapes, including the forests in the proposed treatment area are already quite resilient! LANDFIRE and other databases show that as much as 90% of all western forests belong to mixed- and high- severity fire regimes. Most western forests are disturbance-dependent, meaning that they evolved in the face of repeated mixed- and high-severity fires. They are, therefore, already quite "resilient" and fully capable of returning (through the natural process of succession) to a condition similar to where they started after a fire disturbance." (124, 3)

FS Response: The EA p. 20 and Forested Vegetation Specialist's Report p. 3 explicitly define resilience as, "The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (FSM 2020.5)". Futhermore, Forested Vegetation Specialist's Report p. 5 states

resilience will be measured in the analysis as the "vulnerability to stressors and ability of stands to persist through and reorganize after disturbance and maintain basic structure and function over time. Measurement indicators include resilience to fire and bark beetles (bark beetle hazard) under current and future conditions…The temporal resilience of stands to bark beetles and fire will also be addressed." The definition and statement provided by the commenter that resilience is "one that can return to a pre-disturbance condition at some point after it is disturbed" is incorrect. Furthermore, the EA p. 87 and Forested Vegetation Specialist's Report p. 8 states that "Natural disturbances are not disruptions in forests rather they are the norm and…are disturbance mediated. The species that occupy these forests evolved with and are morphologically adapted to very frequent disturbance, namely fire. These forests are ever-changing and dynamic; forest development typically follows an initial floristic pattern whereby species invade at approximately the same time following a major disturbance, but assert dominance at different times (Oliver and Larsen, 1996). The type, size, scale, arrangement, duration, species affected, etc. in a disturbance event dictate how forest development patterns emerge after its occurrence."

55. "Direct and indirect effects, p. 98—Here and elsewhere, you refer to the need for "…restoration of forest structure, species composition, function, and resilience." Really? Were overgrown forests not historically present in this landscape? Are mixed-conifer forests not disturbance- dependent ecosystems wherein historical forest species compositions and structures come and go with stages of natural succession after disturbance? If this forest system is a constantly changing series of forest structural conditions, then why are you preoccupied with the "restoration" of one particular late-successional stage (open-grown, mature forest)? Mixed-conifer forests were never steady-state systems that maintained themselves in one structural condition—mixed- conifer forests have always been dynamic systems that consist of an infinite number of forest structures, and the current condition is well within the historical range of natural variation, no?" (124, 4)

FS Response: Refer to response to comment #53 above, and reference the following excerpts:
Forested Vegetation Specialist's Report p. 5 states, "To achieve the purpose and need, stand treatments were designed to: 1) Reduce crown fire potential and restore fire as an ecological process focusing on low intensity, high frequency and mixed severity fire regimes; and increased resilience to surface fire and bark beetles; 2) Maintain or increase the species composition of fire-resistant shade-intolerant species (e.g., western larch, ponderosa pine); and design treatments to retain large diameter, old ponderosa pine and western larch trees and create stand conditions that could provide large trees in the future; and 3) Provide for age class, species and structural diversity to reduce vulnerability to stressors (e.g., fire, insects, and disease)."

Forested Vegetation Specialist's Report p. 8, "Natural disturbances are not disruptions in forests rather they are the norm, and warm, dry low elevation forests, like those that occupy Marshall Woods area, are disturbance mediated. The species that occupy these forests evolved with and are morphologically adapted to very frequent disturbance, namely fire. These forests are ever-changing and dynamic; forest development typically follows an initial floristic pattern whereby species invade at approximately the same time following a major disturbance, but assert dominance at different times (Oliver and Larsen, 1996). The type,

size, scale, arrangement, duration, species affected, etc. in a disturbance event dictate how forest development patterns emerge after its occurrence."

Forested Vegetation Specialist's Report p 9, "It is well accepted that ongoing climate changes have pushed regional climates beyond the bounds of the last several centuries. Warmer climates are expected to alter stress complexes that affect forests rendering them vulnerable to increased frequency, severity and extent of disturbances, namely fire and insect outbreaks (Joyce et al., 2008)."

Forested Vegetation Specialist's Report p 14, "Since the early 1920s natural processes such as fire have been abated to protect social values in the (Marshall Woods) area. These disturbance mediated forests have adapted over millennia with very frequent fire and endemic insect and disease occurrence. Values-at-risk and increasing settlement and recreational use within the WUI have precluded the natural role of frequent, low intensity surface fires to continually shape vegetation patterns. The result is small patch sizes and disturbances that preclude patterns that establish landscape resilience including heterogeneity and variability in age class, species composition, forest structure and function."

Forested Vegetation Specialist's Report pp. 20-21, "The general desired future conditions are listed by habitat type group. They provide a range of conditions to guide active management based an understanding of how ecosystems respond to changing conditions gained from historical conditions, as well as, recognize that current and future conditions are and will be different. The focus lies on an indeterministic approach of developing structurally and compositionally diverse forests that are mediated by ecological and disturbance processes. The objective is to hedge bets in the face of an uncertain future and still enable comparison of current conditions, and the trends or direction of change of conditions to assist management decisions. Overall, the desired future conditions address landscape size class and structural distributions and tree-stocking levels as a strategy to minimize forest vulnerability to stressors consistent with the long-term disturbances expected under current and future climates (www.frcc.gov). Managing in the face of uncertainty requires a variety of approaches and strategies that are focused on enhancing ecosystem resistance and resilience. This involves increased emphasis on ecological processes and managing for change, despite uncertainty about the direction or magnitude of a changing climate (Joyce et al., 2008)." Refer to Forested Vegetation Specialist's Report pp. 20-21 for a description of the desired structural stages and species composition by habitat type group.

Forested Vegetation Specialist's Report p. 22, "Project design employs an adaptive approach to make adjustments in the application of historical conditions as a reference point. Flexibility is incorporated to address inherent uncertainty about the local effects of climate change by enhancing the resiliency and resistance of the forests, and specific aspects of structure, composition and function (Joyce et al., 2008; Millar et al., 2007)."

Forested Vegetation Specialist's Report p. 22, "Managing for resilient spatial pattern requires combining reference conditions with climate change adaptation (Churchill et al., 2013). Pre-settlement forests developed following centuries of frequent disturbances and climatic variation, and serve as a guide for managers to increase resilience yet must be considered in the context of future climates to provide targets for restoration (Keene et al., 2009; Spies et al., 2010; Stephens et al., 2011). Properly functioning systems can accommodate processes including fire, insects, disease, and climate change and provide a

sustainable flow of ecosystem services whether or not those systems are within the historical range of variation. Gillette and others (2014) concluded that, "Managing for biologically diverse and resilient forests is our best and only long-term, sustainable response to a multitude of stressors – insects and disease outbreaks, fires that are unprecedented in severity, and drought – that are likely to increase in frequency as climate changes. In the case of bark beetles and other stressors, this calling for greater, science-based use of silvicultural treatments that, paradoxically, require some tree mortality for the greater resilience of the entire forest."

Forested Vegetation Specialist's Report p. 24, "Large-scale thinning to reduce stand density to minimize drought effects, reduce impact of large wildfire events, manage the potential for increased insect and disease outbreaks, and ensure a wide variety of species and age classes diversity, while managing for processes are approaches to facilitate adaption in the face of the changing climate (Joyce et al., 2008; Millar et al., 2007)."

Forested Vegetation Specialist's Report p. 33, "As previously discussed habitat type groups are assemblages of habitat types with similar disturbance response, potential stocking density, potential productivity, potential down wood accumulation, fire frequency, species composition and stand structures. Therefore, habitat type group is important when considering the effects of treatments on species composition, structure, function, resilience, resistance and regeneration.

Within the Marshall Woods area, the most profound changes have occurred in the warm and dry habitat types, Habitat Type Groups A and B. Notable changes due to reduced fire activity include: 1) an increase in fuel loadings and biomass resulting in less available nutrients; 2) lack of suitable seedbed and conditions for continued successful regeneration of fire-adapted species like ponderosa pine and western larch; 3) higher insect and disease levels as these disturbance processes attempt to substitute for the lack of fire; and, 4) changes in vegetation composition and structure. Within the analysis area, mid-aged continuous, dense forest dominates much of the landscape and a lack of plant species and age and size class diversity coupled with drought and mild winters have contributed to MPB activity in the area.
All action alternatives propose treatments in predominantly dry habitat types (Habitat Type Groups A, B, and C) to address shifts in forest structure, composition and function. All treatments in Alternative B work towards restoring the fire-adapted ecosystem by moving towards the desired future condition. As mentioned previously, this is not a static state or structurally/compositionally one specific condition."

Forested Vegetation Specialist's Report pp. 38-39, "A key element of restoration and resilience involves retaining large, fire-tolerant trees (Agee and Skinner, 2005; Hessburg and Agee, 2003; Taylor and Skinner, 2003). Conversely, diameter limits, as included in Alternative D and in Alternative C in Units 2 and 3, without the flexibility for young tree establishment or in-stand age class variation and heterogeneity may actually conflict with restoration of spatial patterns and other objectives (Churchill et al., 2013; Abella et al.; 2006; North et al., 2007).
Additionally, Alternative B would reduce wildfire hazard over the long-term (20-30 years) by rendering stands more resilient to natural fire occurrence and ecosystem processes (M5-31, M5-32, M5-33). Changes attributable to fire-induced mortality, bark beetle predation, and natural disturbances result in greater pattern variation and the creation of clumps, openings and regeneration over time and Alternative B is designed provide such

heterogeneity (Churchill et al., 2013). Stand-based average BA and spacing based silvicultural prescriptions, especially over contiguous stands, do not restore the variation and pattern that existed when frequent fire occurred (Churchill et al., 2013). Under Alternative B the prescription would thin stands to a target average of 50-80 square feet BA per acre, but provide a greater density range across the stand (30-100 variance), and retain clumps of regeneration and small openings that are important elements of restoration and resilience (Churchill et al., 2013). Spatial heterogeneity at multiple scales, in addition to forest structure and composition, are essential to ecosystem resilience and varying the BA throughout the stand, coupled with prescribed fire mortality would provide a more resilient forest (Levin 1998, Mortitz et al. 2011, North et al. 2009, Stephens et al. 2008). Fine-scale mosaic pattern is considered a key component of resilience in dry forest ecosystems (Churchill et al., 2013; Binkley et al., 2007; Stephens et al., 2010; Stephens et al., 2008). Irregular patterns created by groups, clumps, openings and variation in fuels and canopy can reduce the potential and spread of crown fire (this pattern is analogous to strategically placed fuel treatments at the landscape scale) (Finney et al., 2007)."

56. "Treatments Affecting Insect Infestation, p. 106…I am disheartened, however, by the focus on beetles as undesirable components of a "healthy" forest. The vast majority of bird species depend on beetle and other insect larvae as food. Ninety percent of the stomach contents of several bird species in the Intermountain West consist of spruce budworm larvae, for example. A healthy forest is NOT analogous to a healthy individual organism—quite the contrary!" (124, 5)

FS Response: A healthy forest was not described as analogous to a healthy individual organism; nor were beetles characterized as undesirable components of a healthy forest. Rather, the EA disclosed the existing conditions of forest pathogens, including bark beetles, and the effects of the treatments on pathogens and the ability of the four alternatives to meet the purpose and need of the project. As stated on Forested Vegetation Specialist's Report p. 4, the purpose and need is to "Maintain and enhance resilience and resistance of vegetative communities while ensuring visual quality….To achieve the purpose and need, stand treatments were designed to: 1) Reduce crown fire potential and restore fire as an ecological process focusing on low intensity, high frequency and mixed severity fire regimes; and increased resilience to surface fire and bark beetles…and 3) Provide for age class, species and structural diversity to reduce vulnerability to stressors (e.g., fire, insects, and disease)." Resilience as an effects indictor is considered, "Evaluation of vulnerability to stressors and ability of stands to persist through and reorganize after disturbance and maintain basic structure and function over time. Measurement indicators include resilience to…bark beetles (bark beetle hazard) under current and future conditions. Attributes that are consistently linked as primary factors associated with bark beetle infestations are stand density, basal area, stand density index, tree diameter and host density (Fettig et al, 2007) (Forested Vegetation Specialist's Report p. 5). As disclosed on Forested Vegetation Specialist's Report pp. 20-21 the desired future conditions include, "Insects and diseases at endemic levels".

57. "On page 36 the EA indicates the thinning will remove 30-60% of the existing crown cover…It also says that 'Most of the trees that would be removed are from the intermediate crown classes with all or a portion of their crowns overtopped … ' I think it would be a

clearer description to indicate that co-dominant trees will also be removed particularly in the 60% removal portions of the treatments. It is implied by saying 'most' will be intermediate, which is technically true based on the number of trees, but in terms of basal area the co-dominants will likely be as much or more in the 60% canopy removal areas." (147, 8)

FS Response: Co-dominants would be removed in Alternative B (Units 1-6) and Alternative C (Units 1, 4-6). As stated on Forested Vegetation Specialist's Report p. 36, and EA pp. 36 and 113-114, "The proposed treatments include: crown thinning or thinning from below; single tree selection, creating small openings, removing trees to improve species composition and residual tree quality (i.e., improvement cutting), and removal of individual dead, dying and diseased trees. The residual overstory may have some small openings…..The thinning treatments are designed to: 1) favor fire and disease-resistant ponderosa pine and western larch first and 2) *thin stands from below* second. …. In a heavy low thinning, the main canopy may also be thinned to reduce competition, density, and crown fire potential."

58. "Units 60-66 did not indicate what the BA or canopy cover reductions would be, nor for units 90-92. The figures on units 70-71 (p. 38) are 5-25% and on page 112 it indicates the BA would be 86 sq feet. I think these data are critical for evaluation of the alternatives. These figures are directly linked to the fire/fuels evaluation and should be cross referenced within the document; I think that table 19 on page 143 needs to be duplicated for the non-commercial harvest units I have just listed…I have seen any explanation of why units 64 and 66 which have existing road access are not being considered for removing the roundwood/pulp logs and small sawlogs. Also units 60, 61, 62 and 63 could easily have short extensions to existing roads or planned temporary roads to remove the trees from a portion of those units. No explanation as to why the prescription being applied to units 1-6 are not being applied to units 60-63 and 64 and 66, unit 65 doesn't have any reasonable access for removal." (147, 9)

FS Response: The projected canopy cover reduction for proposed Units 60-66 and 90-92 are located the Project File; for Alternatives B, C and D the estimate is 20% (Project File, Item L-19). This information was not included in the EA as the proposed treatment and methods were not identified as an issue during scoping and did not drive alternative development. All action alternatives propose the same treatments in Units 60-66 and 90-92; therefore, the comparison is between treatment and no treatment (Alternative A). The only difference between the action alternatives is that in Units 60-66 the upper diameter at breast of trees that would be felled is 8 inches under Alternatives C and D inches versus 10 inches under Alternative B. EA p. 38, Table 8; p. 40, Table 9; p. 42 and EA p. 111 and Forested Vegetation Specialist's Report p. 34, "Alternative B would include cutting trees up to 10" dbh, Alternatives C and D would include cutting trees up to 8" dbh. The difference in these two treatments within Units 60-66 would be minor; Alternative B would result is slightly more open stand conditions, treatment efficacy and longevity and a greater opportunity to provide large, down, coarse, woody debris to ensure long-term nutrient cycling and soil productivity." Hence, proposed treatments in Units 60-66 were not selected as for modeling in the Fire and Fuels Extension of the Forest Vegetation Simulator.

Units 60-66 occur on the warmest and driest sites (Habitat Type Group A and B, Forested Vegetation Specialist's Report pp. 9-10) proposed for treatment in the Marshall Woods project, generally on south to west aspects. As discussed on EA p. 37-38, 110 and Forested Vegetation Specialist's Report pp. 33-3,4 these are "sites that were historically occupied by very open to moderately open ponderosa pine or ponderosa pine and Douglas-fir communities…Some very dry inclusions that were historically occupied by grassland communities currently support moderate noxious weed populations including spotted knapweed, leafy spurge, and cheatgrass. Some sites are classified as non-forested. As included in the FAQs p. 6 "…all treatments were designed to employ the lightest-touch approach to effectively meet the purpose and need of the project. For example, if hand thinning or prescribed burning alone would effectively reduce the hazard, that is the treatment proposed…"as is the case with Units 60-66 (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11).

The information contained in EA Table 19, p. 143 for proposed non-commercial Units 70-71 is contained in the paragraph immediately beneath the Table 19, page 143, "Mechanized treatments as proposed under Alternative B in Units 70 and 71 along the main Rattlesnake corridor would result in a CFI of 41, FL of 2, and PM under severe conditions of 11%. While some localized improvement would occur in Units 70 and 71 under Alternatives C and D, the treatment would result in a CFI of 39, FL of 6, and PM of 97% under severe conditions. Under No Action the CFI would be 35, FL 4, and PM 81% under severe conditions."

59. "I did not find displayed estimates of the tonnage per acre to be felled/piled and burned for the units as well as the tonnage removed for sawlogs and pulp/non-saw by trucks so it can be seen how the amount to be burned is reduced by removing and utilizing some of the material. These figures should be provided and also include the amount of carbon that can remain stored in long and short lived wood products rather than burned on site or in a wildfire. The tonnages are important for evaluating the air emissions (both particulate matter and greenhouse gases) as well and being able to quantify the differences between alternatives. (147, 10)

FS Response: FS Response: This was not an issue raised during scoping; therefore, did not drive alterative development nor was it included as an effects indicator. Nonetheless, carbon reports, as well as, estimates on tons/biomass per acre removed and/or consumed under the modeled treatment scenarios are in the Forest Vegetation Simulator output reports located in the Project File (Items M5-29, M5-32, M5-35, M5-38, M5-41, and M5-44).

60. "On page 125 under cumulative effects (Table 16) the wildfire activity, I think it would be useful to show the percentage of the NFS part of the landscape resulting in less severe fire behavior. The differences between the three action alternatives are 31%, 24% and 20% for the whole landscape, putting those percentages into the context of the NFS lands would be more insightful…the discussion of Alternative D is not clear to the reader as to why the

treatments across the landscape (20%) is "wholly ineffective"...the brief description of Alt A that is expressed in arcane fire-speak. i.e. 'Alternative A would not improve the ability to suppress fires within treatments units. No cumulative benefits would occur.' ...This block needs to be articulated better for the general reader to understand and cross-referenced with the hydrology, esthetic and noxious weeds sections." (147, 11)

FS Response: To clarify, the information presented in Table 16, p. 125 is cumulative impacts, not direct or indirect impacts. A cumulative impact is the impact on the environment which results from the incremental impact of the action when added to the past, present, and reasonably foreseeable future actions (CEQ 1508.7; EA Appendix D, p. D-1). Direct effects, in contrast, are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (CEQ 1508.8). The commenter is referenced to the direct and indirect effects section of Alternative A in the Fire and Fuels section EA page EA pp. 129-130, 139-146 and associated specialist's report.

As stated in Forested Vegetation Specialist's Report p. 4, "With respect to forested vegetation, the entire Marshall Woods project area was used as the analysis area." The information in EA Table 16, p. 125 that you reference was presented based on the analysis area. As stated on EA p. 122 and Forested Vegetation Specialist's Report p. 44, "the Marshall Woods project area was used for the cumulative effects analysis area for forested vegetation since it represents a watershed scale in which to analyze a diverse array of forested communities and the incremental contribution of the proposal is negligible at the next larger watershed." With respect to cumulative impacts, there is no cumulative impact of no action. With respect to Alternative D, again, the commenter is referred to the direct and indirect effects in the EA and the Fire and Fuels Specialist's Report. The term "wholly ineffective" is the anticipated cumulative effect of Alternative D when considered in conjunction with future wildfire occurrence. EA p. 100 and Forested Vegetation Specialist's Report p. 24 Alternative D "fails to effectively address the most at-risk stands across the project area rendering it largely ineffective at meeting the purpose and need of the project" (Project File, Items M5-40, M5-41, M5-42, M5-43, M5-44, M5-45). In the event of a wildfire under Alternative D, the most at risk and hazardous conditions would remain and extreme fire behavior, intensity and severity is probable under moderate to severe burning conditions rendering it largely infective when considered in conjunction with a wildfire.

61. "The EA and supporting documents are largely predicated on the desirability of mimicking pre- settlement stand conditions. A stated project goal is favoring retention and recruitment of large, widely spaced ponderosa pine and western larch and exclusion of Douglas fir, generating stands that are guestimated to be facsimiles of pre-settlement conditions. This vision is hypothetical versus broad-scale on-the-ground scientific findings"...by Odion, et al. (2014) and Williams and Baker (2012)..."historic conditions may serve as a guide, yet numerous authors have cautioned that pre- settlement conditions cannot be replicated through restoration (Reinhardt, et al. 2008)." (162, 16)

FS Response: Refer to responses to comment #s 53, 55 and 188.

62. "Many researchers have recommended that treatments be spread out over time in approximately three-year increments over 20 years or more to increase the likelihood of success (Covington, et al. 1997). Conversely, the EA at page 143 assumes a single treatment will be effective for up to 20-30 years." (162, 19)

FS Response: Covington and others (1997) completed a sequence of restoration treatments in 1993 and 1994. The treatments are similar to those proposed under Alternative B (Units 1-5) and Alternative C (Units 1, 4-5). The first year, harvest and thinning were completed followed by slash removal and prescribed burning in the second year. The study plan included maintenance prescribed burning at three-year intervals over the next 24 years following the restoration treatment completed over a two-year period (Covington, et al. 1997). The Marshall Woods project does not propose multiple maintenance prescribed burning treatments after project implementation. Such treatments would require additional analysis under NEPA and public involvement. As described in the EA treatment descriptions, the proposed actions involve a series of treatments to achieve the described effects. The analysis of treatment effectiveness was at the completion of staged treatments within a given proposed unit. For example in the 'thin and prescribed fire' treatment, the sequencing would occur as follows: 1) harvest followed by; 2) understory treatment (i.e. small tree thinning) in the next 3 years; 3) followed by a prescribed burning after another two-year waiting period. To complete the sequence of treatments in one unit it would take a minimum of 5-6 years. As disclosed in the Forested Vegetation Specialist's Report pp. 6-7, the temporal efficacy of the alternative treatments was estimated using the Forest Vegetation Simulator (Project File, Items M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-34, M5-35, M5-36, M5-37, M5-38, M5-39, M5-40, M5-41, M5-42, M5-43, M5-44, M5-45).

In EA Appendix F, an example implementation schedule is included to provide an understanding of the timeframes for the project. As displayed in the example, a project such as this takes a minimum of 8-10 years to complete. In addition, page 1 of the FAQs addresses implementation timing, "The project includes many components which would be implemented over a 7 to 10-year period depending on the activity. Activities like vegetation treatment unit layout could occur in 2015, while activities like ecosystem maintenance burning could occur in year 10 depending on site conditions like weather, air quality/smoke dispersion, fuel moisture, etc. Some activities like weed spraying could occur continually over the entire 10-year period but others like timber harvest would occur over much shorter time frames (e.g., one season) to minimize impacts to users" (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11).

63. "The EA doesn't disclose the accuracy, or reliability, of the sets of data upon which its quantitative analyses are based. When data of uncertain reliability is fed into analysis methodology or models, the outputs can be wildly deceiving. Also, the validity of the modeling procedures have not been established for the way the Forest Service uses them. Table 19 is a perfect example. The Forest Service uses that table to support the EA's claim that the project treatments will "improve resiliency, ecosystem function and reduce the potential for high severity fire1." We doubt that such a claim would withstand the results of

an independent scientific peer review. The modeling has never been validated for such purposes.

Moreover, the numbers in the table, being admittedly "approximations", are not accompanied by any statements of their accuracy and reliability. So apparent differences between a CFI of 24 for Alternative D vs, a CFI of 41 for Alternative B, for example, may be exaggerated by the errors inherent in the approximations.

And finally, whereas the EA claims that Table 19 means Alternative D "leav(es) an even larger portion of the area vulnerable to high intensity fire" as compared to other alternatives, there's no indication of if whether this "larger portion" would really be significant for any number of likely fire scenarios." (182, 9)

FS Response: The forested vegetation effects analysis methods were disclosed in the Forested Vegetation Specialist's Report on pp. 4-7. Data, accuracy assessments, protocols, methodology, model inputs and outputs are located in the Project File (Items M5-6, M5-8, M5-9, M5-10, M5-11, M5-12, M5-13, M5-14, M5-15, M5-16, M5-17, M5-18, M5-20, M5-21, M5-22, M5-23, M5-24, M5-25, M5-26, M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-34, M5-35, M5-36, M5-37, M5-38, M5-39, M5-40, M5-41, M5-42, M5-43, M5-44, M5-45). As disclosed in the EA pp. 102 and 142, Forested Vegetation Specialist's Report p. 26, and Fire and Fuels Specialist's Report p. 28, "It is important to clarify that the treatments were designed to meet the purpose and need of the project and are not based on … specific measures. These measures are used to provide a quantitative comparison between the alternatives. They are based on FVS modeling of treatments, they are not absolutes, but should be viewed as relative measures to allow for reasoned quantitative comparison of the current condition, the four alternatives, and the magnitude of change and trends over time." The information in Table 19 displays the following effects indictors: crown fire index, potential mortality and flame length under the modeled treatment scenarios.

EA p. 143 and Fire and Fuels Specialist's Report pp. 29-30, the proposed action "is designed to improve resiliency, ecosystem function and reduce the potential for high severity fire….Alternative D aims to achieve these objectives on 2,647 acres or 20.4% of the landscape; however it does not effectively address reducing the potential for high intensity fire with flame lengths modeled to exceed the 4-foot threshold. Alternative D does not substantially address the canopy bulk density in the most at-risk stands (Unit 1-6) in the project area rendering it less effective at reducing the percent mortality to an acceptable level and meeting the purpose and need of the project."

64. "'Much of the forests within the Marshall Woods area are presently experiencing extreme physiological competition … pines struggle with the demands placed on their limited photosynthae and succumb to insects, disease, and competition.'… Then, the EA contradicts itself, saying that 'Without active management, in the long term wildlife diversity could be decreased due to the lack of disturbance...' In other words, to the Forest Service the only acceptable "disturbances" are the stresses its fire suppression creates, and the management actions it then implements in reactionary fashion. Logging killing trees is okay, bugs killing trees isn't." (182, 11)

FS Response: The following paragraph from Forested Vegetation Specialist's Report p. 8 states, "Natural disturbances are not disruptions in forests rather they are the norm, and warm, dry low elevation forests, like those that occupy Marshall Woods area, are disturbance mediated. The species that occupy these forests evolved with and are morphologically adapted to very frequent disturbance, namely fire. These forests are ever-changing and dynamic; forest development typically follows an initial floristic pattern whereby species invade at approximately the same time following a major disturbance, but assert dominance at different times (Oliver and Larsen, 1996). The type, size, scale, arrangement, duration, species affected, etc. in a disturbance event dictate how forest development patterns emerge after its occurrence."

Forested Vegetation Specialist's Report pp. 8-9, "Without frequent low intensity fire as a disturbance agent, over time, these forested lands shift towards overstocked stands with an increasing shade-tolerant Douglas-fir component. This vastly increases susceptibility to root disease, spruce budworm, and bark beetles. The Douglas-fir response in the understory has resulted in considerable ladder fuel accumulations. Mortality from ensuing insect and disease losses increases surface fuel loading and the potential for severe fire behavior. Growing space freed by mortality would be occupied by existing cohorts onsite or, depending on the level of disturbance, facilitate the establishment of a new one. These conditions predispose stands to stand-replacing fire events and insect and disease epidemics (Graham et al., 2004). Shade-tolerant species (i.e., Douglas-fir) in the Inland Northwest tend to be more prone to a variety of insects and diseases including spruce budworm, Douglas-fir beetle, root disease and dwarf mistletoe (Hessburg et al., 1994). It is well accepted that ongoing climate changes have pushed regional climates beyond the bounds of the last several centuries. Warmer climates are expected to alter stress complexes that affect forests rendering them vulnerable to increased frequency, severity and extent of disturbances, namely fire and insect outbreaks (Joyce et al., 2008)."

Also see response to comment #56.

65. "'Large, healthy ponderosa pine trees would be favored as leave trees. Any live trees >21" dbh would be retained, regardless of species, to the extent practicable given project objectives and implementation logistics (Units 1, 4, 5, 6)." We wonder how much of a loophole "to the extent practicable' is. And why are the other logging units not also limited?" (182, 17)

FS Response: Please refer to response to comment #48 above.

FIRE/FUELS

66. "In terms of implementation, I would caution against fall burning. The conditions are driest, increasing risk of escape and night-time inversions will increase probability of smoke setting in the valley…consider raking out the dripline of larger trees you want to retain." (14, 1)

FS Response: Specific prescribed fire burn parameters will be identified after an action alternative is selected (and) a site-specific prescribed fire plan is prepared to address the objectives in the silvicultural prescription prepared for each treatment unit. Large tree

dripline raking was addressed on Forested Vegetation Specialist's Report p. 28, "Where deemed appropriate, duff accumulations around the base of large (21"+ dbh) trees may be ameliorated to encourage fine roots to migrate deeper in the soil profile before applying stand level prescribed fire (i.e., underburning). Kolb and others (2007) concluded that raking duff accumulations may increase fine root mortality. However, Jain and Graham (in press) studied various treatments to ameliorate duff accumulations and found that treatments when fine roots are not actively growing can mitigate unintended consequences associated with removing duff accumulations around the base of large trees (Jain, personal communication, 2011). The guidelines developed by Jain and Graham could be incorporated into treatments where incidental old trees are present." Also refer to the Project File, Item M5-49, and response to comment #67 below.

67. "Isn't there also the risk that the fires you set could get out of control and create the huge fire they are designed to prevent?" (19, 5)

FS Response: The Forest Service adheres to the "Interagency Prescribed Fire Implementation Guide" and "Forest Service Fire and Aviation Qualifications Handbook" standards for Prescribed Fire Burn Bosses when conducting and developing site specific prescribed fire plans. Fire, Fuels and Air Specialist's Report p. 35 and EA p. 73 discusses Resource Protection Measures. On March 18, 2015 at the public meeting, powerpoint slide 34 described that approved prescribed burn plans establish: dispersion and ventilation requirements, temp/RH/max winds/fuel moisture, predicted fire behavior (flame length, spotting, etc.), organizational minimums, contingency plan, and safety plan (Project File, Item E-20). Additionally EA, p. 142 states, "Fuel treatments that involve prescribed fire carry risks of escape and of greater than intended fire effects including post-fire insect attacks of residual trees (Ganz et al., 2003), consumption of organic soils, and unwanted smoke production. However, in many cases, no action may carry greater risks from effects of abnormally severe fires (Agee and Skinner, 2005). Finney et al. (2005) observed reductions in wildfire severity in portions of the Rodeo and Chediski wildfires on the lee side of areas previously treated with prescribed fire. These positive effects can be expected to be more frequent as the portion of the landscape that has been treated increases (Reinhardt, et al., 2008)."

68. "The EA doesn't even mention Dr. Cohen's methods to reduce the risk that wildfires will burn homes and/or kill or injure the families that live there." (22, 3)

FS Response: EA p. 17 states, "Treatments on NFS lands in the project area would reduce potential fire intensity and crown fire potential, but may not directly protect all homes. Wildfire mitigation focused on structures and their immediate surrounding may be the most effective at reducing structure ignitions (Cohen, 1999, 2000, and 2002; Scott, 2003)."…While individual home-by-home treatments can help reduce the risk of structure loss, relying solely on such treatments could forego strategic opportunities for suppressing wildfires within the WUI. Although homes in the path of wildfire are often the most recognized value-at-risk, treatments need to go beyond the areas immediately surrounding individual homes to protect other resource values that make up the forested setting including soil stability, wildlife habitat, water quality, timber value, and landscape aesthetics (Graham, 2004)."

69. "I feel it is important to call your attention to mushroom bio-piles as a cost-effective alternative to conventional slash treatments (I.e., pile and burn). At less than the cost of

burning, tons of reduced carbon are sequestered for years, and this organic layer retains 5 times its weight in water, which is available to trees and other forest plants." (172)

FS Response: **Thank you for your comment, however, this was not a suggestion raised during scoping; therefore, it was not considered in alterative development. Fuel treatment options are referenced in EA, pp. 35-36. Also see response to comment #105. In addition, mushroom bio piles would not be conducive to the NRA values and management approach as described in the LAC and FP and managed as per Appendix J – special uses.**

70. "Fire and Fuels, p. 126—I would not get too carried away with what is written in the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy) at this point in time, especially when it still contains overly vague language like "restore healthy forested conditions." "Healthy" is clearly a term borrowed from industrial foresters who like nothing but a green tree, and not from ecologists who understand that a "healthy" forest contains all the native insects, dead trees, diseases, birds, mammals, etc." (124, 6)

FS Response: Fire, Fuels and Air Specialist's Report, pp. 4-5, "The National Cohesive Wildland Fire Management Strategy: Phase III Western Regional Science-Based Risk Analysis Report of 2012 set forth recommendations for reducing wildfire risk, improving forest and rangeland health, protecting communities from wildfire, and enhancing firefighting effectiveness and firefighter and public safety. The Action Plan builds upon these recommendations -- detailing actions, tasks, suggested lead and collaborating agencies, and the timeframes in which those actions and tasks should take place. The recommendations fall into four categories – overarching actions, actions to restore and maintain landscapes, actions to promote fire adapted communities, and actions to promote fire response." Also see response to comment #52.

71. "Fire, Fuels and Air Specialist's Report, second bullet—As stated above, there is no need to "restore and maintain resilient landscapes" when they are well within the natural range of variation for a system born of mixed-severity fire. The project area is not like the pure ponderosa pine forest surrounding Flagstaff, Arizona, and so the principles that apply there do not apply here. As the Cohesive Strategy says, we must recognize "…variability of this issue from geographic area to geographic area!" The low-severity fire model simply does not apply here." (124, 8)

FS Response: Refer to responses to comment #s 53 and 54 above.

72. "*Fire*, *Fuels and Air Specialist's Report*, *p. 3*—I certainly agree that "all aspects of wildland fire should be used to restore and maintain resilient landscapes," but that applies only when it can be demonstrated that the system is in need of restoration. Which specific evidence are you using to conclude that the particular stage of succession that the forest is in right now is somehow "out of whack" with what has occurred for millennia?" (124, 9)

FS Response: Refer to the existing conditions on Forested Vegetation Specialist's Report pp. 7-21 and EA pp. 86-96 (Existing Conditions and Desired Future Conditions), and Fire and Fuels Specialist's Report pp. 12-23 and EA pp. 126-138 (Existing Conditions and Desired Future Conditions).

73. "Fire, Fuels and Air Specialist's Report, p. 9—Resilience is NOT defined as "the ability of a forest community to avoid alteration of its present state by a disturbance." Where did this definition come from? That is the definition of "resistance" not "resilience!" Our forests may not be (and should not be) resistant to fire; they should be resilient to fire, and they are already plenty resilient." (124, 10)

FS Response: The definition on p. 9 was an editing error. Refer to Forested Vegetation Specialist's Report p. 5 to see the definition correctly labeled as resistance. Refer to response to comment #54 above for a definition of resilience.

74. "Fire, Fuels and Air Specialist's Report, p. 9—I think if you are going to claim that "landscapes near communities, and within the communities themselves, can be modified to reduce the likelihood that damage will occur to communities in the event of a wildland fire," then you need to provide the data to support that contention." (124, 11)

FS Response: The commenter is referring to the Fire and Fuels Specialist's Report p. 12, which describes the "National Cohesive Wildland Fire Management Strategy: Phase III Western Regional Science-Based Risk Analysis report (2012)". The context of this statement in the specialist report is referencing the National Cohesive Wildland Fire Management Strategy, which is a national policy document (Project File, Item M2-5).

75. "From a fire fighting standpoint, the trails themselves and various open clearings would provide firebreaks, while the character of the forest would not be impaired." (136, 2)

FS Response: Trails and various opening s are commonly used as firebreaks/fuel breaks; however, tactical firefighting decisions such as line location are made during initial and extended attack by responding resources and the incident commander based on fire behavior and risk management.

76. "As for wildland/urban interface (deemed the WUI), your text states on page 16 that the prevailing wind is from south or southwest to the north and northeast, or up- slope and up the drainage of Rattlesnake Creek. This would indicate that the main fire risk is to the north and northeast, and not towards the structures, which are a mile or more away to the south." (136, 4)

FS Response: There are many factors that influence fire spread beyond prevailing winds including the ignition site which could be well to the south of the project area. There are also numerous values beyond the WUI that are being addressed. These are stated in the EA, page 16, within the purpose and need, "Emulate fire's natural role on the landscape through vegetative treatments including prescribed fire. Promote ecosystem health with prescribed fire to distribute beneficial fire effects to areas within the wildland-urban interface (WUI). Integrate project objectives with the Missoula County Wildfire Protection Plan (CWPP). Decrease high intensity wildfire potential; enhance firefighter efficiency and safety within the WUI. Also see response to comment #52.

As stated on EA, p/ 129 "The CWPP has an overall rating for communities based on two subcomponents: wildfire risk and human safety factors. Wildfire risk is based on critical infrastructure, water supplies, transportation corridors, fuels, slope, and facilities. Human safety risk factors are based on population density, critical egress, and fire response capabilities. The combination of these two risk factors establishes the overall risk rating.

The overall risk rating for the Rattlesnake portion of the Marshall Woods Project is second out of eight areas at high risk for wildfire impacts."

77. "Figure 33 on page 134 regarding Fire Behavior Fuel Models is confusing, especially when reading the last two paragraphs on page 133. Red (TL3) Moderate Load Conifer litter seems to conform to areas 2 and 3, and yet the text on page 133 states "Proposed treatments are focused on areas with fire behavior fuel models representing high intensity fire behavior during typical fire season conditions for this area." (136, 5)

FS Response: As discussed in the Fire and Fuels Specialist's Report p. 11, we used a variety of datasets to establish the existing condition. Landfire is used in the context of a coarse landscape scale assessment (Project File, Item M2-1). Also on p. 11, data at the stand level context is discussed, "During the spring of 2011, approximately 350 acres of plot-based statistical stand exams plots were conducted to quantify forest conditions in representative units proposed for treatment. All stand exam data collected resides in the FSVeg database. Surface fuel loads were quantified with Brown's Planar intercept (Brown, 1974) method during these field visits to assist with fuel model determination. Field site visits coupled with all the aforementioned data allowed for reasoned professional extrapolation of the existing condition."

As discussed above FVS was used in this analysis to summarize current stand conditions, model future conditions and stand dynamics, and model proposed treatments and their effects. In addition, FVS was used in conjunction with the Fire and Fuels Extension (FFE) to analyze the effects of no action and the proposed treatments on fire behavior and fuel loading. The temporal scale used in this effects analysis was from present day to 2050. All FVS keyword and detailed output files are located in the Project File.

Refer to the Project File for fuel loading data and estimates, by alternative, across the temporal period used in the analysis (M5-18, M5-21, M5-22, M5-24, M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-43, M5-44, and M5-45). The stand level analysis indicated potential for high intensity fire within "areas" (units) 2 and 3. Also see response to comment #63.

78. "I found the fire history map on page 137 nearly unreadable in some ways. The conclusions drawn at the bottom of page 136 regarding this map don't seem to be substantiated by the map." (136, 6)

FS Response: The fire history map (Figure 35, p. 137) has multiple data sets showing fire history for the area overlaid on one map. Fire perimeters in red show the fires from 1980 to 2013 with the year also in red. Fire perimeters in blue with blue backgrounds indicate fires occurring from 1870 to 1979 with the year also in blue. All points labeled with letters A-G indicate fires of various size classes from 1931-2013. The map is designed to show the extensive number of fire events in and adjacent to the project area as well as to highlight the fire history of the project area lending to larger fire growth previous to fire management suppression activities.

79. "It's unfortunate that budget for fires eats up funds for prevention. That said, at the Carlton Complex <in Washington state last year>, one of the primary town savers and lifesavers was air tankers that showed up just in the nick of time. Missoula should have this capability in spades for that eventuality, given the growth of homes out into the WUI." (136, 10)

FS Response: Aerial resources are located approximately 5 miles from the project area; however that they may be unavailable. Large airtankers and many other firefighting resources are prioritized nationally. Availability of national resources is not discussed as part of the Marshall Woods EA. For further information on firefighting resources, and their prioritization and mobilization, please refer to the National Interagency Fire Center webpage (http://www.nifc.gov/nicc/mobguide/index.html) (Project File, Item M2-47).

80. I support Alternative B because…"commercial thinning and removal of large stems and on-site disposal through burning of smaller stems in piles are necessary to safely reintroduce underburns and restore biologically diverse native plant communities in Units 2, 3, 70 and 71." (144, 2)

FS Response: Thank you for your comment.

81. I support Alternative B because…"low elevation ponderosa pine and larch forests in the Missoula area are fire-associated ecosystems that were historically influenced by frequent (every 10+/- years) low intensity fires and occasional mixed-severity fires. The Salish were an integral component of this environment and managed low elevation forests through spring burns for 10-12,000 years. This is significant for many reasons"…including…"replicating historic disturbance regimes improves the probability that native flora and fauna can adapt as climatic conditions change"…and…"proposals to do nothing (Alternative A) or so little the ecological effects described above are not achieved (Alternatives C & D) are radical management decisions with unknown long term implications and would continue to exclude important ecological disturbances which created and maintained healthy and diverse forests for thousands of years, render them increasingly vulnerable to intense, stand-replacing fires and insect and disease outbreaks, and are far outside the historic range of conditions." (144, 3)

FS Response: Thank you for your comment.

82. Alternative C is not workable as proposed, and "suffers from inherent, practical limitations. The nuances of these are frequently not understood by folks whose experience with forestry is not "hands-on" e.g is gained mostly from reading EIS/EA documents, plans, and attending presentations. Several practical challenges arise with any treatment mix that leans too heavily on prescribed burning and leaving thinned material in the woods. While this approach is "more sellable" and sounds good in theory, actually getting a sufficient number of days meeting the prescribed fire prescription can be very problematic, particularly taking into account our western Montana climatology and local air-shed (and human health) constraints. Similarly, leaving too much woody biomass on-site can promote both insect pathogens (and in select areas root-rot pathogens) despite the goal of wanting to minimize these. Pile burning is another approach whose efficacy depends on scale, scope and timing; larger piles tend to be more economical/efficient, yet piles made too large (with thermal pulse/depth damage) adversely affect certain soil types, as well as adverse hydrological impacts. On the other hand, if a large volume of material needs to be treated, and if a hand-piling approach used results in many 'too-small' piles, this can tip labor costs in the wrong direction." (175, 4)

FS Response: Thank you for your comment.

83. "Table 19 is helpful for seeing the fire effects tradeoffs for units 1-6 between alternatives, but a similar table is needed for all the other units so it is possible to see the benefits of the various treatments between alternatives including the No Action alternative"….it also "does a nice job of summarizing the within unit benefits but it does not show the landscape level effects in relation to fire behavior…" (147, 12)

FS Response: Please see the responses to comment #s 58 and 63. Refer to pp. 24-25 of the Forested Vegetation Specialist's Report or EA, Figure 21 and Table 14 for unit benefits represented at a landscape scale. Table 14 provides a quantitative comparison of the four alternatives and their effectiveness at meeting elements of the purpose and need within the Marshall Woods landscape (EA, p. 100).

84. "In the third paragraph on p. 143 the percentage of treatment on NFS lands is provided as 54.2% and that is the same for all alternatives. In the next paragraphs for Alt. B, Alt C and Alt D there is a smaller acreage number and the percentage of the landscape is provided but not the percentage of the NFS lands. It doesn't explain why the acreage and percentage goes down other than saying, '… would achieve these objectives on xxxx acres …).'… These objectives are linked to the list in the description of Alt. B. It is not readily clear that these are linked or why they are not met." (147, 13)

FS Response: The percentage of treatments effecting NFS land is consistent throughout the action alternatives at 54.2% of NFS land within the greater 13,000-acre Marshall Woods project area which includes multiple land ownerships. Of the 13,000 acres, 56% is NFS lands and this project would treat 54.2% of those NFS acres. Please see EA p. 12 for land ownership within project area boundary (Table 1).

Throughout alternatives, varying treatments and their effectiveness occur on that 54.2% of NFS lands. Subsequent paragraphs on EA p. 143 display the percentages of the landscape by treatment and effectiveness. In paragraph 4 on EA p. 143, percentages are taken from the greater project area being analyzed (13,000acres). Ownerships are not accounted for. The intent behind this display is to articulate treatments and their influence at a landscape scale.

85. "…more discussion of the safety and property (values at risk) from a wildfire on a severe day, when resources are committed to other parts of the state and country is warranted and how each of the alternatives affects these important factors...the treatments make the difference between an IC being able to deploy crews to the ground and make direct flanking attack of the fire or having to pull back from the fire and looking at an "air show" with indirect line construction, burning out operations which will result in more land burned, more site disturbance, erosion, sediment in the streams and wildlife habitat lost and more cost for trail maintenance years into the future." (147, 14)

FS Response: Treatments throughout the project area are designed to reduce the surface intensity of wildfire events. Please refer to EA pp. 141-143 for further descriptions of measurement indicators used in the fire and fuels analysis. The fire and fuels effects analysis methodology can be found on EA pp. 129-130 and Fire and Fuels Specialist's Report PP. 8-12. Please see response to comment #79 for national firefighting resource mobilization policy.

86. "The EA stretches the definition of Wildland-Urban Interface well beyond the language or intent of WUI (Healthy Forests Restoration Act; Sierra Club). The primary definition is an

area within 0.5 miles of residential areas within the intermix zone. Since the Lolo National Forest, Missoula Ranger District is part of a community-based, multi-entity Fire Management Plan, an area within 1.5 miles of a community and primary egress route may be considered to be part of the WUI. The string of residences within the strip of private land east of Rattlesnake Creek and across from the trailheads qualifies. Yet the project boundary and map of the WUI (page 138) doesn't make sense…Even applying the more liberal definition of WUI, major portions of the Project Area, including all of Units 2, 3, 66, 81, 63, 84 and 200 are outside the WUI. Portions of Units 1, 4, 62, 80, 82 and 101 are also outside the WUI." (162, 12)

FS Response: As discussed on Fire and Fuels Specialist's Report p. 5, "The Marshall Woods Restoration Project is within the area assessed in the Missoula County Community Wildfire Protection Plan (CWPP). Missoula County Community Wildfire Protection Plan (2005) is a county level document emphasizing collaborative effort to reduce hazardous fuels. The county level CWPP efforts are directly tied to the Healthy Forests Restoration Act of 2003 (HFRA). The HFRA effort asked communities to assume a greater role in identifying lands for priority fuels reduction treatment and treatment recommendations". The Lolo National Forest FMU map (Figure 36, EA page 138) depicts FMU1 - the wildland-urban interface at a forest scale. Based on current forest FMU maps, portions of Units 2, 62, 63, 66, 82, 101, 200, and all of units 1, 4, 80, 81, and 84 are within FMU1/WUI. Utilizing the Region 1 HFRA Wildland-Urban Interface Map (2004), the entire Marshall Woods Project is within WUI with the exception of the northern most portions of Units 101, and 3 (Project File, Item M2-2).

87. "Another issue in regards to the healthy forests law is that projects should be focused on areas with "high" burn probability. The EA displays in Figure 31 that Missoula County has a "moderate" mean burn probability. The finger of structures within the public land corridor may have higher burn risk, but this can be addressed without a 14,000 acre project area." (162, 15)

FS Response: Although this is not a project authorized under the Healthy Forests Restoration Act of 2003, the Marshall Woods Restoration Project is within the area assessed in the Missoula County Community Wildfire Protection Plan (CWPP). The Missoula County CWPP (2005) is a county-level document emphasizing collaborative effort to reduce hazardous fuels. Although the county is rated as "moderate", the project area contains higher fuel conditions. The county rating is therefore an average value and should not be applied to the project as a whole.

The county-level CWPP efforts are directly tied to the Healthy Forests Restoration Act of 2003 (HFRA). The HFRA effort asked communities to assume a greater role in identifying lands for priority fuels reduction treatment and treatment recommendations (Fire and Fuels Specialist's Report p. 5).

As stated in Fire and Fuels Specialist's Report p. 12, "In the Mean Burn Probability Map below (Figure 31) the counties are categorized as high, moderate, or low average burn probability. Fire was simulated with FSIM at 270 meter resolution with burn probability averaged across all the pixels within a county. Missoula County is rated at moderate for Mean Burn Probability. The Marshall Woods Restoration Project is entirely within Missoula County."

88. "The Project Will Increase Fuel Loading… At page 30 of the Silviculturists Report (SR) it states that under Alternative B, many units would see short-term increased fuel loads. At page 9 of the SR, it states historic average fuel loading in tons/acre in dry ponderosa pine forests was approximately 5-10 tons/acre while in Douglas fir stands was approximately 11 tons/acre. The Fire & Fuels Specialists' Report states that current fuel loading in the project area is approximately 12 tons/acre, likely within the Historic Rate of Variation (HRV) for Ponderosa and Douglas fir stands. But the Project Goal of 5-25 tons/acre, where the lower loads are presumably on grassy areas to be underburned only and the higher loads on thinned forested areas represents a potential doubling of the current average fuel loading. This may be a high-risk strategy within the WUI and elsewhere." (162, 17)

FS Response: This comment incorrectly cites the Forested Vegetation Specialist's Report. Page 30 discusses the effects of the alternatives on insect infestations; it does not discuss the effects on short-term fuel loading under Alternative B. Forested Vegetation Specialist's Report p. 9 discusses Habitat Type A, warm and dry forests, the desired future conditions for these sites as described on p. 20 is an "average fuel loading generally ranging from 5-15 tons per acre." As stated at p. 10, "Nearly all the area proposed for treatment under Alternatives B, C, and D is occupied by Habitat Group B including: the main Rattlesnake corridor, Woods Gulch, Marshall Creek, and Sections 31 and 33…Historically fires were mixed with variable intensities ranging from frequent, low intensity, non-lethal, understory fires to infrequent, high intensity, stand-replacement fires. Downed, dead fuel loads averaged about 12 tons per acre, but may have been much higher as they ranged from 1 to 74 tons per acre (Fischer and Bradley, 1987)." The project doesn't state a fuel loading goal per se; however the (DFC) for Habitat Type Group B at p. 21 is an "average fuel loading generally ranging from 5-25 tons per acre." Furthermore, the Soils Specialist's Report on p. 16, "The Lolo National Forest Woody Material Guidelines (2006) and Graham *et al.* (1994) provide guidance for evaluating large woody material within forested stands. After project completion, all harvest and thinned stands would meet the Lolo NF wood guidelines. Large wood material levels are included in both silviculture and fuel prescriptions." Refer to the Project File for fuel loading data and estimates, by alternative, across the temporal period used in the analysis (Items M5-18, M5-21, M5-22, M5-24, M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-34, M5-35, M5-36, M5-37, M5-38, M5-39, M5-40, M5-41, M5-42, M5-43, M5-44, and M5-45). Additionally, refer to response to comment #55 above for a discussion of desired future conditions.

89. "it has often been reported and cited that thinning can increase surface fire potential and severity through increasing the ground fuel load, increasing windspeeds at ground level and increased solar radiation resulting in drier, flashier surface fuels (Reinhardt, et al. 2008; Wuerthner 2014)…The EA and supporting documents state the goal of proposed thinning treatments is removal of 30-60% of the existing canopy coverage, through removal of smaller diameter ladder fuels in the understory as well as larger trees to be removed through commercial methods. Extensive removal in one treatment will likely result in an unmanageable amount of slash." (162, 18)

FS Response: Reinhardt and others (2008) state, "there are two main reasons why rate of spread is not an appropriate metric with which to evaluate fuel treatments. First, spread rate is only important in a suppression context, and second, ecologically robust fuel treatments may often increase rate of spread or leave it unchanged."

Wuerthner 2014 is not a scientific paper, it is an opinion.

Please see response to comment #62 above; slash would not be removed or consumed in one treatment as you suggest. The thinning and prescribed fire treatments would involve three staged activities and slash treatments over a period of 5 or more years.

90. "Commercial removal of material from MA 28 is not allowed, so this slash must be burned on site, presenting problems of increased fire risk, unintended mortality of large trees and the risk of an "escape fire." The California Department of Forestry (calfire.org) rates moderate slash as one of the highest burn rating categories, with estimated flame heights of 8 feet at standard modeling parameters. This would result in excessive scorching and unintended mortality of larger diameter "leave trees" and more crowning behavior and be beyond the ability of firefighters to use direct attack methods. For example, Table 17 (EA page 13) shows that at 4-8 foot flame heights, hand line cannot be relied upon, requiring deployment of engines and aircraft. Flame heights above 8 feet present serious control problems." (162, 20)

FS Response: Refer to response to comment #1.

91. "The accompanying risks to firefighters can be substantial. Fox and Ingalsbee (1998): "…within the U.S. Forest Service, there has been more of an interest in mechanical fuels reduction treatments using commercial thinning for fuelbreak construction to lower the risk of crownfires. Proponents argue that using commercial thinning to reduce canopy densities would increase firefighter safety and prescribed fire efficiency during wildfire suppression, and are necessary treatments to prepare for future prescribed burning. However, we suggest that these kinds of mechanical treatments create their own fire risks and fuel hazards that can potentially cause problems for wildland firefighter safety and prescribed fire efficacy." They also note that "After generating abundant slash through mechanical thinning and before disposing of that slash, the program may become stalled due to lack of funding, air quality, or other political concerns. This scenario would leave firefighters worse off as they face both the untreated high risk fuels and vast areas of new slash." Ingalsbee (2005) provides a cogent analysis and discussion on the efficacy and risks associated with creation of fuel breaks for future fire suppression." (162, 21)

FS Response: The classic definition of a fuelbreak is "a strategically located, wide block or strip on which a cover of dense, heavy, or flammable vegetation has been permanently changed to one of lower fuel volume and reduced flammability Green (1977) Ingalsbee (2005)" The Marshall Woods project is a restoration based project designed in part to "emulate fire's natural role on the landscape through vegetative treatments including prescribed fire" (EA p. 16), the project does not include any "fuelbreak" construction.

Overall, the desired future conditions address stand and landscape scale changes in fuels conditions specific to canopy characteristics to reduce the probability of crown fire behavior, dead and down fuel loads to reduce the flame length, and resultant level of tree mortality a stand will experience during a wildfire (Fire and Fuels Specialist's Report, p. 24).

92. "Wuerthner (2014): "…prescribed burning is risky, and the opportunity for agencies to set fires is limited to short time frames. Many forest managers are loath to okay a prescribed burn unless conditions are ideal for containment. No one wants to be the person who signed off on a prescribed burn and then had it get away and burn homes to the ground." Prescribed burns are usually carried out during the early season, when plants and shrubs

are not historically adapted to fire and when heavy fuels will not be consumed. There is also the issue of having the proper fire staff available at the right time, as they may well be deployed on fires on other districts, forests or even regions." (162, 22)

FS Response: Wuerthner (2014) is not a peer-reviewed scientific paper; it is an opinion. See response to comment #67.

93. "The Proposed Action also departs from standard diameter recommendations for "thinning from below' (Brown et al. 2004) which is generally limited to stems less than or equal to 8" diameter at breast height. It raises it to less than or equal to 10" dbh. This will result in a larger percentage of stems of larger size that will be downed, significantly increasing the fuel load component that is more resistant to rapid decomposition due to its volume. This increased fuel loading may move conditions in the opposite direction of what the Forest Service claims to be trying to achieve." (162, 23)

FS Response: No standard diameter recommendations exist for "thinning from below", rather as disclosed in the Forested Vegetation Specialist's Report p. 36 and EA pages 36 and 114, "Thinning from below (low thinning) involves removing trees from the lower part of the forest canopy, leaving the largest, healthiest trees to occupy the site…Thinning from below primarily removes overtopped and intermediate trees, trees that are shorter and receive a limited amount of light. Brown and others (2004) actually state, "Possible standards for placing boundaries on appropriate low thinning include diameter limits and percentile approaches. Diameter limits, such as restricting removal to trees < 30 cm (11.8") or 50 cm (19.7") is one way to approach the problem, but the limit should vary by site." Also refer to response to comment #s 53 and 58.

94. "The evidence is clear that one time thinning creates an overwhelming amount of slash. The EA does not include a risk analysis of the effects of the excessive slash loading predicted in the EA. These risks include raising the current fire risk above existing levels and the risk of an escape fire doing more harm than good. The Forest Service has limited its options to address this risk by tiering the project to the Healthy Forests law, which requires qualifying projects be completed within two years. Within the life of the project fuel loads are predicted to increase. NEPA requires a "hard look" at all reasonably foreseeable potential effects and a comprehensive risk analysis is required." (162, 24)

FS Response: Refer to response to comment #s 62 and 88. Refer to the Project File for fuel loading estimates and potential fire reports under moderate and severe conditions, by alternative treatment, across the temporal period used in the analysis (Items M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-34, M5-35, M5-36, M5-37, M5-38, M5-39, M5-40, M5-41, M5-42, M5-43, M5-44, and M5-45). This is not a project analyzed under the Healthy Forests Restoration Act authority of 2003.

95. "Thinning and Burning for Fire Suppression is Misguided Beyond the Structure/Wildland Fuel Interface…Some of the major goals of the proposed project are thinning and burning of understory vegetation to promote fire safety, aid in future suppression and help prevent large catastrophic fire events. This strategy has been shown to be self-defeating by numerous researchers"…including Reinhardt, et al. (1999 and 2008) and Wuerthner (2014). (162, 25)

FS Response: The Marshall Woods project is a restoration based project designed in part to "emulate fire's natural role on the landscape through vegetative treatments including prescribed fire" (EA p. 16). "Overall, the desired future conditions address stand and landscape scale changes in fuels conditions specific to canopy characteristics to reduce the probability of crown fire behavior, dead and down fuel loads to reduce the flame length, and resultant level of tree mortality a stand will experience during a wildfire" (Fire and Fuels Specialist's Report, p. 23). "Thinning stands to reduce crown fire potential is a primary means of reducing fire hazard" (Graham et al., 1999, 2004; Brown and Aplet, 2000) (Fire and Fuels Specialist's Report, p. 24).

"The fundamental goal of fuel treatment should not be to reduce spread rate but to reduce burn severity (Reinhardt, et all, 2008). Burn severity for the desired future condition is represented by flame length. The objective is that with reduced flame lengths, stands will experience lower levels of tree mortality during wildland fire events whether they are large or small event in scale. The lessened fire intensity allows for a greater margin for firefighter and public safety. Resilient stand conditions contribute to resilient community conditions" (Fire and Fuels Specialist's Report, p. 23).

Wuerthner (2014) is not a peer-reviewed scientific paper; it is an opinion.

96. "The EA does not disclose the cumulative effects of fire suppression on the project area. From reading the EA, general adverse impacts of fire suppression are suggested, but they are not analyzed in the proper spatial and temporal context. None of the regulatory framework for the Fire/Fuels issue was developed in a NEPA process that analyzed the forestwide impacts of fire suppression implicit and explicit from the best available updated science on ecosystems. This includes national policies such as the National Cohesive Wildland Fire Management Strategy, the Forest Plan and the 2014 Lolo Fire Management Plan." (182, 6)

FS Response: Table 7 on p. 33 of the Fire and Fuels Specialist's Report depicts the cumulative effects summary for fire and fuels. The first section of this table describes fire suppression. Treatments within the project area would affect ecosystem function by returning prescribed fire to the landscape since there will be limited opportunities for fire to play its natural role due to values at risk. Pages 2-8 of the Fire and Fuels Specialist's Report outline regulatory frameworks and policies addressing fire management.

97. "Fuel reductions are temporary, but the EA does not disclose what vegetation re-growth would look like, or when vegetation re-growth would neutralize the fuel reduction treatments so that the agency would consider it necessary for the next round of treatments. The EA states, "the effectiveness of treatments would span 20-30 years" as if the effectiveness is 100% and then all of a sudden it's not. So then you get vague terms in places like Table 20: "effective in the long term"..."short term" and "less effective." This does little to help people to evaluate the value of the proposed treatments." (182, 7)

FS Response: Reducing basal area reduces crown bulk density which directly affects CFI, and %mortality. The more BA is reduced, the longer the treatment is effective. Surface fuel treatments reduce flame length which reduces intensity (pp. 139-142, EA). Timeframes for effectiveness of treatments were taken from FVS outputs and are listed below.

Forested Vegetation Specialist's Report, pp. 5-6, "The Forest Vegetation Simulator (FVS), an individual-tree, distance-independent growth and yield model, was used in this analysis to summarize current stand conditions, model future conditions and stand dynamics, and model proposed treatments and their effects. In addition, FVS was used in conjunction with the Fire and Fuels Extension (FFE) to analyze the effects of no action and the proposed treatments on fire behavior and fuel loading. The temporal scale used in this effects analysis was from present day to 2050. " The treatments in Alternative B were designed to fall below thresholds of high stand susceptibility to mountain pine beetle for the temporal period of 20-30 years (Forested Vegetation Specialist's Report pp. 5-6 and 26). Additionally, thin and prescribed fire treatments in Alternative B were designed to maintain resilient stands with less than 15 percent mortality under moderate and severe burn conditions throughout the time period. Alternative B is the only alternative that would accomplish this. Based on modeling, Alternative C and D in the Main Rattlesnake corridor would result in up to 100% mortality under severe conditions following treatment, rendering the treatment ineffective and comparable to no action under severe conditions. All FVS keyword and detailed output files are located in the Project File (Items M5-28, M5-29, M5-30, M5-31, M5-32, M5-33, M5-34, M5-35, M5-36, M5-37, M5-38, M5-39, M5-40, M5-41, M5-42, M5-43, M5-44, and M5-45).

98. "The EA also downplays the short-term risk of slash lying on the ground in piles or across units. And the EA also doesn't disclose that opening up the overhead canopy will dry up conditions on forest floor increasing the risk of more rapid spread once a fire does start." (182, 8)

FS Response: Please see response to comment #s 88 and 89. As discussed on Fire and Fuels Specialist's Report p. 23, "The fundamental goal of fuel treatment should not be to reduce spread rate but to reduce burn severity (Reinhardt, et al, 2008). Burn severity for the desired future condition is represented by flame length. The objective is that with reduced flame lengths, stands will experience lower levels of tree mortality during wildland fire events whether they are large or small event in scale. The lessened fire intensity allows for a greater margin for firefighter and public safety. Resilient stand conditions contribute to resilient community conditions."

99. "'(T)reatments need to go beyond the areas immediately surrounding individual homes to protect other resource values that make up the forested setting including soil stability, wildlife habitat, water quality, timber value, and landscape aesthetics (Graham, 2004)." The EA has no scientific basis for stating that logging will significantly reduce the effects of the high-severity fire that will eventually occur anyway. After all, "in extreme weather conditions, such as drought or very high winds, fuel treatments may do little to mitigate fire spread or severity (Pollet and Omni, 2002).'" (182, 12)

FS Response: As stated on EA p. 17, "Studies indicate the most appropriate fuel treatment strategy for reducing hazardous fuels includes forest thinning (removing ladder fuels and decreasing tree crown density) followed by prescribed burning, piling and burning of fuels, or other mechanical treatments (e.g., Peterson, 2005). Other research shows that treating areas before fire begins can decrease the severity of fire (Strom and Fule, 2007; Peterson, et. al, 2005; Omni and Martinson, 2004; Agee and Skinner, 2005; Graham, 2004; Pollet and Omni, 2002; Fule et. al 2001).

Our findings indicate that fuel treatments do mitigate fire severity. Treatments provide a window of opportunity for effective fire suppression and protecting high-value areas.

Although topography and weather may play a more important role than fuels in governing fire behavior (Bessie and Johnson 1995), topography and weather cannot be realistically manipulated to reduce fire severity. Fuels are the leg of the fire triangle (Countryman 1972) that land managers can change to achieve desired post-fire condition" Pollet and Omni (2002)."

"Fuel treatments that involve prescribed fire carry risks of escape and of greater than intended fire effects including post-fire insect attacks of residual trees (Ganz et al., 2003), consumption of organic soils, and unwanted smoke production. However, in many cases, no action may carry greater risks from effects of abnormally severe fires (Agee and Skinner, 2005)."(Fire and Fuels Specialist's Report, p. 27).

100. "A big problem with the fuels and fire analysis is that the EA fails to disclose the implications of the areas not treated by the proposal. The no-action alternative is described basically a disaster waiting to happen, and the action alternative discussions, by contrast, fail to address the significance of elevated fuel levels still remaining after project implementation in untreated areas. This is a systematic failure to analyze cumulative effects." (182, 13)

FS Response: Cumulative effects for fire and fuels are described on pp. 33-35 of the Fire and Fuels Specialist's Report. Figure 21 on EA p. 100 describes effect indicators as displayed by acres of treatment. One of the measurement indicators, within the effects analysis methodology, is high intensity wildfire potential which is the measure of a stand's higher or lower potential for crown fire initiation during typical fire season weather patterns and fuels conditions (Fire and Fuels Specialist's Report p. 9). Proposed treatments are focused on areas with fire behavior fuel models representing high intensity fire behavior during typical fire season conditions for this area (Fire and Fuels Specialist's Report p. 18). Due to ecological and social constraints, treating the entire project area is not possible, however, "The spatial arrangement of vegetation influences the growth of large fires. Patches of vegetation that burn relatively slower or less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking (at a lower intensity), which locally delays the forward progress of the fire." Graham et al. 2004).

101. "The EA describes the forests of the project area as historically open due to frequent low-severity fire, implying that mixed-severity or high severity fire was outside the norm. This is not correct. Baker et al., 2006 state: (T)he variable-severity model, in which forest structures were shaped mainly by infrequent severe fires, is consistent with the evidence of fire history and tree age structures in these forests. Only limited areas of ponderosa pine–Douglas fir forests in the Rocky Mountains, primarily at low elevations and on xeric sites, appear to have been shaped primarily by low-severity fires. To assess which model may best fit a potential management area, site- specific information on fire history and forest conditions is required." (182, 14)

FS Response: Refer to responses to comment #s 53 and 55 above. Assessments of which models best fit the project analysis was completed and documented on the following EA pp.: 12-13, 16-17, 35-39, 86-96, 110-125, 131-138, 148-149; Forested Vegetation Specialist's Report pp. 6-21 and 33-46; and Fire and Fuels Specialist's Report pp. 19-22.

102. The EA states that 'The Rattlesnake and Marshall drainages run to the south and south west. This is the inverse direction of the prevailing winds…The combined effects of topography, prevailing winds, and daytime up-valley and upslope winds could quickly escalate fire behavior leading to significant control problems in the WUI in the Marshall Woods project area.' So doesn't this mean that if wind blows UP the RS drainage and "up valley and upslope" then the wind would blow a fire AWAY from the residences which are DOWN drainage and DOWN slope of the RS drainage? And if this is the case, how would this lead to significant fire control problems in the WUI? I thought this means the wind would blow a fire AWAY from the residences. (153, 1; 162, 13)

FS Response: Please see response to comment #76.

AIR QUALITY

103. "This section treats the smoke emissions as being the same from all the action alternatives. This is flatly wrong. If trees are removed there will be less PM from pile burning/underburning. The type of fire behavior will be very different between alternatives as you have described in the fire fuels section therefore the amount of Particulate Matter generated will be significantly different from a wildfire running through each of the alternative landscapes." (147, 15)

FS Response: Please refer to descriptions of Alternatives B, C, and D to better understand the activities proposed (EA pp. 33-43). As the proposed alternatives are designed, commercial material would not be burned, it would either be hauled out or left standing, either way influencing subsequent prescribed fire activity. We would cut material 8" dbh or less. Please refer to EA pp. 35-39 for vegetation treatment descriptions.

Please refer to FVS outputs in the Project File which show insignificant differences in emissions between alternatives. All action alternatives reduce emissions in a wildfire event, which is the only scenario in which a NAAQS exceedance is modeled.

104. "The section doesn't address the greenhouse gas emission differences between alternatives from wood utilization or from wildfire size and intensity. Neither does it address post-fire GHG emissions which are very different between alternatives based on the mortality estimated to occur." (147, 16)

FS Response: Based on the Clean Air Act, and The National Ambient Air Quality Standards, the only emission standards required for analysis are PM2.5 and PM10. Nonetheless, carbon reports, as well as estimates of tons/biomass per acre removed and/or consumed under the modeled treatment scenarios are in the FVS output reports located in the Project File (Project File, Item M2-3). Also please refer to the Forest Carbon Cycling and Storage Report in the Project File (Item N-25).

105. "No discussion of the use of an air curtain burner was found in my review. This would substantially change the PM emissions from pile burning; it would also change the cost and would require the use of equipment to haul the burner into the site and to load it while in operation. Also to be effective the slash would need to be transported (yarded) to the roadside." (147, 17)

FS Response: Use of an air curtain burner is a form of onsite mechanized disposal and could be used under Alternative B (Units 1-6 and 70-71) or Alternative C (Units 4-6). An air curtain burner would not be used under Alternative D or Alternative C (Units 1-3) as these alternatives do not include the use of mechanized equipment. EA pp. 36 and 114 and Forested Vegetation Specialist's Report p. 36 state, "Biomass and slash disposal may include a variety of methods such as mechanical removal, mastication, hauling as sawlogs, biomass utilization, disposal on site, piling and burning, burning, or chipping. Individual treatments or a combination of treatments may occur." Please refer to EA p. 51 for resource protection measure #8 which specifically refers to the use of a curtain burner.

106. "The EA talks about the potential for nuisance smoke but no differentiation between alternatives…Won't alt B and C generate less smoke if sawlogs and pulp wood is removed and not put in the piles to be burned? The less wood greater than 3" in dia in the piles the quicker they will burn and less residual smoldering and thus less smoke. It also reduces the risk of escapes. Piles with small material are less likely to harbor hold-over smokes that could become a wildfire two weeks after the piles are burned and a fall cold front with strong winds arrives. The less large material the less patrolling of pile burning will be needed and thus the cost is reduced. The smaller the piles and reduced tonnage means less scorched soil and less potential for noxious weed infestation and treatment being needed." (147, 18)

FS Response: Please see response to comment #s 59, 103, and 104. This was not an issue raised during scoping; therefore did not drive alternative development nor was it included as an effects indicator.

WILDLIFE

107. "The picture that was shown to us depicting the healthy forest after all the cutting, burning and timber harvest looked more like a park than a forest. It was difficult to imagine wildlife, assuming they survived the initial destruction, being able to exist in this pristine park like setting. With their habitat destroyed, their food supply, such as berry bushes and bugs in rotted stumps and trees burned how will this stark forest sustain the wildlife. Many animals need the cover and density of thick bushes and small trees. Has any consideration been given to the wildlife? I realize that the elk and deer will thrive on new grasses but what about all the other species? Many property owners already panic when they see wildlife in their yards. Will the animals be driven into these areas?" (19, 1)

FS Response: The Wildlife Specialist's Report details the consideration given to wildlife species, including analysis of effects to 21 different species of mammals, birds, and amphibians. The analysis considered the impacts of displacement, as well as other habitat modifications, on these species and their habitat. Resource Protection Measures were developed for wildlife (see EA pp. 63-67, RPMs #32-45). These measures address concerns about the cover of thick bushes and small trees, as do many of the prescriptions. Other Resource Protection Measures were developed to phase implementation of some of the project activities to account for displacement of wildlife species, and ensure adequate un-disturbed areas would be present within the project area during implementation of treatments.

108. "Has the welfare of the wildlife been considered in regards to the time of year this project commences?" (19, 4)

FS Response: Yes. The effects analyses for wildlife species considered the treatments as well as timing of all activities related to the project. Details can be found in the Wildlife Specialist's Report, and in the wildlife analysis section of the EA (pp. 150-228). Where deemed necessary, timing of activities would be restricted or phased to reduce or avoid effects to certain wildlife species during critical times of the year for them biologically (see Resource Protection Measures, EA pp. 63-43, RPM #s 32, 37, 40, 41, and 43)

109. "The pre-decisional EA does not discuss how the timber sale's logging and slash/RX burning activities will be mitigated to assure protected bird species' individuals and their habitat are not harmed in any way…Identify the birds that exist in or near the project area that are protected by the Migratory Bird Treaty Act and discuss how these birds will be protected during burning and timber harvest operations." (22, 2)

FS Response: Migratory birds are discussed in multiple parts of the EA and Wildlife Specialist's Report. In particular, p. 16 of the Wildlife Specialist's Report explains the MOU between US Fish and Wildlife Service and the Forest Service regarding migratory birds, and states, "The parties agreed that through the NEPA process, the Forest Service would evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors. The needs of migratory birds are addressed throughout this analysis, including the individual sections on project impacts to bald eagle, black-backed woodpecker, flammulated owl, northern goshawk, and pileated woodpeckers, as well as other sections of this report that address habitat diversity." Harlequin ducks, which are also migratory birds, are also discussed. Analysis of each of these species in the report discussed effects to the species of activities, and any project-specific protection measures for them (see Resource Protection Measures in the EA, pp. 63-67, particularly RPM #32-36, 41). Bird species in the project area are discussed in the Analysis Area description (EA p. 150, or on p. 25 of the Wildlife Specialist's Report), as well as in the individual sections for flammulated owls, harlequin ducks, peregrine falcons, bald eagles, black-backed woodpeckers, and northern goshawks. In addition, a comment during scoping pointed out the importance of woody draws for songbirds, and this is addressed in the EA on p. 228, which references Resource Protection Measures that would protect those habitats from direct fire (see Resource Protection Measure #s 11 and 50).

110. "While rare, grizzlies have historically utilized the Rattlesnake NRA and wilderness for foraging and denning purposes and commercial logging will undoubtedly have an adverse effect on grizzly bears in the area." (163)

FS Response: It is true that grizzly bears do use the Rattlesnake NRA and wilderness (EA p. 56). The effects of all project activities to grizzly bears were analyzed and discussed extensively in the Wildlife Specialist's Report (pp. 55-68), and presented in the EA on pp. 173-185. A Biological Assessment will also be prepared and submitted to the US Fish and Wildlife Service in order to consult with USFWS on the effects to grizzly bears.

111. I support Alternative B because…"dense, heavily shaded forests now occupy a historically disproportionate and increasing portion of the Rattlesnake watershed and provide relatively few resources for native wildlife. In contrast, open forests are increasingly rare and support a rich diversity of native grasses, forbs and shrubs of value to birds, bears, ungulates and small mammals and their prey." (144, 2)

FS Response: Thank you for your comment. The wildlife analysis and project design considered the current conditions in terms of forest structure and diversity for a variety of wildlife species. Conditions are discussed in the EA on pp. 150-153, with details about the suitability of forest structural types currently and post-treatment (for each alternative) on a variety of Threatened, Sensitive, and Management Indicator Species (EA pp. 155-232).

112. FWP supports commercial operations in Units 1, 4, 5, and 6 as these would have long-term benefits for winter range for elk in these areas while maintaining long-term elk security. If conditions are amenable, we would prefer operations to occur in early spring or late summer/fall (outside of flammulated owl nesting period). We also recommend monitoring the units right before harvest, especially for late summer work, to ensure that any flammulated owl nests have fledged before field operations begin. If operations are deemed necessary to conduct during winter months, then FWP suggests trying to minimize disturbance of wintering elk as much as possible during harvest operations with the following recommendations: 1) Conduct all operations in Unit 1, 4, 5, and 6 in one winter season to avoid disturbance across multiple years; 2) Not conduct operations in Units 4, 5, and 6 at the same time as operations in Unit 1, in order to reduce disturbance across space; and 3) Conduct and finish operations in Units 4, 5, and 6 first before starting Unit 1, in order to potentially mitigate the amount of vehicle disturbance on the haul road later in the winter, when elk may become more food stressed." (160, 1)

FS Response: Timing of the proposed harvest was a big consideration in project design, due to the occupancy of those units by both elk and flammulated owls. While early spring or fall would be the least impactive times to flammulated owls and elk to conduct logging or to do non-commercial treatment, concerns with other resources (such as soils and recreation) and the need for flexibility in contracts led us to potentially allowing winter harvest in Units 1, 4, 5, and 6. The effects of disturbance to elk are discussed in the Wildlife Specialist's Report in the Elk section and in the EA (pp. 221-225). Resource Protection Measure #37 addresses the need to phase implementation of harvest in units within elk winter range. At this time and depending on which alternative is selected, we cannot guarantee that Units 4, 5, and 6 would be completed before Unit 1, or that all four units would be completed in one season; however we will continue to consider the suggestion, as well as others, as ways to minimize disturbance to elk. Resource Protection Measure #32 limits harvest in Units 1, 4, 5, and 6 during the flammulated owl breeding, nesting, and fledging seasons.

113. "The map on p. 151, Figure 37 makes it look like unit 3 and part of unit 2 are in the wilderness." (147, 19)

FS Response: Thank you for your observation. This was an unintentional error in that map. Figure 1 on EA p. 11 accurately shows the wilderness area in relation to the project area.

114. "On p. 202 in describing the effects of Alt. A it indicates habitat would degrade over time as forests become denser. It doesn't mention the potential for a rapid loss of habitat if a severe wildfire was to burn through the Flammulated owl occupied areas in the near future." (147, 20)

FS Response: The potential for severe wildfire and the consequences of such are covered in other sections of the EA, including Fire and Fuels (pp. 139-145) and Forested Vegetation (pp. 97-102). Because high severity fire is not a planned activity, it was not specifically addressed for flammulated owls. The descriptions of suitable flammulated owl habitat are given on pp. 92-93 of the Wildlife Specialist's Report and in the literature cited therein. Suitable habitat for flammulated is not associated with recent severely burned forests, particularly with the 100% crown mortality that could occur under certain alternatives (see Table 19, EA p. 143).

115. "The Effects on Elk From Loss of Hiding Cover Was Not Evaluated…The EA evaluates the effects a 30-60% loss of canopy cover would have on elk, concluding there would be no effects on thermal cover. Yet there is no analysis of a key component of elk habitat: hiding cover at ground level." (162, 41)

FS Response: The Wildlife Specialist's Report details the analysis conducted regarding elk. It does not conclude that there will be "no effects on thermal cover," as suggested in the comment, but rather that the proposed treatments would still meet the Forest Plan Standards for cover:forage ratio for MA23. There are no Forest Plan Standards that require analysis of hiding cover at ground level. The elk analysis considers the effects of the proposed treatments on habitat suitability for elk. This analysis took into account the numerous design features and Resource Protection Measures that would retain vegetative cover in the form of thickets of young dense trees following harvest and burning (Resource Protection Measure #36) and that would feather vegetation, slash, or large woody debris within 100 feet of trail corridors to provide screening (Resource Protection Measure #63). The main Rattlesnake corridor is not within any Management Areas with big game standards, and is outside of the primary winter range for elk.

116. "The EA's wildlife analyses are lacking in that they don't address consistency with explicit applicable Forest Plan direction. Conclusions of population viability are therefore not properly supported, and furthermore the analyses fail to utilize the best available science." (182, 18)

FS Response: Consistency with Forest Plan direction is addressed at multiple places within the Wildlife Specialist's Report. In particular, pp. 12-15 explicitly detail the Forest Plan standards related to wildlife that are applicable to this project. Table 3 on p. 12 details all of the standards and guidelines relative to wildlife for Management Areas designated in the Forest Plan, and Table 4 p. 15 details the wildlife-related standards for the Limits of Acceptable Change in the Rattlesnake National Recreation Area, and how the project meets those standards and is thus consistent with the Forest Plan.

Forest Plan requirements for species viability is discussed in depth on p. 17 and again on p. 67 of the Wildlife Specialist's Report, as well as an assessment of how the project activities would affect viability for individual species throughout the report (see also the responses to comment #s 118 and 119 below).

Consistency with Forest Plan Standards is also addressed for Elk on pp. 126-132 of the Wildlife Specialist's Report.

The best available science used to support the analysis for each species is cited throughout the report, listed in the Literature Cited, and provided in the Project File.

117. "The Forest Service must complete a programmatic consultation with the U.S. Fish & Wildlife Service on the forest plan, in the context of forestwide Canada lynx Critical Habitat designation and the Northern Rockies Lynx Management Direction (NRLMD)." (182, 19)

FS Response: The Forest will consult on both lynx and lynx Critical Habitat at the project level. Both the BA and NEPA analysis are written to address critical habitat at the project level by performing a qualitative and quantitative analysis of primary constituent elements (PCEs). This analysis is independent and totally separate from the analysis of impacts based on the Standards and Guidelines found in the NRLMD. The results of ongoing fire suppression in the analysis area are captured in the description and quantification of habitat types and PCEs that is presented in the Existing Condition for Critical Habitat. In particular, the Wildlife Specialist's Report details the existing condition of Critical Habitat on pp. 47-48 (EA pp. 166-167), as well as Table 14 in the Wildlife Specialist's Report (Table 29 in the EA) describes the current condition in the analysis area. The current condition reflects all past activities that have influenced the elements of Critical Habitat in the past, particularly the structural stages of boreal forest within the analysis area.

118. "The EA fails to disclose the best available science it is relying upon in making sure Forest Service management is not impeding grizzly bear population recovery. Likewise, the analyses for the wolverine, fisher, gray wolf, elk, harlequin duck, boreal toad, pileated woodpecker, northern goshawk, and Townsend's big-earred bat do not disclose what the Forest Service is relying upon as best available science to assure population viability. The analyses must assure that sufficient quantity and quality of available, well-distributed habitat for each species is provided, based upon the best available science." (182, 21)

FS Response: The literature that was used to consider each of these species is included in the EA in the sections for each species, is also cited in the Wildlife Specialist's Report, and is included in the Project File. In particular:

Grizzly bears—on p. 54 of the Wildlife Specialist's Report it states that "the current Lolo Forest Plan has been thoroughly considered by USFWS and determined to be sufficient to protect grizzly bears in occupied areas outside the Recovery Zone, and that incidental take is accounted for in the updated ITS." The analysis discusses multiple aspects of grizzly bear ecology and the effects of the project to those different factors, and overall effects to grizzly bears. The analysis also tiers to the draft Grizzly Bear Conservation Strategy (GBCS) and talks about adherence with guidance in that document, which incorporates best available science for grizzly bear recovery (see p. 66 of Wildlife Specialist's Report, as well as the Grizzly Bear Conservation Strategy (Project File, Item O-246 and O-341)).

Gray wolf, harlequin duck, and Townsend's big-eared bat-- The analyses concluded that there would be No Impact to these species. Viability for these species is not required at the project level, and thus if the project is having no impact, then no further viability analysis is needed.

Wolverine- The analysis for wolverines tiered to the best available science that is cited and summarized in the 2013 Listing Proposal (78 FR 7865) and in the 2014 Finding (79 FR 47522), both of which are cited multiple times in the Wildlife Specialist's Report (particularly on pp. 67-69) and included in the Project File, Items M13-12 and 17). Page 71 of the Wildlife Specialist's Report specifically re-iterates the scientific basis for assessing effects to wolverines, and states that, "The FWS concluded that because wolverine habitat is generally inhospitable to human use and occupation and most of it is also federally-managed, wolverines are somewhat insulated from impacts of human disturbances from industry (e.g., logging), agriculture, infrastructure development, or recreation."

Fisher—The Wildlife Specialist's Report cites analysis by Samson (2006b) (Project File, Item O-268) addressing fisher viability at the Forest and Regional scale, and shows that habitat is sufficient at the Forest level to provide for a viable population of fishers (p. 76). Effects to fisher habitat in the project area are discussed on p. 78 of the Wildlife Specialist's Report and conclude there will not be a reduction in fisher habitat under any of the alternatives.

Boreal Toad—Science used to support the analysis is cited in the Wildlife Specialist's Report, pp. 104-107.

Elk, Pileated, and Goshawk—These three species are Management Indicator Species for the Forest. As such, there is no rule stating that the Forest must manage for population viability, as that rule is specific to Sensitive Species (see p. 67 of Wildlife Specialist's Report, which cites FSM 2670.32 (viability of Sensitive species) and Forest Plan standard 27 (at p. II-14) directs the Forest to manage for population viability (USDA-FS 1986).

119. "Does the Lolo National Forest assume that adhering to the Forest Plan's management indicator species (MIS) scheme assures viability of the Sensitive, Threatened, and Endangered species?" (182, 21)

FS Response: Viability of each Sensitive and Threatened species in the project area were addressed in the Wildlife Specialist's Report in the sections on each species (there are no Endangered terrestrial species in the project or on the Forest). As stated on p. 67 of the Wildlife Specialist's Report, "For species identified as sensitive, the Forest Service shall avoid or minimize impacts to species whose viability has been identified as a concern (FSM 2670.32). Forest Plan standard 27 (at p. II-14) directs the Forest to manage for population viability (USDA-FS 1986). The Forest Service is required by the National Forest Management Act (NFMA) and its implementation regulations to provide for a diversity of native plant and animal communities based on the suitability and capability of the land in order to meet multiple use objectives (16 U.S.C. 1604(g)(3)(B); 36 CFR 219.10(b) (2005); and FSM 2670.12)." See response to comment #118 for further information on viability for various species.

120. "The Forest Service's Samson (2006) reports says that 110 breeding individuals (i.e. 55 pairs) are necessary for a viable goshawk population in Region 1. Attachment 1 is a map showing the results from the 2005 Region-wide goshawk survey using the "Woodbridge and Hargis" goshawk monitoring protocol, which is published as a USFS a Forest Service technical report. That 2005 detection map says there were 40 detections in 2005 in Region 1. So the results of this survey essentially show that the population in Region 1 is not viable

according to the agency's own science (only 40 instead of 55). And some of the detections may have been individuals using the same nest, so the number of nests (and therefore number of breeding pairs) could be even lower than 40. What is wrong with our analysis?" (182, 25)

FS Response: The map referenced in this comment shows detections from a Regional goshawk survey effort conducted in 2005, the methods and results of which are detailed in Kowalski 2006 (Project File, Item O-215), and cited in the Wildlife Specialist's Report on p. 113. The survey effort sub-sampled the Region, as it would be infeasible to survey every acre of land in the Region for goshawks. Thus Kowalski used a sub-set of Primary Survey Units (PSUs) placed throughout the Region for the survey, surveying 114 of the 12,350 PSUs that contained NFS lands in the Region. Goshawks were detected in 40 of the 114 PSUs surveyed, leading to a detection rate of 0.39 for PSUs in the Region (all described in Kowalski). Extrapolating this detection probability across all lands in the Region would result in many more than 40, or even 55, goshawk detections. As stated in Kowalski: If we use the above confidence limits to extrapolate to the entire set of PSUs within the accessible portion of the Northern region, we obtain a maximum likelihood estimate of 4,816 PSUs with goshawk presence and, based on a 95% confidence interval, having a range of 3,581 to 6,175 PSUs with goshawks present…since goshawk researchers have found no evidence that goshawks are declining in the western United States (Kennedy 1997, Squires and Kennedy 2006) and Samson (2005) demonstrated that goshawk habitat was well-distributed and abundant in the Region, our estimate of goshawk presence suggests that goshawks are abundant and well-distributed throughout the accessible portions of Region One National Forest System lands within Montana and Idaho during the breeding season."

The goshawk analysis in the Wildlife Specialist's Report (pp. 112-113) considers this information in the existing condition for goshawks, and in the analysis of effects to goshawks (pp. 119-120).

121. "The EA states that "Nesting and foraging habitat for the northern goshawk and pileated woodpecker (detailed below) would remain abundant and widespread in the analysis area, Forest- and Region-wide. " The EA does not disclose its criteria for declaring an area to be nesting or foraging habitat for either species." (182, 16)

FS Response: Habitat for goshawks is described on pp. 113-114 of the Wildlife Specialist's Report. In particular, on p. 114 (EA p. 212), it states, "Nesting habitat for goshawks was estimated using the goshawk habitat model developed by Lolo NF wildlife biologists (Project File, Item M13-13). The model is based on vegetation attributes collected from nest sites observed in the Northern Rocky Mountain Ecoprovince that encompasses the analysis area (Samson 2006a), and then querying R1VMap data to identify areas that could provide nesting and foraging habitat." Model results for the project area are shown in Figure 8 in the Wildlife Specialist's Report (p. 117, EA p. 215). Similar methods that tier to Samson (2006) were used for pileated woodpecker habitat identification via a model. Details of the habitat model criteria for both species can be found in the methods paper that is included in the Project File (Item M13-13).

OLD GROWTH

122. "'Monitoring data collected on the Lolo NF on silvicultural treatments designed to protect large, old trees indicated marked success over no treatment. Data collected in old growth stands between 1995 and 2005 indicate that treatments are successful at maintaining old growth structure post-treatment where it occurred (Brewer et al., 2008) ..' Has the Lolo National Forest monitored these stands to determine the response to these treatments by wildlife species of interest?" (182, 16)

FS Response: Yes, the Lolo NF has monitored the habitat conditions and use of old growth stands that were treated or burned. This monitoring focused on flammulated owls, pileated woodpeckers, and northern goshawks, and is detailed in Brewer et al., 2007 and 2009 (Project File, Item O-153 and 154). The results of this monitoring showed use of treated old growth stands by all three species. In addition, goshawks have been observed nesting in old growth stands both pre- and post-treatment on the Lolo NF in at least two areas in recent years—Pattee Canyon and Dry Gulch. This information is also available in Brewer et al., 2014 Lolo Forest Plan Wildlife Monitoring Report (Project File, Item M13-26).

123. "The Forest Service apparently is operating under the assumption that maintaining a forestwide amount of 8% old growth would assure populations of old-growth MIS and maybe other species. What is the "best scientific information" the Forest Service is relying upon? Lesica (1996) states that use of even 10% as minimum old-growth Standard may result in extirpation of some species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old- growth condition prior to European settlement. If that is not "best available science", please cite what the Forest Service considers it to be in terms of amount and distribution of habitat." (182, 22)

FS Response: The project is not proposing to treat any stands identified as Old Growth (see response to comment #125 below, and stated in the Wildlife Specialist's Report at p. 112), and there are no areas designated as Management Area 21 within the project area (MA21 has goals of providing for old-growth succession; see Wildlife Specialist's Report pp. 13-14). The project meets old growth standards in the Forest Plan.

The Forest Plan standards related to Old Growth were designed to protect Old Growth-associated species (Project File, Item L-4 particularly p II-61; also the Forest has conducted monitoring to assess habitat for Old Growth-associated species on the Forest, concluding that habitat parameters are being met (see Brewer et al. 2007 and 2009; Project File, Items O-153 and 154)). In addition, species monitoring for Old Growth-associated species, such as goshawks and pileated woodpeckers, indicates the species are well-distributed across the Forest (see Wildlife Specialist's Report at pp. 112-114 and 122-123). This monitoring information, including data on the distribution of pileated woodpeckers (Project File, Item M13-17) and from Regional goshawk survey (see Kowalski 2005,Project File, Item O-215) is the best available science that the Forest is relying upon to determine whether forest management is assuring populations of old-growth MIS.

The history of the Forest's Old Growth policies and science is documented in Brewer et al., 2008, particularly in Appendix 1. It states on p. 1 of Appendix 1, "As a strategy for meeting non-game species needs, the 1986 Plan allocated 8% of its land area to old growth, evenly distributed within the Forest's six habitat groups, and evenly distributed within each of the Forest's 71 major watersheds. The 8% was based on interpretation of the literature

available at the time concerning minimum habitat needs for various old-growth associated species including the pileated woodpecker, fisher, pine marten, and northern goshawk."

124. "The EA states: Using the definition of old growth in the Lolo NF Plan (1986 at pp. VII 24-25) conservative estimates derived from FIA data show at least 14.4% of the Forest is old growth or over mature timber (Bush et al. 2003). This estimate far exceeds the 8% standard in the Lolo NF Plan. Using the Region One definition of old growth (Green et al. 1992), conservative estimates from FIA data show the Lolo NF is comprised of 9.6% old growth (90% CI 7.7 to 11.5%), slightly above the 8% standard in the Plan and far above the 2% allocated in MA21 (Bush et al. 2007).

    What exactly are the differences in those two old-growth definitions that lead to such disparate estimated amounts? Is there a minimum stand size below which a stand cannot qualify for the old growth inventory, and if so, what is the scientific basis? Also, does the Lolo National Forest maintain any other inventory of old-growth for the forest besides the FIA?" (182, 23)

FS Response: The project does not propose to treat any stands that are identified as Old Growth by any definition. The three papers cited, which are available in the Project File (Items O-158, 159, and 184), detail the definitions and queries used to define old growth by the Forest Plan and how it was estimated by Bush et al. (2003), and the Green et al. (1992) definition and how it was estimated by Bush et al. (2007). Please refer to these papers for the details of the methods (Project File, Items O-158 and 159).

The definition of Old Growth in the Forest Plan (page VII-24) says "See Overmature Timber." Overmature Timber is defined as "Individual trees or stands of trees that in general are past their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth." The Region One definition of old growth is described in Green et al., 1992 (Project File, Item O-184).

Old growth is not an issue in the Marshall Woods project (Forested Vegetation Specialist's Report p. 27, EA pp. 104, 212). On Forested Vegetation Specialist's Report p. 27 and EA p. 104, the record states, "As described in the existing condition section, the Marshall Woods project area has an extensive history of past harvest, human occupation, human-caused stand-replacing fire, and extractive use all prior to NFS ownership. Given this history, no known old growth stands, as defined by the Forest Plan and Green and others (1992), are present within the project area. Remnant, individual old and/or large trees are a scarcity within the project area as well." As stated in Project File Item M5-27, "A Forest-wide old growth analysis using Forest Inventory and Analysis (FIA) data validates that the Lolo NF continues to meet the old growth strategy of the Forest Plan. Bush and others (2007) derived statistical estimates of the percent old growth using FIA data and the more restrictive definition (than the FP (see Project File, Item M5-27)) provided by Green and others (1992) on all forested lands on the Lolo NF. The 2007 estimate is 9.6 percent old growth that exceeds the 8 percent strategy (Lolo Forest Plan EIS, p. II-61). Forested Vegetation Specialist's Report p. 27, EA p. 104, "All treatments, in all alternatives, are designed to retain large, fire-resistant ponderosa pine and western larch where they occur within the limits of the treatment design. Refer to Forested Vegetation Specialist's Report pp. 27-29, EA pp. 104-106 on for details on how, "the treatments would likely hasten

diameter accretion and stands may potentially provide the large tree component of old growth habitat in the future."

125. "The EA also does not disclose how much old growth exists in the wildlife analysis area." (182, 24)

FS Response: The EA on p. 104 addresses the amount of old growth in the project area, and states "no known old growth stands, as defined by the Forest Plan and Green and others (1992), are present within the project area." No old growth, thus, is proposed for treatment in any of the alternatives, since it does not exist in the project area. The Wildlife Specialist's Report on pp. 27-29 addresses the current vegetative conditions and forest structural stages in the analysis area in terms of diversity of habitats for wildlife. In particular, Table 9 on p. 27 details the structural diversity and tree sizes, and shows that 8,121 acres within the analysis area are mature forest (tree sizes >10" dbh) with moderate to dense canopy (40%+). Thus approximately 28% of the analysis area consists of mature forest with dense canopy.

FISHERIES

126. "Rattlesnake Creek is prime habitat for endangered bull trout… a commercial timber operation would clearly impact the creek with increased siltation, etc." (54, 3)

FS Response: Rattlesnake Creek contains native bull trout, which are listed as a *threatened* under the Endangered Species Act, as well as designated critical habitat for bull trout (Fisheries Specialist's Report pp. 3, 7 and FAQs p. 5 (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11)). Alternative B is the only alternative that would result in commercial harvest and haul in the Rattlesnake Creek corridor. The Fisheries Specialist's Report discloses the anticipated effects of each of the action alternatives, including Alternative B (pp. 21-35, and EA pp. 258-268). No direct effects on sedimentation are anticipated from commercial vegetation treatments due to application of BMPs and INFISH buffer retention (Fisheries Specialist's Report p. 25 and EA p.260). Haul road use is expected to increase sediment production, but BMPs would reduce sediment delivery (see Hydrology Specialist's Report pp. 25-34 or EA pp. 248-252 for analysis of proposed haul, road work, and assessment of road sediment delivery). The haul route for Alternative B (Forest Road #99/Trail 515 for units in the Rattlesnake Creek corridor) would receive road BMP improvements designed to be commensurate with the level of use. The BMPs would provide longer-term benefits because the road/trail system will remain into the future, although it is restricted for administrative use only.

127. "The Rattlesnake Recreation Area is one of the most important natural areas for the Missoula community, and it has taken on social and cultural significance in addition to its ecological value. Because of these factors and its heavy recreational use we can't just "let nature take its course."… Thinning and burning understory trees and shrubs will make these forests more resilient in the face of a serious fire, so that a higher proportion of their ecological, recreational and cultural values are likely to persist after the fire… particularly concerned about impacts on native fish, whose populations would likely be adversely affected by wildfire (Rieman et al., 2012). In addition, the immediate impacts of firefighting activities and the use of fire retardants on fish is a topic of current concern (USGS, n.d.)." (171, 1)

FS Response: As stated in the Fisheries Specialist's Report (pp. 24-25) and EA (p. 259), the effects of natural processes like wildfire cannot be accurately assessed, as it could have both negative and positive effects on the stream. Firefighting activities and/or tools used in the event of a wildfire also cannot be accurately assessed because they would be dependent on the conditions of the fire itself and the resources perceived at risk. The use of fire retardant is not anticipated for the proposed Marshall Woods project.

128. "…the stream and riparian buffer zones proposed within the Project Alternatives are good, but more proactive measures should be considered to improve rather than just maintain riparian vegetation and instream habitat. Riparian buffer analysis should include sun angle calculations to ensure preservation and future infilling of shade-providing trees. As trees are cut in areas near streams, there may be opportunities to add large woody debris within the stream channels, in consultation with hydrologists and fisheries biologists." (171, 6)

FS Response: The regulatory framework applicable to this project, including direction for riparian areas is discussed in the Fisheries Specialist's Report (pp. 3-7), and consistency with the regulatory framework is also discussed (p. 33). Alternative A (No Action Alternative) is not in compliance with the Forest Plan as amended by INFISH. The standard and guideline RF-5 would not be met because culvert replacement would not occur on FS Rd #2122 on Marshall Creek, a westslope cutthroat trout stream. However, all of the action alternatives (B, C, and D) analyzed for the Marshall Woods project are in compliance with the regulatory framework. Resource Protection Measures were prescribed to protect riparian areas and aquatic resources (Fisheries Specialist's Report, Table 2, pp. 22-23, and EA, pp. 67-72). Commercial harvest is limited to areas greater than 300 feet from streams. Smaller tree thinning will only occur beyond a 50-foot no activity buffer. Although there were some areas where large woody debris was less abundant than others, adding large woody debris to stream channels was not scoped as part of this project, and there are no future projects planned at this time to add large woody debris to stream channels in the project area.

129. "Proposed Action Alternative B Would Violate the Federal Endangered Species Act and the Act's Critical Habitat Provisions… The Proposed Action, Alternative B, calls for commercial logging and associated trail to road upgrades within the riparian zone of Rattlesnake Creek. These actions would create fine sediments and pose negative effects to bull trout and westslope cutthroat trout." (162, 26)

FS Response: The regulatory framework applicable to this project, including the Endangered Species Act and Critical Habitat direction is discussed in the Fisheries Specialist's Report (pp. 3-7). The Fisheries Specialist's Report discloses the anticipated effects of each of the action alternatives, including Alternative B on bull trout and bull trout critical habitat (pp. 21-35, and EA pp. 258-268). Consistency with the regulatory framework is discussed on p. 33 of the Fisheries Specialist's Report, and Alternative B is in compliance with the regulatory framework. Resource Protection Measures were prescribed to protect riparian areas and aquatic resources (Fisheries Specialist's Report, Table 2, pp. 22-23, and EA, pp. 67-72). As described in the Resource Protection Measures, INFISH default RHCAs include those areas within 300 feet of perennial, fish-bearing streams. Therefore, no commercial timber harvest would occur within 300 feet of Rattlesnake Creek, and the boundaries of all RHCAs would be flagged prior to on the ground activities. Young stand thinning and prescribed fire are allowed to occur to a certain extent within RHCAs, beyond

the 50-foot no-activity buffer as described in the Resource Protection Measures. No direct effects on sedimentation are anticipated from commercial vegetation treatments due to application of BMPs and INFISH RHCA buffer retention. The thick vegetation that makes up RHCA buffers acts as an excellent filtering source for overland sediment flow. Retaining downed woody debris within the harvest units also provides structures that capture sediment and slow or stop its movement down the slope. Haul road use is expected to increase sediment production, but BMPs would reduce sediment delivery (see Hydrology Specialist's Report pp. 24-32 and EA pp. 248-252 for analysis of proposed haul, road work, and assessment of road sediment delivery). The haul route for Alternative B for units in the Rattlesnake Creek corridor is Forest Road #99/Trail 515, which would receive road BMP improvements commensurate with the level of use. As noted in the Fisheries Specialist's Report (p. 14), "the road is restricted for administrative use only, and has a low impact on sediment or large woody debris and temperature/shading because it has a low gradient and is located up on the high terrace with adequate buffering distance from the Rattlesnake floodplain for most of its length (Figure 2A). Still, there are areas in need of BMPs/drainage improvements, particularly in areas where the road curves near the stream (Figure 2B)." BMPs are designed with the purpose to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources (Fisheries Specialist's Report p. 6). BMPs would increase drainage frequency, route water and sediment off the road into vegetated buffers, and reduce the potential for sediment input to streams. Appendix A in the Hydrology Specialist's Report contains information on the effectiveness of BMPs and performance criteria. The BMPs on Road #99/Trail 515 would provide longer-term benefits because the road/trail system will remain into the future. There are no proposed trail-to-road upgrades within the riparian zone of Rattlesnake Creek. As stated in the FAQ, (pg. 7), "roaded access (in the Rattlesnake corridor) has existed since the area was homesteaded in the early 1900s (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11). Additionally, the main Rattlesnake corridor has provided road access to accommodate heavy equipment to service municipal reservoirs upstream since the 1950s." Road 99/Trail 515 is currently used as a road, although it is restricted for administrative use only, and that designation would not change as a result of this project. BMPs, buffers, and other Resource Protection Measures would reduce or eliminate potential negative effects from thinning and prescribed burning activities. Despite the limited scope of proposed activities within RHCAs, the proximity of those activities to existing aquatic populations, and the implementation of all prescribed Resource Protection Measures described in Table 2 and within the EA, the Fisheries Biologist acknowledges that potential negative effects may occur as a result of the proposed activities (Fisheries Specialist's Report, pp. 21-35, and EA pp. 258-268). Therefore, the Fisheries Biologist made the preliminary effects calls of "not likely to adversely affect" bull trout and bull trout critical habitat (Fisheries Specialist's Report p. 34 and EA p. 268). If one of the action alternatives (B, C, or D) is selected, the Fisheries Biologist would prepare a combined Biological Assessment (BA) and Biological Evaluation (BE) that addresses the potential biological effects of the proposed project on bull trout and bull trout critical habitat, westslope cutthroat trout, and western pearlshell mussel, to meet the requirements of the Endangered Species Act and NEPA requirements for Sensitive Species (p. 5 of the Fisheries Specialist's Report and p. 268 of the EA). The Forest Service has had early, informal consultation discussions with the U.S. Fish and Wildlife Service regarding design, potential activities, and anticipated effects associated with this proposed project. Consultation with the U.S. Fish and Wildlife Service and concurrence with the effects calls would be obtained before proposed activities would occur. Also of note, the Fisheries Specialist's Report clearly describes that the anticipated effects of the Marshall Woods

Project are limited to the project area scale and would not change the baseline condition for bull trout at the 6th code HUC scale, either positively or negatively (p. 22, and Table 3, p. 32).

130. "The Fisheries Specialist's Report at page 34 comes to the simple and erroneous conclusion that Alternative B will have no significant effects on bull trout and that all alternatives have a "not likely to adversely affect" bull trout or their habitat. At page 33 it states that there would "50 foot no activity barriers" around Rattlesnake Creek. This is totally inadequate according to the best available scientific information. Within INFISH RHCAs, "Activities that retard the attainment of the RMOs are not allowed within these default RHCAs." The 300' on either side of the creek is 6 times that proposed as the no activity zone. Commercial logging Units 2 and 3 include commercial removal in the riparian area between Trail 515 and the creek itself. These units also follow every bend and turn of Rattlesnake Creek, substantially increasing the likelihood that fine sediments will be delivered into the streambed itself." (162, 27)

FS Response: See response to comment #129. In addition, the Fisheries Specialist's Report at p. 33 states, "The application of BMPs, INFISH RHCA buffers, a 50-foot no activity buffer, and other specific Resource Protection Measures described within Table 2 and the EA would maintain or improve conditions within RHCAs over the long term and would not retard the attainment of INFISH RMOs." We are aware that activities that retard the attainment of the RMOs are not allowed within these default RHCAs and have designed the project as such. Rationale and supporting information are found in the Fisheries Specialist's Report (pp. 21-35), and the EA (pp. 258-268).

131. "Any trail to road upgrade to accommodate what may be up to 200 truck loads would have significant impacts on fine sediment delivery, as would the associated logging and burning. There is no literature showing that these methods would result in long-term positive effects on bull trout, as claimed." (162, 28)

FS Response: See responses to comment #s 129 and #130. Under Alternative B, it was estimated that 80-90 truckloads would be hauled using Road #99/Trail #515, not 200 (see FAQ, p. 7 (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11), and EA, p. 286). See additional literature citations in the Forested Vegetation Specialist's Report and the Fire, Fuels, and Air Specialist's Report. In addition, the Hydrology Specialist's Report Appendix A discusses the effectiveness of Best Management Practices and Resource Protection Measures (Project File, Item M7-13).

132. "Physical connectivity in this area has been improved significantly through removal of Milltown Dam and installation of the fish passage structure on Rattlesnake Creek. However, the Fisheries Report shows that rising stream temperatures are a concern in the lower section of Rattlesnake Creek. The project area is within the lower 1/3 of the drainage…The Fisheries Report notes Rattlesnake Creek is the only south-facing bull trout spawning tributary, and increased water temperatures are a concern. Yet there is no analysis of the impact of removing canopy cover and understory vegetation on shade or the potential for site warming." (162, 29)

FS Response: You are correct in noting improvements in connectivity, as discussed throughout the Fisheries Specialist's Report, and that water temperature is a concern in the lower section of Rattlesnake Creek, as discussed in the Fisheries Specialist's Report (p. 18). The Report also notes that "temperature is also of concern due to climate change, and is a

larger issue in the lower watershed due to deforestation and private development impacts" (pp. 20-21). The Forest Service cannot control activities that occur on lands downstream of the project area that may have effects on stream temperature. However, the Fisheries Specialist's Report includes effects analysis for NFS lands that could be treated as part of the Marshall Woods project and takes into account cumulative effects of activities on surrounding lands within the watershed (pp. 21-35, and EA pp. 258-268). Effects analysis specific to temperature for each of the action alternatives (B, C, and D) is found in the Fisheries Specialist's Report (p. 25, EA pp. 259-260), with rationale and supporting scientific literature. No effects are anticipated to stream temperature under Alternative B, C, or D.

133. "Due to its location and role within the system, effects on bull trout in Rattlesnake Creek will have far-reaching effects throughout the middle section of the Clark Fork River Basin. Rattlesnake Creek provides spawning opportunities for a large percentage of the adult bull trout in this section of the Clark Fork. The adverse modification requirements explained above apply. To properly assess the potential effects pursuant to the ESA and INFISH, a comprehensive watershed assessment is required." (162, 30)

FS Response: See response to comment #s 129 and 130. Resource Protection Measures were prescribed to protect riparian areas and aquatic resources (Fisheries Specialist's Report, Table 2, pp. 22-23, and EA pp. 67-72). These also correspond with default INFISH RHCAs, and were designed to be in compliance with INFISH Standards and Guidelines and RMOs (USDA-FS 1995). A watershed analysis is only needed as required by INFISH (USDA-FS 1995) in order to provide a basis and documentation for any specific changes to default RMOs or RHCAs, which we are not proposing for this project. In addition, the Fisheries and Hydrology Specialists' Reports and justification for the Resource Protection Measures are based on site-specific data collected and compiled for the Rattlesnake watershed. As noted in the Fisheries and Hydrology Specialists' Reports (pp. 9-10, and pp. 11-14, respectively), assessment and effects analysis was based on a variety of existing site-specific information including but not limited to PIBO data sites within the Rattlesnake watershed, GIS data, baseline assessment information, fisheries sampling and redd counts, recreation monitoring, personal communications with local Fisheries Biologists, and multiple site visits to the project area by hydrology and fisheries personnel. The Fisheries Specialist's Report (pp. 17-18) also uses information from the Bull Trout Conservation Strategy (USDA-FS and USDI-FWS 2013) which provides data on bull trout population and habitat status at the Middle Clark Fork Core Area scale. All of this information, as well as the EA document itself provides the necessary site-specific data to qualify as a watershed analysis for the project. Also of note, the Fisheries Specialist's Report clearly describes that the anticipated effects of the Marshall Woods Project are limited to the project area scale and would not change the baseline condition for bull trout at the 6th code HUC scale, either positively or negatively (pg. 22, and Table 3, pg. 32), thus the effects of this project would not have "far-reaching effects throughout the middle section of the Clark Fork River Basin."

134. "A central purpose and goal of management in the NRA and Wilderness is protection of water quality and watershed values. The significant earth moving and vegetation removal within the Rattlesnake Creek corridor would certainly have negative effects. In fact the Fisheries Report at page 26 states 'Effects to water quality would arise from short-term sedimentation inputs associated with haul roads…' Rattlesnake Creek is also listed as an A-1 "closed" watershed. The Fisheries Report states at page 3 that a goal for Forest water quality is 'meet or exceed State water quality standards,' and at page 4 'meet or exceed Federal and State water quality standards.' Yet it also states: 'If during contruction stream

turbidity and sediment loads are anticipated to exceed state water quality standards, a 3A authorization is acquired from the Montana DEQ.'" (162, 31)

FS Response: See response to comment #129. Forest Plan direction and the regulatory framework applicable to this project are described in the Fisheries Specialist's Report (pp. 3-7). You are correct in your highlights of the regulatory framework from the Fisheries Specialist's Report. The Forest plan has a goal to meet or exceed state water quality standards (II.A.8) (p. 3), and it is also a Forest Plan standard to apply Best Management Practices (BMPs) to assure that water quality is maintained and to meet or exceed Federal and State standards (II.E.15) (p. 4). The quote from page 6 of the Fisheries Specialist's Report, "If during construction stream turbidity and sediment loads are anticipated to exceed state water quality standards, a 3A authorization is acquired from the Montana DEQ," was with regard to the Montana Stream Protection Act where the Lolo National Forest would obtain a 124 permit from the Montana Department of Fish, Wildlife & Parks when Forest projects affect any stream bed and/or bank areas. This would apply only to the culvert removals/replacements and associated stream rehabilitation proposed under Alternatives B, C, and D. In the Fisheries Specialist's Report, the effects analysis includes a discussion of the anticipated effects of sedimentation during culvert removals/replacement (pp. 26-27, and EA pp. 260-261). The effects are expected to be short-term and localized, and are not anticipated to exceed state water quality standards, so they would not require a 3A authorization from the Montana DEQ. Consistency with the regulatory framework is discussed on p. 33 of the Fisheries Specialist's Report, and Alternative B, C, and D are in compliance with the regulatory framework. Additionally, the Hydrology Specialist's Report discusses compliance with the standards for water quality for the "A closed" classification (pp. 10-11).

135. "The EA does not contain an effects analysis on the removal of extensive amounts of forest canopy (up to 60%) and extensive removal of ground cover on air and stream temperatures in the project area and downstream to the Clark Fork River. The level and geographic scope of risk and the potential to violate numerous federal laws and standards including NEPA requires preparation of a full Watershed Analysis at the EIS level. The Forest Service also needs to re-consult with the USFWS on PACFISH/INFISH in bull trout critical habitat since bull trout critical habitat was designated after PACFISH/INFISH was signed." (162, 32)

FS Response: See response to comment #s 129, 132, and 133. The proposed treatments were described in detail in EA Chapter 2, Alternatives. The removal of vegetation would not affect air temperatures. Effects on stream temperature were addressed in the Fisheries Specialist's Report – see response to comment #132. The Forest Service initiated the Marshall Woods Project analysis as an Environmental Assessment rather than an Environmental Impact Statement based on the anticipated effects of each alternative. Each of the action alternatives (B, C, and D) were designed to be in compliance with applicable Forest Plan direction and regulations. As discussed on EA p. 10, "the purpose of the Environmental Assessment is to comply with the National Environmental Policy Act (NEPA) and to provide sufficient evidence, analysis and basic conclusions for the Deciding Officer to determine whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI)". See response to comment #133 regarding the watershed analysis. The Forest Service would initiate project-level consultation with the U.S. Fish and Wildlife Service on potential effects to bull trout and bull trout critical habitat following selection of the desired alternative, as described in the response to comment #129.

136. "Some of the outstanding natural values found in the RNRA that would be harmed by the proposed logging near Rattlesnake Creek are represented by the bull trout critical habitat. The logging cannot go forward before the Forest Service completes its consultation with the U.S. Fish & Wildlife Service to determine if compliance with the Forest Plan will avoid adversely modifying bull trout critical habitat on national forest lands and determine if forest plan implementation will ensure bull trout recovery." (182, 1)

FS Response: The Forest Service would initiate project-level consultation with the U.S. Fish and Wildlife Service on potential effects to bull trout and bull trout critical habitat following selection of the desired alternative, as described in the response to comment #129.

137. "…speaking of native fish and the Forest Plan, it appears that the EA has substituted an analysis of "Pathways: Indicators" for what it's legally required to include in the analysis—compliance with Forest Plan direction." (182 2)

FS Response: As described on pp. 9-10 of the Fisheries Specialist's Report, "as part of the listing of bull trout under the Endangered Species Act, the USFWS developed a systematic process defined as "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale" (USDI-FWS 1998b). The framework was developed to include the biological and habitat elements needed to evaluate baseline conditions and effects of proposed and ongoing land management activities on the persistence and potential recovery of bull trout. It was also designed to facilitate and standardize determinations of potential effects resulting from management activities. The framework involves a systematic assessment through a matrix of seven diagnostics/pathways and a series of four species indicators and 19 habitat indicators…Analysis of the habitat indicators also provides a thorough evaluation of the baseline condition and potential effects of management activities on the primary constituent elements (PCEs) of designated bull trout critical habitat. A crosswalk between the bull trout matrix of pathways and indicators and PCEs of designated critical habitat is displayed in the Environmental Consequences section as associated with individual indicators." The systematic assessment process was used to document the baseline condition of bull trout populations and habitat following the bull trout's listing as threatened under the Endangered Species Act. Due to the comprehensive nature of the framework and the baseline assessment, the systematic process is also used to assess the status and potential impacts of management activities. Due to the similarity of habitat requirements, the process is also used for assessing effects on westslope cutthroat trout and western pearlshell mussels. The level of detail provided in the analysis of pathways and indicators is not required for NEPA; however, the Fisheries Biologist would analyze the anticipated project effects using the systematic process for consultation with the U.S. Fish and Wildlife Service. Therefore, the comprehensive analysis was provided in the EA (pp. 258-268) and the Fisheries Specialist's Report (pp. 21-35) because it clearly reveals the anticipated effects with the highest level of detail. The regulatory framework applicable to this project is discussed in the Fisheries Specialist's Report (pp. 3-7), and consistency with the regulatory framework is also discussed (p. 33). All of the action alternatives (B, C, and D) analyzed for the Marshall Woods project are in compliance with the regulatory framework.

138. "The watershed and fisheries analyses fail to provide any comparison to natural, pre-settlement conditions, which is absolutely necessary for conducting an adequate cumulative effects analysis." (182, 3)

FS Response: Under 36 CFR 220.4 (f), the Forest must conduct a cumulative effects analysis that considers the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative Effects only include a discussion of combined, incremental effects of human activities. For activities to be considered cumulative, their effects need to overlap in both time and space with those of the proposed actions. Those actions that contribute to cumulatively to anticipated watershed/hydrology and fisheries effects are discussed in those Specialists' Reports (pp. 34-36, and pp. 28-31, respectively). Ongoing actions with no further cumulative effects are discussed in the Affected Environment sections of the Hydrology and Fisheries Specialists' Reports (pp. 14-21, and pp. 3-21, respectively).

139. "Viability of populations bull trout and Westslope cutthroat trout is not being assured, and monitoring as per the Forest Plan has not occurred. Also there is insufficient field data for there to be a thorough watershed assessment, as Montana Forest Restoration Principles envision." (182, 4)

FS Response: As stated on page 34 of the fisheries report: "The preliminary effects determinations for Alternatives A, B, C, and D would be "not likely to adversely affect" bull trout, "not likely to adversely affect" bull trout critical habitat, and "may impact individuals or habitat, but will not likely result in a trend toward federal listing or result in reduced viability for the population or species" (MIIH) for westslope cutthroat trout and western pearlshell mussels." Also see responses to comment #s 129, 130, and 133 which highlight the breadth of information used in the Fisheries Specialist's Report and effects analysis and contain a discussion with regard to a thorough watershed assessment. Regarding the MFRC principles, Principle 3 says that we should use the appropriate scale of analysis to prioritize and design restoration activities. In this case, we selected the project area based on the highest priority restoration needs on NFS lands. Principle 3 does not say that we have to do a watershed assessment at the larger scale (also see response to comment #133 for further discussion on watershed analysis). We are also following Principle 12 with the project's proposed stream restoration work, and already completed other stream restoration work in the Rattlesnake and Spring Creek drainages prior to this proposed project (Fisheries Specialist's Report pp. 15-16). In addition, the MFRC Principles are discretionary and intended to identify a zone of agreement for collaboration. The Forest Plan was not amended to require mandatory adherence to the principles.

HYDROLOGY

140. "…if you were really concerned about aquatic species' health you would indicate in the final EA that all newly constructed temporary roads will be obliterated after use and apply the obliteration method that returns the ground to the natural angle of repose and eliminates the running surface. Not doing so clearly indicates you have no intent of using the road temporarily." (22, 6)

FS Response: The Environmental Assessment does state that newly constructed temporary roads will be obliterated after use on p. 37.

141. "The pre-decisional EA mentions nothing about the need to secure NPDES permits for roads planned to be constructed for this timber sale." (22, 7)

FS Response: All necessary permits will be obtained once a decision is made and the project is implemented, as is our standard practice. Requirements for permits are discussed in the Hydrology Specialist's Report (e.g., Montana Stream Protection Act SPA 124 permit, p. 8).

142. Logging is "not acceptable in Woods Gulch"…Woods Gulch "is too steep and mechanical logging would scar the land"…"Woods Gulch also feeds Quast Ditch. There is an overflow spillway in the ditch at the culvert going under Rattlesnake road. It is ¼ mile up the road from Wildcat Rd turn off. There is potential for silt to go down Woods Gulch Creek and end up in Quast Ditch and Rattlesnake Creek." (24, 1)

FS Response: Page 34 of the Hydrology Specialist's Report includes a section which addresses fine sediment delivery from silvicultural activities. Research shows that current forest harvest procedures and BMPs are largely effective at reducing rilling and sediment sources. Appendix A of the Hydrology Specialist's Report discusses the effectiveness of Best Management Practices and resource protection measures, which have been investigated in research studies and monitored by the Lolo NF as well as by the State of Montana.

143. "Woods Gulch Creek could affect water rights in Quast Ditch." (24, 2)

FS Response: The Marshall Woods project does not propose to secure any in-stream water rights in Woods Gulch. Therefore, water rights in Quast Ditch would not be affected.

144. "…it's my understanding that up until recently this watershed provided Missoula's drinking water, and may do so again in the future if needed. The state of Montana has classified the entire watershed as "closed", which means that activities such as commercial logging are not allowed." (54, 2; 103; 117)

FS Response: The watershed is classified as A-closed by the State, which means that it is given the highest level of water quality standards. The A-closed water classification is addressed on pp. 10-11 and 37-38 of the Hydrology Specialist's Report. The proposed activities are expected to meet the A-closed water quality standards by not increasing temperature, sediment, pH, turbidity. etc. Page 10 of the Hydrology Specialist's Report summarizes the specific water quality standards for Rattlesnake Creek and states, in water quality standard #2 that: "Public access and activities such as livestock grazing and timber harvest are to be controlled by the utility owner under conditions prescribed and orders issued by the department."

145. "We have water rights from Quast Ditch. The Woods Gulch creek flows into the ditch. Sediment deposits from the creek currently impede the flow of water in the ditch. There did not seem to be much attention to sediment flows from Woods Gulch in the Draft Assessment. Disturbances from activities in Woods Gulch will further exacerbate sediment deposits in the Quast Ditch. . The potential runoff from Woods Gulch is very high, and no doubt, exceeds the capacity of the culvert under Rattlesnake Drive near the northern terminus of Wildcat Road. There should be more thought given to protecting both water quality from Woods Gulch and the impact on water rights from the ditch." (59, 1)

FS Response: The Hydrology Specialist's Report discusses the potential for sedimentation into Woods Gulch. Woods Gulch is assessed as part of the Lower Rattlesnake Watershed. Sediment modelling indicates that there is a potential for slight sediment increases with proposed activities in this watershed but there should be a slight long-term reduction (pp. 30-33). The majority of this will be associated with Rattlesnake Creek. Research shows that current forest harvest procedures and BMPs are largely effective at reducing rilling and sediment sources (p. 34 of Hydrology Specialist's Report and Appendix A). The Marshall Woods project does not propose to secure any in-stream water rights in Woods Gulch; therefore, water rights in Quast Ditch would not be affected.

146. "When the Forest Service required that a fish screen be placed on the head-gate of the Quast Ditch, the head-gate itself was moved some 8 to 10 feet up into the full force of the creek. This contributed to the weakening of the stream bank and the ultimate recent diversion of the creek around our head-gate. Logging and fuel management will also likely increase runoff in the creek and increase sediment flows. The Forest Service should recruit large woody debris to stabilize the steam bank north of the Quast Ditch head-gate. Stream bank stabilization will maintain stream flows in the mature main channel rather than continuing to cut a new more erodible stream channel. This will reduce sediment flows and protect our water rights." (59, 2)

FS Response: An analysis of water yield is included in the Hydrology Specialist's Report as is described on p. 13. It is not anticipated that there will be any measureable change in runoff due to proposed activities. Thank you for recommending recruiting large woody debris for stream stabilization. Although there were some areas where large woody debris was less abundant than others, adding large woody debris to stream channels was not scoped as part of this project and there are no future projects planned at this time to add large woody debris to stream channels in the project area. The Marshall Woods project does not propose to secure any in-stream water rights in Woods Gulch; therefore, water rights in Quast Ditch will not be affected.

147. I do not believe "the issue of water quality can be handled according to the requirements of current law and regulations, considering the municipal use." (99)

FS Response: Montana DNRC forestry BMP audits as well as recent research (see Hydrology Specialist's Report, Appendix A) support the fact that water quality can be protected and meet the water quality standards of the A-closed water classification for the municipal watershed.

148. "The EA does not mention the existing irrigation ditches that draw water out of Rattlesnake Creek and their interests, similar to Mountain Water Co." (147, 21)

FS Response: The Hydrology Specialist's Report mentions the water quality standards of the A-closed (municipal) watershed on pp. 10-11 and 37-38. Page 10 refers directly to the ability of the utility owner (Mountain Water) to restrict use in this watershed. The Quast Ditch is supplied by Woods Gulch and is mentioned on p. 17 of the Hydrology Specialist's Report. The Fisheries Specialist's Report also discusses the existing diversions (pp. 14-16).

149. "In Table 43 it would be good to add the FS portion to the Road density column as done in the other columns. Similarly in Table 44 for Road Crossings." (147, 22)

FS Response: Thank you for the recommendation.

150. "The analysis lacks a disclosure of effects due to a wildfire and how those effects would be different between alternatives. The statement in Table 47 under "Wildfire" is one sided and unsubstantiated. Yes, large event wildfires result in pulse additions of sediment, nutrient and water yields that can have some positive long-term benefits to stream hydrology, but to simplistically say they are all positive is unsupportable. You need to back that up with some references. To discount any potential negative effects on downstream users, such as Mountain Water, the irrigation ditch water users and residences along the stream in the lower Rattlesnake, city roads and bridges is negligent. These people and infrastructure could be mildly to severely affected by downstream peak flows, debris flows, increased sediment and nutrient loads and high flow water yields." (147, 23)

FS Response: One of the purpose and needs of the proposed project is to mitigate the potential for a large-scale wildfire in the wildland-urban interface which could possibly have some of the effects that are mentioned above. Potential wildfire effects to the hydrology and watershed resources are not routinely analyzed through the NEPA process due to the uncertainty of their occurrence; however, wildfires are mentioned in EA Table 47 Cumulative Effects Summary as a past and potential future disturbance on the landscape.

In the event of a wildfire of this nature, it would be considered an emergency situation and the Forest Service would have the ability to conduct a Burned Area Emergency Response (BAER) assessment, as is our standard practice. This BAER assessment would be able to draw conclusions of potential large-scale wildfire effects, as described above, because the information such as acres burned, burn severity, burn intensity, and downstream values-at-risk would be known at that time. This crucial information is not currently known.

151. "This section does not mesh with the comments in the fire/fuels section that indicate for alt. A and D in particular and less for alt. C the heavy crown fuel loads will likely result in more impactive fire suppression tactics. I know these would lead to greater post-fire erosion and sediment effects that the forest conditions created by alternative B where fire behavior and effects would be substantially mitigated and less impactive tactics required." (147, 24)

FS Response: The hydrology/watershed section of this Environmental Assessment considered the effects of the proposed activities, not those effects that may potentially occur from a large-scale wildfire, due primarily to the uncertainty of a large-scale wildfire. Effects from the proposed prescribed burning are analyzed in the Hydrology Specialist's Report pp. 33-34.

SOILS

152. "I found no mention of the need to retain desirable amounts of Coarse Woody Debris on treated sites. To meet the needs of site productivity and wildlife that utilize CWD a desirable

goal is about tons/acre. How will this be planned for over the long term? A research study that discusses the desirable and undesirable aspects of CWD is: Brown, James K.; Reinhardt, Elizabeth D.; Kramer, Kylie A. 2003. Coarse woody debris: managing benefits and fire hazard in the recovering forest. Gen. Tech. Rep.RMRS-GTR-105. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 16p." (2, 3)

FS Response: The Forest Service is required to retain CWD and Forest Plan standards require this. Existing down woody material information is gathered during field quality assessments. Assessments can be found in Soil File 2 (Project File, Items M8-2, 3, and 5). Coarse woody Debris is further discussed in the Soils Specialist's Report, p. 15. Assessment and restoration of large woody material in the Marshall Woods project follows guidelines provided in the Lolo NF Coarse Woody Material Guide (2006) and Graham et al. (1994).

153. "The harvesting of larger diameter trees through a logging operation with heavy equipment would be detrimental. The trade-offs wouldn't adequately offset the destruction. The use of heavy falling machinery would cause scarring of the forest floor. Soils there already seem to be thin." (136, 1)

FS Response: Per FSM 2500 R1 Supplement No 2500-99-1, detrimental soil disturbance is considered at the activity area scale (defined as a harvest unit, activity unit, or a prescribed burn area). Field soil quality assessments are conducted in the activity area to determine existing soil conditions. Field Quality Assessments can be found in Soil File 2 (Project File, Items M8-2, 3, and 5) and a discussion of existing soil conditions in the project area can be found beginning on p. 8 of the Soil Specialist's Report. Expected soil disturbance from harvest effects is considered in each activity area, and is presented in the Soil Specialist's Report (p. 25 and Appendix C). Cumulative detrimental soil disturbance considers the existing condition of the soil within a unit and estimates the effects of project activities, design standards, applied BMPs, and rehabilitation measures on the soil resource. Unit specific estimation of detrimental soil disturbance from project activities can be found in Appendix C of the Soil Specialist's Report and Soil File 5 (Project File, Item M8-12). Estimated soil disturbance is based on forest monitoring (Lolo National Forest, 2012/2013 - Project File, Item O-83). In addition the effectiveness of Best Management Practices on protecting soil and water resources (e.g., preventing erosion and sedimentation) is discussed in the Hydrology Specialist's Report, Appendix a (pp. 43-46).

154. "The EA doesn't disclose how Forest Plan and NFMA direction for protecting soil productivity is being accomplished with this Project. Vegetative conditions are directly related to soil productivity, which has been highly altered on the Forest by past management activities. The Lolo National Forest utilizes an unvalidated proxy that allows up to 15% detrimental soil disturbance (DSD) in vegetation treatment units, and possibly even more in previously disturbed activity areas." (182, 28)

FS Response: The regulatory framework which provides direction for protecting the soil resource can be found in the Soil Specialist's Report on pp. 3-5. Project compliance with this regulatory framework, including the Lolo NF Plan and NFMA is summarized in the Soil Specialist's Report on p. 33. Field soil quality assessments are conducted in the activity area to determine existing soil conditions, including vegetative conditions. Field surveys and data collection follow the National Soil Condition Assessment protocols (Page-Dumroese et al. 2009 – Project File, Items O-52 and 53). Field Quality Assessments can be found in Soil File 2 (Project File Items M8-2, 3, and 5) and a discussion of existing soil conditions in the project area can be found beginning on p. 8 of the Soil Specialist's Report. Expected detrimental soil disturbance from harvest effects is considered in each activity area, and is presented in the Soil Specialist's Report (p. 25 and Appendix C). In order to assess and quantify detrimental soil disturbance, the Lolo NF complies with Region 1 FSM Soil Supplement 2500-99-1 (Region 1 Soil Quality Standards – Project File) which requires that "new activities do not create detrimental soil conditions on more than 15 percent of an activity area. In areas where less than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 15 percent." Cumulative detrimental soil disturbance considers the existing condition of the soil within a unit and estimates the effects of project activities, design standards, applied BMPs, and rehabilitation measures on the soil resource (Soil Specialist's Report, p. 43). Unit specific estimation of detrimental soil disturbance from project activities can be found in Appendix C of the Soil Specialist's Report and Soil File 5 (Project File, Item M8-12). Estimated soil disturbance is based on forest monitoring (Lolo National Forest, 2012/2013 - Project File, Item O-83). A summary of Lolo Forest monitoring assessment protocols and monitoring results can be found in Soil File 4 (Project File, Items M8-8 and 10). Powers (1990) cites that the rationale for the 15% limit of change in soil bulk density was largely based on the collective judgment of soil researchers, academics, and field practitioners, as well as the ability to detect change in productivity through current monitoring methods. Thus the soil quality guidelines are set to detect a decline in potential productivity of at least 15%. This does not mean that the Forest Service tolerates productivity declines up to 15%; rather it recognizes problems with soil disturbance detection limits. It is important to consider the 15 % as a trigger point at which more in-depth soil quality evaluations would be conducted and soil amelioration plans written and implemented (Soils Specialist's Report, p. 6).

155. "The Lolo National Forest does not recognize any threshold amount of coarse and fine woody debris and other organic matter for maintaining soil productivity. The EA also fails to quantify or analyze project area deficits in amounts of coarse and fine woody debris below amounts recommended by best available science, which is necessary to understand cumulative effects on the soil productivity." (182, 29)

FS Response: Existing down woody material and organic matter information is assessed at the activity unit level and is gathered during field quality assessments. Assessments can be found in Soil File 2 (Project File, Items M8-2, 3, and 5). Coarse Woody Debris and organic matter is further discussed in the Soils Specialist's Report (p. 15). Assessment and restoration of woody material in the Marshall Woods project follows guidelines provided in the Lolo NF Coarse Woody Material Guide (2006) and Graham et al. (1994). After project completion, all harvest and thinned stands would meet the Lolo NF guidelines for woody material (Soils Specialist's Report, p. 36).

156. "The EA discloses how heavily logged and otherwise developed the national forest land is in the project area. It fails to disclose the conditions of soils outside the project treatment units. The cumulative amount of existing soil damage over the entire project area has implications for every other resource including development of old-growth forests and even sustained yield of timber. The public deserves to know the scale of needed soil restoration in a 'Restoration Project.'" (182, 30)

FS Response: Region 1 Soil Quality Standards (2500 R1 Supplement No 2500-99-1) defines the geographic area for soil cumulative effects analysis as the "land area affected by management activity" (the vegetation or fuel treatment unit). Since soil productivity is site-specific, it is not assessed on a watershed scale (USDA FS March 2009). It is not operationally feasible to assess, analyze, or monitor soil productivity on large areas because productivity is spatially static and productivity in one location does not influence productivity in another location (Soil Specialist's Report p. 4 and Soil File 4 – Project File, Items M8-8 and 10). Field soil quality assessments are conducted across the project area to assess the existing condition of the soil resource in activity units. The data is analyzed and presented in the Soil Specialist's Report (Appendix C and Table Soil 4).

157. "The EA does not disclose its methodology for determining DSD. This raises questions of data reliability and the validity of modeling and other analysis methodology." (182, 31)

FS Response: Methodology for determining existing DSD in the project area is discussed in the Soil Specialist's Report in the "Data Sources and Methods" section beginning on p. 5. Estimation of DSD resulting from project activities can be found in Appendix C of the Soil Specialist's Report and Soil File 5 – Project File, Items M8-8 to 12. Estimated soil disturbance from project activities considers the effects of project activities, design standards, applied BMPs, and rehabilitation measures on the soil resource (Soil Specialist's Report, Appendix C). Estimated soil disturbance is based on forest monitoring (Lolo National Forest, 2012/2013 – Project File, Item O-83). A summary of Lolo Forest monitoring assessment protocols and monitoring results can be found in Soil File 4 (Project File, Items M8-8 and 10).

158. "…the EA fails to disclose the results of monitoring that evaluate the effectiveness of soil protection mitigation measures." (182, 32)

FS Response: The Lolo NF has an active soil monitoring program; a list of potential soil disturbance monitoring sites across the Forest is maintained and updated annually (Soil File 4 – Project File, Items M8-8 and 10). A discussion of the monitoring plan is found in the Soil Specialist's Report beginning on p. 21 and includes methodology used for forest monitoring and guiding literature. Results from the Lolo NF monitoring program are disclosed in biannual reports (Lolo Forest Plan Monitoring Reports 2006/07, 2009, 2010/11, 2012/13 - – Project File, Item O-83). A summary of results from these reports is found in Soil File 4 – Project File, Items M8-8 and 10.

NOXIOUS WEEDS

159. "How will treatments that involve skidding be scheduled to avoid soil disturbance that invites weed problems, which unfortunately will be a big challenge?" (2, 4)

FS Response: Ground conditions would dictate the timing of treatments. Resource protection measure #s 5 and 6 would ensure minimal ground disturbance during commercial operations by reducing detrimental soil disturbances that would be conducive to noxious weed spread (pp. 47 – 49 of the EA). In addition a weed treatment plan was developed to be implemented before, during, and after project activities (Weed Specialist's Report pp. 46 – 52).

160. "Telling the public that 'no negative, long-term effects due to herbicide application on workers or the public are expected' ignores the many recent, independent, science papers that conclude glyphosate is a carcinogen." (22, 5)

FS Response: Glyphosate was identified by the Lolo NF as a potential herbicide for noxious weed control, specifically eradication with known off target impacts, in the 2007 Integrated Weed Management EIS. It was included in Table 4 (pp. 11-12 of the Weed Specialist's Report) based on the 2007 EIS. Appendix A of the Weed Specialist's Report (pp. 46 – 52) identifies possible treatments that would be used to reduce the spread of weeds; including the use of herbicides. The herbicides identified are aminopyralid, chlosulfuron, clopyralid, metsulfuron, imazapic, and picloram. At this time there is no plan to use glyphosate.

161. "Opening the canopy and disturbing soil and logging equipment will introduce and spread weeds in the project area…Underburning will also increase the likelihood of weed spread…Why are you proposing activity that will spread more weeds when you can't keep up with the existing weeds? Do you have any money or people to treat the existing weeds in the project area? What is your current plan and strategy to treat the existing weeds in the Rattlesnake? (74, 1)

FS Response: The EA (pp. 240 – 242) and Weeds Specialist's Report (pp. 17 – 33) acknowledges the potential for noxious weeds to spread as a result of the proposed activities. Funding sources are sought to treat noxious weeds in the project area yearly. Treatments include hand-pulling, mowing, biological control releases and herbicide application on areas less than one acre up to 50 acres. Implementation of the project would include the weed treatment plan which was developed to be implemented before, during, and after project activities (Weeds Specialist's Report, Appendix A, pp. 46 – 52). Weed treatment included in Alternatives B, C, and D would far exceed treatments in Alternative A (No Action). Work would be completed by force account and contractors.

162. "The EA does not disclose the degree to which the productivity of the land and soil been affected in the project area and forestwide due to noxious weed infestations, and how that situation is expected to change in the coming years and decades. The Forest's noxious weed treatment program is mitigation for management activities which exacerbate the spread of noxious weeds. The EA fails to disclose the effectiveness of this mitigation. The EA states: Increased management and ground-disturbance levels could result in moderate impacts to noxious weed establishment and expansion. Resource Protection Measures to monitor and treat noxious weeds would decrease this impact to minor if fully implemented." (182, 27)

FS Response: Since soil productivity is site-specific, it is not assessed on a watershed scale (USDA FS March 2009). It is not operationally feasible to assess, analyze, or monitor soil productivity on large areas because productivity is spatially static and productivity in one location does not influence productivity in another location (Soil Specialist's Report p. 4 and Soil File 4 – Project File, Items M8-8 and 10). The effects of noxious weeds on soil productivity is discussed in the Soils Specialist's Report on p. 30, which concludes:

"For the most part, noxious weeds are not affecting soil productivity in the proposed harvest units since their population is currently restricted to the road system or isolated patches. As canopy closure becomes greater than about 60%, shading reduces the weed's competitive advantage and native species will slowly establish. Units 64 (EA Chapter 2, RPM #12) and 200 (EA Chapter 2, RPM #3) may be seeing changes in soil physical, chemical, and biological processes because of weed infestations; restoration has been proposed. In addition there is a cooperative weed treatment project with the City of Missoula and Fish, Wildlife, and Parks in Sections 1 and 12. Weeds are found in past treatment areas and along the roads in these sections. Treating noxious weeds on the landscape would increase soil productivity over the long-term (greater than 5 years)."

The Lolo NF has a strong weed program, which goes far beyond just providing mitigation for project activities, as discussed in the Weeds Specialist's Report on pages 8-9, which states, "The implementation of the Integrated Weed Management FEIS/ROD (USDA Forest Service 2007) allows the Lolo NF (including the Missoula RD) to treat noxious weeds under an adaptive management strategy; incorporating mechanical, biological, and chemical weed control along with educational efforts directed at the prevention and management of noxious weeds (preceding environmental assessments have included sections of the project area prior the 2007 Integrated Weed Management assessment). Analysis of the effectiveness of noxious weed treatments is contained within the FEIS. Noxious weed control has been ongoing since 1992 in the form of herbicide treatment, biological control releases, hand-pulling, and educational efforts. Herbicide treatments have and will continue to be applied to trails and open meadows infested with various weed species on a scheduled interval. Biological controls have and will continue to be released on leafy spurge infestations as needed. Hand-pulling methods will continue on houndstongue populations and incidental small infestations discovered in remote, relatively weed-free areas. Treatment of weeds within the Rattlesnake NRA, Marshall Canyon, and Woods Gulch can and have been implemented under the authority and guidelines of the 2007 FEIS. All methods will continue regardless of the alternative selected in this analysis in order to maintain previous noxious weed control and suppression efforts."

RECREATION

163. "I would ask you to consider not logging on the lower main corridor up to Pilcher Creek from late December through the end of February, our short cross country ski season." (5, 1; 9, 1; 13, 1; 15, 1; 27, 1; 33, 1)

FS Response: Impacts to winter recreation are discussed in the EA on pp. 287 – 288 (pp. 36 – 37 of the Recreation Specialist's Report); the EA acknowledges winter harvest activities could impact cross-country skiing. Snowshoeing and other activities would still be possible.

Road plowing in the winter may open more opportunities for winter recreation including running, biking, and hiking/walking. The decision maker will consider these impacts as well as impacts to other resource areas when determining which alternative to select for implementation.

164. "…"trail development in the Woods Gulch area is a prime and accessible landscape. For instance, off the Sheep Mtn. trail in Sec. 81 & 82, there is a small trail that connects to the proposed 'add to proposed road system'…just to the west of tis is ridge & standing forest (Sec. 31) that could possibly support a trail similar to the start of 3 larch trail and could connect up with the 3 larch at the logging road. This would be a wonderful extend loop pf the existing trail system." (6, 1)

FS Response: Thank you for your comment. This action was not considered in the Marshall Woods project because it does not meet the purpose and need. If additional actions are proposed in the future, the agency may consider this request at that time.

165. "Concerning recreational closures, we are concerned with weekday recreational closures during the commercial thinning proposed in units 2 and 3. Given the heavy year-round recreational use of Trail 515/Road 99, it's hard to imagine how weekday recreational closures could be implemented without severely restricting recreational access to a much larger portion of the national recreation area and wilderness." (95, 4)

FS Response: Impacts (defined on EA pp. 274-275) from potential temporary trail or area closures are disclosed on pp. 276, 278, 281, and 284-286 of the EA and pp. 24, 26, 32, and 35-37 of the Recreation Specialist's Report. As stated in the FAQs for the project (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11):

"For public, crew, and operator safety, we may have to implement temporary trail, road, and/or area closures in portions of the project. Temporary closures could be in effect during burning, harvesting, and or hauling operations. The level, frequency, and if closures are even needed would be determined by the project alternative that is selected.

In order to minimize inconvenience to recreationists and provide maximum opportunities, project implementation would be completed in phases. For example, if commercial treatments were to occur along Trail 515/National Forest Road 99 (Rattlesnake main corridor) and a closure was needed, we would ensure that Sawmill Gulch, Woods Gulch, and the Marshall Canyon area were open to the public. We would also only temporarily close the portions of trails or areas where the hazard existed and provide alternate open routes in the same area where possible."

We would strive to ensure that impacts are known in advance and well-communicated to the public. Temporary inconveniences are necessary in order to reduce the risk of long-term impacts to the area from high severity fire and insects and disease.

- **The public could expect temporary closures; rerouting activities to adjacent trails, and – depending on the treatments approved – smoke, heavy equipment on popular roads, and machine noise.**
- **We would take measures to minimize the impacts to the community, as much as possible, and communicate these potential impacts using multiple platforms such as: the Lolo National Forest webpage, social media outlets, local news, and through the help of our partners."**

166. "Although I am not familiar with these particular trails, I am quite familiar with the removal of trails from the official trail system. Many good historically used trails are decommissioned or not maintained and private individuals are not allowed to maintain them for their use." (192, 1)

FS Response: **No trails are proposed for decommissioning in this project.**

167. "…we are adamantly opposed to commercial logging units in the Rattlesnake National Recreation Area, including within agency identified Inventoried Roadless Area (IRA) – specifically, units 2, 3 4, 5, and 6. Road building and logging within the RNRA and/or IRA and outside the private/public land interface is unacceptable and not consistent with Sierra Club policies. The agency should be looking to add acres to its roadless inventory not remove acres." (189, 1; 162, 2; 162, 2)

FS Response: None of the 7,281 acres of NFS land in the Marshall Woods project area is in an IRA. The nearest IRA is Rattlesnake #1204 which includes 3,310 gross acres and 2,700 non-contiguous acres of NFS land. Rattlesnake #1204 consists of three separate tracts. The closest of the three tracts is over seven miles north-northeast of the Marshall Woods project area (Project File, Item M6-2). There is also no MA10 (small roadless blocks), MA 11 (large roadless blocks) or MA 12 (existing and proposed wilderness) in the Marshall Woods project area. Please see the previous responses to comments regarding logging and road building in the Rattlesnake NRA.

168. "Commercial logging as proposed in cutting units 2, 3, 4, 5, and 6 …may inadvertently negatively affect primitive recreation by opening up the understory which can lead to the creation of non-system recreation routes in addition to increasing the spread of weeds – both of which are already a big problem in the RNRA and would require more public resources to repair. The reconstruction of Trail 515 to support proposed logging also conflicts with the recreation focus and IRA designation." (189, 4)

FS Response: Please see response to comment #167 addressing IRAs. The EA and Recreation Specialist's Report acknowledges there would be short-term impacts to recreation in general (including primitive) and the potential of non-system recreation routes/trails being created (pp. 275 – 290 of the EA and pp. 23 – 39 of the Recreation Specialist's Report). Resource protection measures were developed to reduce the potential of non-system routes/trails from developing by leaving a 100-foot buffer around trails (RPM #61 and 63, pg. 76 of the EA) and around dispersed campsites (RMP #62, p. 76 of the EA). Impacts from improvements on TR515/RD99 are discussed on pp. 288 – 289 of the EA.

169. "The EA Contains No Analysis on the Effects on Recreation Use and Public Enjoyment of the Area." (162, 33)

FS Response: **Please refer to pp. 7 – 12 of the Recreation Specialist's Report where the management direction for the RNRAW is described in terms of Opportunity Classes and the standards (limits of acceptable change) and settings (resource, social, and management) to understand the LNF guidelines for managing the RNRAW. The LAC for the RNRAW defines standards of acceptable change and indicators that determine when these standards are being exceeded. Pages 15 through 22 of the Recreation Specialist's Report describe common, recreational use patterns in the RNRAW.**

The experience of the visitor is captured in the social setting of each Opportunity Class and the expectations the visitor may encounter. The LAC was designed to handle human-induced changes. Public enjoyment can be subjective based on the individual recreationist and their goals and expectation for each individual day. Given that the RNRA receives over 100,000 trail entrances and exits at the main trailhead, evaluating enjoyment would be an insurmountable task. Pages 23 through 39 of the Recreation Specialist's Report describe the possible impacts to the recreating public as a result of the proposed projects without trying to guess the individual's emotional response. Definitions for recreational impacts are on p. 23 of the Recreation Specialist's Report.

170. "The EA also states Alternative B would require a Forest Service amendment allowing changing the current Visual Quality Objective "retention," which requires maintaining the NRA in a natural appearing condition. Leftover stumps, slash, skid trails, removal of vegetation including large trees along Trail 515 to accommodate log trucks would have effects lasting over many years. What effects would this have on visitor use and enjoyment?" (162, 34)

FS Response: **The effects of the proposed project activities on Visual Quality Objectives are discussed in the Scenery Resources Specialist's Report and on pp. 290 through 295 in the EA. While the effects vary by alternative, in summary the treatments would reduce the risk of disease, insect infestation, and high severity wildfire while increasing vegetation diversity, which would increase sustainability and have some beneficial long-term impacts to the visual quality of the landscape.**

171. "What cumulative effects would closing the area to public use for several weeks for two summers have on the public? What effects would result from transferring this use to other areas of the forest? What effects would there be on primitive and wilderness recreational opportunities? The noise and ugliness of commercial logging and log truck traffic would be both audible and visible from a wide area of the RNRAW." (162, 35)

FS Response: **Closures would be temporary and the Forest Service would make every effort to alert the public to the closures so those seeking to recreate in the RNRAW would be able to plan accordingly (see response to comment #165). The cumulative effects to other areas of the Forest are discussed on p. 277 of the EA, specifically in regards to other recreation areas in the immediate vicinity (e.g., Pattee Canyon and Blue Mountain) and the availability of other recreation opportunities in Missoula Valley. The effects to the recreating public from proposed activities are described on pp. 279 through 289 which acknowledge there would be sensory impacts (e.g., sight, hearing, and smell).**

172. "There is also the risk that the Trail 515 upgrade to a log haul road will lead to future use and further seasonal closures. What are these long-term risks?" (162, 36)

FS Response: **There are no known future mechanical timber harvest activities planned; however we will continue to maintain Trail 515/Road 99 for administrative use. See response to comment # 165 and refer to EA Appendix D for planned, reasonably foreseeable future activities.**

173. "There is also the risk that the cleared corridors to accommodate high lead-line and skidding operations may be converted to illegal trails by mountain bikers, thus creating

serious resource damage and enforcement problems. The EA contains no analysis." (162, 37)

FS Response: **See response to comment #168. These resource protection measures are expected to prevent the creation on non-system routes and trails.**

174. "The EA Fails to Recognize the Wildland/Wilderness Setting in Which the Project is Proposed…The proposed action, with its extensive proposals for management interventions into the wildland landscape, could significantly change both the scene and the experience for those traveling through the NRA as part of their Rattlesnake Wilderness experience." (162, 38)

FS Response: **Please refer to pp. 7 – 12 of the Recreation Specialist's Report where the management direction for the RNRAW is described in terms of Opportunity Classes and the standards (limits of acceptable change) and settings (resource, social, and management) to understand the LNF guidelines for managing the RNRAW. The LAC for the RNRAW defines standards of acceptable change and indicators that determine when these standards are being exceeded. The experience of the visitor is captured in the social setting of each Opportunity Class and the expectations the visitor may encounter. The LAC was designed to handle human-induced changes from within as well as outside the Wilderness boundary. Trail maintenance and use (including access to the Wilderness) is described on pp. 19 through 21 of the Recreation Specialist's Report. Impacts from the proposed project, including on Wilderness and non-wilderness, are described on pp. 22 through 39 in the Recreation Specialist's Report in terms of changes within each OC as the recreational user continues north to the Wilderness boundary.**

175. EA pg 285 states 'Overall the long-term impacts would be seen as beneficial to the area for the majority of the recreating public.' Please provide your source and reference for this statement. (153, 8)

FS Response: **The summation of overall impacts is based on familiarity with the land and knowledge of the benefit of management actions. It is assumed the majority of recreational users in the RNRA can comprehend the benefits of land management activities to improve resilience and restore landscapes. This conclusion is based on findings researched by McFarlane et al. 2006, McFarlane and Witson 2008, Tahvanainen et al. 2001, and Winter 2007. These studies reviewed how management action and/or natural resource damage impact the experience and enjoyment of the outdoors by the recreating public as they are occurring and over the long-term. Each of these studies are cited within the Recreation Specialist's Report (McFarlane et al. 2006 (pp. 22 and 34); McFarlane and Witson 2008 (pp. 22 and 34); Tahvanainen et al. 2001 (p. 30); and Winter 2007 (p. 22)). In addition, as sated on EA p. 18, part of the purpose and need of this project is "to provide educational opportunities" to the public.**

176. "Please disclose the anticipated number, duration and frequency of future logging activities in the RNRA and public recreation closures that may result from the future logging." (153, 19)

FS Response: **Please refer to the response to comment #172.**

VISUAL QUALITY

177. "On p. 32-33 in the discussion of the Forest Plan amendment for VQO's I am not convinced it is accurate. Was a similar amendment needed for the Sawmill Gulch work performed in 2007? At the bottom of p. 32 it says, "A portion of the proposed treatments would create a decrease in scenic integrity to the public viewshed for a period of time greater than one year." I think the Sawmill Gulch work was substantially recovered in one year and thus; units 2 and 3 should not be included in the amendment. The esthetics are actually enhanced very quickly when the forest is opened up and it is easier to see the larger trees. I can see where units 4, 5 and 6 are using temporary roads it may take 2-4 years to recover visually depending on whether the roads are used one or two seasons. I think the indication that modification would be for a 10 year period is overly conservative." (147, 26)

FS Response: Thank you for your comment. The effects of the alternatives are disclosed in the Scenery Specialist's Report which found on pp. 21 -22 that for Alternative B the VQOs for Units 1-6 would not be met and for Alternative C the VQOs for units 4-6 would not be met requiring a Forest Plan amendment.

TRAVEL MANAGEMENT

178. "I generally support the decommissioning of roads that may be contributing sediment to nearby streams. However, roads that may be needed for future management activities or fighting wildfire should not be removed. Instead, improvements should be made to such roads, including BMP features such as drain dips, slash filter windrows or other techniques that are proven to reduce sedimentation." (16, 2)

FS Response: The proposed action is based on the advice provided by a travel analysis of road risks and benefits conducted by the Forest (EA Appendix E). Benefits and risks associated with each road were analyzed to make road management recommendations that balance the need for access, the environmental effects of roads and the available funding for road maintenance.

179. "In Unit 200 of Section 33, after reforestation, I'd like to see Roads 63235, 63233, 53033 decommissioned at level 5 as well as the other roads scheduled for decommission in Section 33." (157, 1)

FS Response: The proposed action is based on the advice provided by a travel analysis of road risks and benefits conducted by the Forest (EA pp. 29-31 and Appendix E). Benefits and risks associated with each road were analyzed to make road management recommendations that balance the need for access, the environmental effects of roads and the available funding for road maintenance.

180. "In Unit 63 I would like to see the feathering stop short of Trail 513 so that users don't have to look into the treatment areas below to the south as they hike to and from Sheep Mountain. It would be nice to have a buffer between the trail and the old, ugly logged area." (157, 2)

FS Response: This is not a commercial unit. The feathering effect would be caused by the effects of the prescribed burn and subsequent tree mortality. Feathering with fire, while

targeted and deliberate, does not carry the precision associated with tree cutting. Both Unit 200 to the south and Unit 63 would be burned under all action alternatives to restore the site in the long-term; Unit 200 would subsequently be planted.

181. "Since practically all vegetation management projects nowadays include utilization of "temporary" roads, what is needed is a programmatic limitation on the use of temporary roads, so their effects can be minimized." (182, 10)

FS Response: A programmatic limitation to temporary roads is outside of the scope of this analysis. The proposed action is based on the advice provided by a travel analysis of road risks and benefits conducted by the Forest (EA Appendix E). Benefits and risks associated with each road were analyzed to make road management recommendations that balance the need for access, the environmental effects of roads and the available funding for road maintenance. In addition, Forest Plan Standards 48 to 52 provide the programmatic direction for constructing and managing roads on the Lolo National Forest. Standard 49 limits the development of roads to the minimum number and standard. Standard 50 addresses the minimization of effects from roads including soil movement.

182. "Travel Management Regulations (36 CFR 212) Subpart A require the Forest Service to identify the minimum road system needed to sustainably manage the Lolo National Forest. In the absence of a completed forestwide Travel Analysis Process, the Forest Service cannot demonstrate how it is minimizing the road system in compliance with the Forest Plan or the Travel Management Regulations and their related Directives." (182, 33)

FS Response: The Lolo National Forest is currently conducting an analysis of its Forest-wide minimum road system. This assessment is expected to be completed fall, 2015. The regulations at 36 CFR 212.5(b) (Subpart A, disclose requirements that the Forest Service incorporate a "science-based roads analysis" when identifying the minimum road system for each national forest. The travel analysis completed for the Marshall Woods project (EA Appendix E) contributes positively to the broader science based assessment currently being developed by the Forest in support of the requirements of 36 CFR 212.5(b).

183. "The EA also fails to demonstrate consistency with Travel Management Regulations subparts B and C and their related Directives. The EA does not disclose any Road Management Objectives, which would follow from designations under Subpart B." (182, 34)

FS Response: Road management objectives are disclosed in the EA in the mapping and listing of travel management proposed for the road segments (see EA Appendix E).

184. "The EA's financial analysis fails to consider the long-term budget shortfalls for road maintenance in the Project Area, and the EA fails to analyze and disclose the ecological impacts of this ongoing situation. We incorporate the December 18, 2014 letter from

WildEarth Guardians and the Friends of the Wild Swan's December 15, 2014 letter regarding the Lolo National Forest's November 14, 2014 Interested Public letter and accompanying "Draft Step 4—Assessing Benefits and Risks of the Existing Road System" as comments on this EA. We also incorporate WildEarth Guardians August 23, 2014 letter to Forest Supervisor Tim Garcia regarding the Lolo National Forest's responsibilities under 36 CFR § 212 Subpart A." (182, 35)

FS Response: The proposed action is based on the advice provided by a travel analysis of road risks and benefits conducted by the Forest (EA Appendix E). Benefits and risks associated with each road were analyzed to make road management recommendations that balance the need for access and the available funding for road maintenance. The 2014 letters that the commenter is referring to were pertinent to Forest-level analysis, not to project level work.

185. "Will management under the Marshall Woods Restoration Project be consistent with the Travel Management Regulations at 36 CFR § 212?" (182, 36)

FS Response: See response to comment #182.

CLIMATE CHANGE

186. "It is highly likely that climate change will continue to create conditions in which winter snow flows gradually increase and summer flows decrease as snow packs melt earlier and earlier. There is peer reviewed research in Montana showing that thinning of forest stands can increase snowpack water and extend snow melt periods which would increase summer stream flows and reduce stream temperatures. It would be a mistake to thin less than 30% of the basal area of any stand treated, and a 40-50% reduction would likely better achieve many of the multiple use objectives." (126)

FS Response: A Forest Carbon Cycling and Storage Report addressing climate change is included in the Project File (Item N-25). Refer to the response to comment #47.

187. "Global climate change issues are ignored in the EA except to mention the Forest Service Roadmap Responding to Climate Change (2010)." (142)

FS Response: A Forest Carbon Cycling and Storage Report addressing climate change is included in the Project File (Item N-25). It was not included in the EA itself because it had not been brought up as during public involvement. See response to comment #188.

188. "Despite the ever-growing acknowledgment and awareness of the effects of climate change and its causes, the EA fails to address this in its analyses. Neither the effects of forest management on climate change, nor the effects of climate change on the achievability of project objectives are considered." (182, 37)

FS Response: **A Forest Carbon Cycling and Storage Report addressing climate change is included in the Project File (Item N-25). This report was not included in the EA itself because it had not been brought up during public involvement; however, climate change was addressed in the EA and throughout Forested Vegetation Specialist's Report as listed below:**

EA pp. 21-22 and Forested Vegetation Specialist's Report p. 3, "Forest Service Manual (FSM) 2020 provides foundational policy for using ecological restoration [1] to manage NFS lands in a sustainable [2] manner. The aim is to reestablish and retain ecological resilience [3] of NFS lands and associated resources to achieve sustainable management and provide a broad range of ecosystem services [4]. Healthy, resilient landscapes will have greater capacity to survive natural disturbances and large scale threats to sustainability, especially under changing and uncertain future environmental conditions, such as those driven by climate change and increasing human uses (FSM 2020.20).

EA p. 21 and Forested Vegetation Specialist's Report p. 4, "The Forest Service Roadmap for Responding to Climate Change (2010) identified the agency's management response as threefold: (1) adaptation, (2) mitigation, and (3) sustainable consumption. The agency is responding to climate change through adaptive restoration—by restoring the functions and processes characteristic of healthy ecosystems, whether or not those systems are within the historical range of variation. Through restoration, conditioning and repairing the key functions of ecosystems across landscapes so that they can withstand the stresses and uncertainties associated with climate change.

Adaption strategies include: (1) Building resistance to climate-related stressors [5] such as drought, wildfire, insects, and disease; (2) Increasing ecosystem resilience by minimizing the severity of climate change impacts, reducing the vulnerability and/or increasing the adaptive capacity of ecosystem elements; and (3) Facilitating large-scale ecological transitions in response to changing environmental conditions. Resistance strategies are for short-term protection of high-value resources. Resilience strategies are longer term and broader in scale, designed to help ecosystems return to a healthy condition, often within the historic pattern of stressors. Transitions are the longest term approach, responding to changes in environmental conditions and a concomitant need for ecosystems to adapt by moving or changing, often adopting a trajectory beyond the historical conditions (USDA, 2010)."

The effects indicators in the forested vegetation are, in part, based on climate change as it is a stressor to forested vegetation. EA p. 97 and Forested Vegetation Specialist's Report p. 22 "Each alternative was analyzed for its ability to address the following measures of success to meet the purpose and need: resilience, resistance, species composition, structure and function, and restoration of fire as a process. Project design employs an adaptive approach to make adjustments in the application of historical conditions as a reference point. Flexibility is incorporated to address inherent uncertainty about the local effects of climate

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[1] The process of assisting the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions (FSM 2020.5).

[2] Meeting needs of the present generation without compromising the ability of future generations to meet their needs (FSM 2020.5). Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905).

[3] The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (FSM 2020.5).

[4] Benefits people obtain from ecosystems (FSM 2020.5).

[5] Any physical, chemical, or biological entity that can induce an adverse response (Joyce et al., 2008).

change by enhancing the resiliency and resistance of the forests, and specific aspects of structure, composition and function (Joyce et al., 2008; Millar et al., 2007)."

EA p. 97 and Forested Vegetation Specialist's Report p. 5, "The effects analysis is based on the following measurement indicators:
Resilience- Evaluation of vulnerability to stressors and ability of stands to persist through and reorganize after disturbance and maintain basic structure and function over time. Measurement indicators include resilience to fire and bark beetles (bark beetle hazard) and under current and future conditions.
Resistance- the ability of a forest community to avoid alteration of its present state by a disturbance. Resistance practices seek to improve forest defenses against the effects of rapid environmental changes. Resistance measures are aimed at protecting high value resources that are vulnerable to stressors.
Function- measured by functions and processes characteristic of healthy ecosystems, whether or not those systems are within the historical range of variation. Properly functioning systems can accommodate processes including fire, insects, disease, and climate change and provide a sustainable flow of ecosystem services.
Species composition– measured by percent composition of at-risk shade-intolerant species (i.e., ponderosa pine, western larch, aspen). Measures of species composition include establishment of shade-intolerant, root disease-resistant species and species diversity at the stand and landscape scale. Managing for a variety of species and genotypes provides resilience to environmental stressors (Joyce et al., 2008)."

EA p. 88 and Forested Vegetation Specialist's Report p. 9, "It is well accepted that ongoing climate changes have pushed regional climates beyond the bounds of the last several centuries. Warmer climates are expected to alter stress complexes that affect forests rendering them vulnerable to increased frequency, severity and extent of disturbances, namely fire and insect outbreaks (Joyce et al., 2008)."

Forested Vegetation Specialist's Report p. 20, "The general desired future conditions (DFC) are listed by Habitat Type Group. They provide a range of conditions to guide active management based an understanding of how ecosystems respond to changing conditions gained from historical conditions, as well as, recognize that current and future conditions are and will be different. The focus lies on an indeterministic approach of developing structurally and compositionally diverse forests that are mediated by ecological and disturbance processes. The objective is to hedge bets in the face of an uncertain future and still enable comparison of current conditions, and the trends or direction of change of conditions to assist management decisions. Overall, the desired future conditions address landscape size class and structural distributions and tree-stocking levels as a strategy to minimize forest vulnerability to stressors consistent with the long-term disturbances expected under current and future climates (www.frcc.gov). Managing in the face of uncertainty requires a variety of approaches and strategies that are focused on enhancing ecosystem resistance and resilience. This involves increased emphasis on ecological processes and managing for change, despite uncertainty about the direction or magnitude of a changing climate (Joyce et al., 2008)."

EA p. 98 and Forested Vegetation Specialist's Report p. 22, "The key issue related to forested vegetation in the Marshall Woods area is the need for healthy and resilient forests. Indicators of a properly functioning condition include a resilient ecosystem with diverse

distribution of seral stages, with composition, structure and pattern that is resilient to natural fire regimes, and insect and disease occurrence under current and future climates.

EA p. 98 and Forested Vegetation Specialist's Report pp. 22-23, "Managing for resilient spatial pattern requires combining reference conditions with climate change adaptation (Churchill et al., 2013). Pre-settlement forests developed following centuries of frequent disturbances and climatic variation, and serve as a guide for managers to increase resilience yet must be considered in the context of future climates to provide targets for restoration (Keene et al., 2009; Spies et al., 2010; Stephens et al., 2011). Properly functioning systems can accommodate processes including fire, insects, disease, and climate change and provide a sustainable flow of ecosystem services whether or not those systems are within the historical range of variation. Gillette and others (2014) concluded that, 'Managing for biologically diverse and resilient forests is our best and only long-term, sustainable response to a multitude of stressors – insects and disease outbreaks, fires that are unprecedented in severity, and drought – that are likely to increase in frequency as climate changes. In the case of bark beetles and other stressors, this calling for greater, science-based use of silvicultural treatments that, paradoxically, require some tree mortality for the greater resilience of the entire forest.'"

EA p. 99 and Forested Vegetation Specialist's Report p. 23, "Alternative B is the only alternative designed to reduce stand density to minimize drought effects, reduce the impact of large wildfire events, manage the potential for increased insect and disease outbreaks, and ensure a wide variety of species and age class diversity, while managing for processes to facilitate adaptation in the face of a changing climate across the analysis area (Joyce et al., 2008; Millar et al., 2007)."

EA p. 107 and Forested Vegetation Specialist's Report p. 30, "Notably, warmer temperatures associated with climate change facilitate bark beetle outbreaks in two primary ways: (1) drought stress makes trees more vulnerable to attack, and; (2) populations of bark beetles can speed up their reproductive cycles potentially leading to more frequent generations (Joyce et al., 2008). Drought-induced stress reduces the number of beetles necessary for a successful mass attack, relaxing the conditions necessary for a bark beetle outbreak to occur (Bentz et al., 2010). Nonetheless, bark beetle response to climate change is highly complex and uncertain as bark beetle populations, community associates, and host trees are influenced by changes in temperature (Bentz et al., 2010). In the Marshall Woods project area, 8 out of 10 years (2001-2010) received below average precipitation; the recent decade of drought will likely continue to be a factor causing physiological stress and predisposing trees to successful MPB attack (Sturdevant and Egan, 2011; M5-7)."

EA p. 109 and Forested Vegetation Specialist's Report p. 32, "Under current and future climates it is likely that the impacts of Armillaria root disease will increase significantly (Klopfenstein et al., 2009). Sturrock and others (2011) concluded that incidence of Armillaria root disease is likely to increase as temperatures increase and precipitation decreases (Shaw & Kile, 1991; US Office of Technology Assessment, 1993; La Porta et al., 2008; Klopfenstein et al., 2009). Klopfenstein et al. (2009) demonstrated that the area in which climate supports persistence of Douglas-fir, a major host for A. solidipes in the interior northwestern USA, is likely to decrease by 2060, and suggested that stressed Douglas-fir will also be more susceptible to Armillaria root disease. In the interior northwest, spread of Armallaria ostoyae occurs mostly through root-to-root contact and by rhizomorphs, with limited basiodiospore infection (USDA Forest Service, 1991, page 117,

Wargo and Shaw, 1985). Therefore, infections will spread only a short distance from the edge of a root-disease center, via root to root contact, or by rhizomorphs traveling a short distance. Armillaria is not considered a primary pathogen of mature ponderosa pine or western larch. In fact, ponderosa pine and western larch are two of the most Armillaria-resistant species. The severity of root disease is dependent on species present. If the site has been regenerated to a root disease-susceptible species, then the severity of root disease will likely increase (i.e., Douglas-fir). Conversely, if the site has been regenerated to a root disease-resistant species, the severity of the disease will likely be lessened over time. Establishing and favoring ponderosa pine and western larch can reduce losses to root diseases (Hagle and Goheen, 1988). Where Armillaria is identified within the proposed treatments, ponderosa pine and western larch of a variety of age classes, where available, would be featured. This is the most frequently used approach to managing root disease problems in western North America (USDA Forest Service, 1991, p155)."

EA p. 113 and Forested Vegetation Specialist's Report p. 36, "In addition, promoting a diverse age class and species mix and spatially heterogeneous and complex vegetation structure would provide a landscape that is more resilient to climate change in the longer-term (Joyce et al., 2008)."

EA p. 116-117 and Forested Vegetation Specialist's Report p. 39, "Restoring fire as a process would contribute to landscape-scale age class and structural diversity; perpetuate landscape-scale natural diversity of plant communities; and restore sites with disease-resistant species adapted to current and future climates."

EA p. 121 and Forested Vegetation Specialist's Report p. 42, "Reforestation of fire, drought, and disease-resistant species like ponderosa pine would provide increased resistance and resilience to potential future drought and wildfire that may be associated with a changing climate (Joyce et al., 2008)."

EA p. 120-121 and Forested Vegetation Specialist's Report p. 4,3 "The planting program in the Northern Region relies on the most sophisticated seed transfer guidelines for conifers, modeling patterns of genetic variation in adaptive traits in three dimensions to capture patterns of variability and adaptation. Reforestation with desired species composition and stocking levels would ensure the productivity of the sites and enhance ecosystem resilience and sustainability. Planting ponderosa pine on the site would establish the most drought-avoidant native tree species to this southwesterly aspect to ensure adaptability in a changing climate (Scott et al., 2013)."

ECONOMICS

189. "Table 52 on page 299 concerning Project Feasibility was difficult to understand. Because 80 logging truck loads was often mentioned, l asked staff how many CCFs would be in a logging load and was told that the figure was nine. Multiplying nine times 80 yielded 720 CCFs. Alternative C shows harvested volume of 2030 CCFs. Alternative B shows 4645 CCFs, or a difference of 2615 CCFs which I assumed was the volume of units 2 and 3 in the Rattlesnake Corridor. The 720 amount was so far off of that, I couldn't understand how the feasibility numbers were calculated. Staff told me that these were just paper estimates, and there was some shrinkage, and that the areas had not been timber cruised." (136, 7)

FS Response: The exact locations of individual harvest unit boundaries have not been identified in the field nor has actual GPS data been collected, as is typical for most Forest Service projects during the planning phase. Both acres and associated timber volume are simply estimates which will likely shrink during unit layout due to topographical restrictions, equipment limitations, silvicultural prescriptions, identification of wildlife trees, buffer zones, etc. The 80 loads was an estimate prepared specifically for the FAQs (http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11) after EA Table 52 had already been developed to more accurately depict unit size and associated volume for Units 2 and 3 after these anticipated reductions.

190. "The analysis on page 299 is incomplete, confusing and the figures do not add up correctly." (162, 40)

FS Response: The Economics Project Feasibility and Financial Efficiency sections of the EA describe and summarize the components of Table 52 on p. 299. As stated on EA p. 298, "Table 52 *summarizes* the project feasibility and financial efficiency" and is not meant to "add up".

191. "The Proposed Action is Fiscally Irresponsible…The economic analysis of Alternative B projects maximum revenue at $163,000 against expenses of $2,282,000 leaving a total loss of $2,119,000." (162, 42)

FS Response: As stated on EA pp. 297-298, "Financial efficiency analysis is not intended to be a comprehensive benefit-cost or PNV analysis that incorporates a monetary expression of all known market and non-market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a decision is made. Many of the values and costs associated with natural resource management are best handled apart from, but in conjunction with, a more limited benefit-cost framework. Therefore, they are not described in financial or economic terms for this project, but rather are discussed in the various resource specialists' reports (e.g., refer to the Fire and Fuels, Wildlife, and Forested Vegetation Specialists' Reports for specific benefits of the project)." A negative PNV (where monetized costs exceed monetized benefits) simply implies that agency revenue from the predicted high bid does not fully offset its costs of sale preparation, sale administration, forest regeneration, burning, and other restoration activities. Management of National Forest Lands is expected to yield positive net benefits for the American public – including the consideration of all other non-market benefits and costs. These management actions given the values-at-risk, however, may or may not yield financial net revenues.

192. "The economics analysis does not include an itemized disclosure of costs vs. benefits, and a detailed Present Net Value (PNV) discussion. The perpetual fire suppression followed by fuel reduction followed by fire suppression cycle is nowhere shown to be a cost-effective way to manage a forest. The EA shows a very negative PNV for the action alternatives, yet it doesn't itemize it to the degree that the average person could dissect the economics of this proposal." (182, 15)

FS Response: As stated in the Economics, Financial Efficiency section of the EA, "This analysis is not intended to be a comprehensive benefit-cost or PNV analysis that incorporates a monetary expression of all known market and non-market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a

decision is made." Table 53 identifies all activity costs associated with timber harvest, required design criteria, and restoration activities (EA, p.300).

EDUCATIONAL/INTERPRETIVE

193. "I also recommend installing a couple of permanent educational exhibits with photos from the early 1900s to document the effect of excluding disturbances." (144, 5)

FS Response: While the action alternatives do not include installing permanent exhibits the Forest conducts public education through other means. As discussed in resource protection measure 55, "additional permanent signs will not be permitted without prior approval from the Missoula Ranger District Resources staff. Educational material will be provided in brochure or field trip form…" (EA p. 73).

194. There are a number of educational/interpretive opportunities that could be explored in partnership with the Lolo Restoration Committee, the University, Backcountry Horsemen, Society of American Foresters, Wildlife Society, National Forest Foundation, and others. "A project this controversial is a wonderful opportunity to engage the public pro, con, and neutral on a huge array of forest management benefits." (147, 2)

FS Response: Thank you for your suggestion; that is definitely something we could consider doing.

IMPLEMENTATION

195. …"will you favor local contractors to do the work?...job creation/local capture…should be viewed as positive" (3, 1)

FS Response: As described throughout the EA and summarized in the FAQs (http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11), "Work may be contracted through public works or timber sale contracts solicited through the Western Montana Acquisition Zone or the Lolo NF Timber Contracting office. Some projects may be completed with contracts that are already in place. Any new public works contracts associated with this project will be solicited in the FedBizOpps website." If Stewardship Contracting Authority is used, preference will be given to local contractors (FSH 2409.19).

196. "I would ask that you also use a professional logging company that is experienced in working in this type of setting to minimize disruption and the amount of time the trails will be closed. (5, 1; 9, 1; 15, 1; 27, 1; 33, 1)

FS Response: The choice of logging contractor is based on their professional experience and qualifications, bid value, a successful track record of doing good work, and other factors. In addition, the Resource Protection Measures were developed specifically to minimize impacts to all resources.

197. "We are interested in the possibility of partnering with you in thinning trees on the west side of Marshall Canyon Rd. on our property." (7, 1)

FS Response: Thank you for your interest. If a contract is assigned, we could provide you with the name and contact information of the successful recipient.

198. "How long will this project take? From one employee I heard 30 days and from another...10 years." (19, 2)

FS Response: As described throughout the EA and summarized in the FAQs (http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11), "The project includes many components which would be implemented over a 7 to 10-year period depending on the activity. Activities like vegetation treatment unit layout could occur in 2015, while activities like ecosystem maintenance burning could occur in year 10 depending on site conditions like weather, air quality/smoke dispersion, fuel moisture, etc. Some activities like weed spraying could occur continually over the entire 10-year period but others like timber harvest would occur over much shorter time frames (e.g., one season) to minimize impacts to users." Additionally, see EA Appendix F – Implementation Schedule Example.

199. "How many successful projects of this magnitude has this Forest Service accomplished?" (19, 3)

FS Response: The Forest has successfully completed numerous projects containing forest restoration activities similar to those proposed in the Marshall Woods project. Recently completed and ongoing examples include the Cutoff Project, St. Regis Fuels Reduction, Fishtrap, South Fork Fish, Auggie Mountain, and Mayo Gulch Fuels Reduction.

200. "I have a Trillium study along Spring Creek that has been continuous for 14 years now and I would like to be sure that any activity will not harm the plants, plot markers and plant tags that I have in place." (82)

FS Response: Your scoping comment on this matter was noted and Resource Protection Measure #78 (EA p. 80) which calls for a 200-foot buffer around the research site was added to address your concern.

201. "Although I support USFS efforts to improve forest health and usage, I am extremely concerned about the increased vehicular traffic in an area that is heavily used by residents as well as runners and cyclists from all over Missoula, and already identified as dangerous by the Rattlesnake Valley Transportation Summit and Rattlesnake families…Non motorized transit infrastructure has been identified as a top concern for area residents.* To add logging trucks to the already existing vehicular traffic of neighboring residents as well as other residents who travel to the area to recreate, is of extreme concern." (88)

FS Response: Please see responses to comment #s 9 and 16.

202. "Smoothing the road and limbing the corridor, particularly to standards for logging truck traffic, would require temporary closures of the road while the work is taking place and

would force recreationists to hike, ride or bike three miles before the trail/road became more like a wide trail and less like a narrow road." (95, 3)

FS Response: The road maintenance and BMP work included in all alternatives (including No Action) is discussed on EA p. 27. Resource protection measures were developed to keep the public informed and reduce safety concerns as well as to minimize both short and long-term impacts to recreation use and public safety (EA pp. 73 – 74). Temporary closures may be necessary depending on which alternative is selected. As discussed in the FAQ document, "For public, crew, and operator safety, we may have to implement temporary trail, road, and/or area closures in portions of the project. Temporary closures could be in effect during burning, harvesting, and or hauling operations. The level, frequency, and if closures are even needed would be determined by the project alternative that is selected.

In order to minimize inconvenience to recreationists and provide maximum opportunities, project implementation would be completed in phases. For example, if commercial treatments were to occur along Trail 515/National Forest Road 99 (Rattlesnake main corridor) and a closure was needed, we would ensure that Sawmill Gulch, Woods Gulch, and the Marshall Canyon area were open to the public. We would also only temporarily close the portions of trails or areas where the hazard existed and provide alternate open routes in the same area where possible." (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11). These impacts are discussed in more detail in the Recreation Specialist's Report.

203. "I don't feel that the transportation aspect has been studied enough. It is frequently mentioned that there is a proposed movement of 160 logging trucks (80 trucks loaded and 80 trucks empty) going down the roads and through neighborhoods and past , other road users (cyclists, pedestrians, cars, riders on horseback). Many homes have been built in recent years. One of the busiest times of use on Rattlesnake Drive, in addition to the morning hours, is noon-time. School buses leave the Rattlesnake School before 3 PM, and return around 3:30. We've been told by city officials that the pick up and delivery of kids at the school is a dangerous time. Then you have returning commuters after this time." (136, 8)

FS Response: Resource protection measures were developed to keep the public informed and reduce safety concerns as well as to minimize both short-and long-term impacts to recreation use and public safety (EA pp. 73 – 74). As discussed in the FAQs (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11), "During summer months and for commuters along Marshall Canyon Road and old Highway 200, haul trucks should be expected but should not interfere with commuting times. We would make extra efforts to keep the public informed about haul activities to reduce safety concerns….When school is in session, log hauling would be prohibited between 6:00 a.m. and 8:00 a.m. Monday through Friday in the Rattlesnake to mitigate impacts to school bus routes and riders."

204. "The upper road is in extremely poor condition, and narrow - lanes barely the width of a logging truck, with no shoulders whatsoever in many places. Visibility is poor, particularly on sharp curves. An 80-thousand-pound logging truck would not improve the already stressed surface." (136, 9)

FS Response: The roads that are planned for use in the Marshall Woods project have been used previously and successfully for logging haul and equipment. Road maintenance is planned; brushing/limbing to improve sight distance and reduce damage to the roadside trees and the vehicles; and drainage improvements to reduce the potential for erosion/sedimentation. Surfacing is not part of the plan, although there are some areas of Rattlesnake road that will have material added to improve drainage.

205. "…believe that there's a strong majority of community support for actions that restore natural, healthy and historically more open forest conditions, and for activities that do not involve widening road corridors, use of heavy machinery, selling timber and building new (albeit temporary) roads…Marshall Woods work should be phased in, beginning with the less controversial project elements like road decommissioning, hand-thinning & burning, meadow restoration and noxious weed treatments." (171, 2)

FS Response: Alternative D was developed to address these desires/concerns.

206. "If an alternative is selected that involves commercial removal of timber, please consider working with smaller contractors who may be able to cost-effectively take out less timber with smaller impacts. We are particularly concerned by the need to remove trees along the main Rattlesnake road ("Rd 99/TR 515") to provide access by large trucks—this modification would have important long-term consequences on the community of Rattlesnake users." (171, 3)

FS Response: Contractors, including smaller contractors, would be notified of this project and all would have the same opportunity to submit a bid. The road maintenance and BMP work included in all alternatives (including No Action) is discussed on EA p. 27 and states, "in general, trees larger than 6-inch dbh within 3 feet from the driving surface would not be cut."

207. "The final Marshall Woods plan should include a schedule to involve community groups like RCWG, Clark Fork Coalition, Lolo Restoration Committee and others, along with user groups such as horsemen and mountain bikers, to monitor and map weed distributions before work commences, and at regular intervals after the treatments… The same principles…also apply to problems of erosion, wildlife habitat and other natural values within the project area." (171, 4)

FS Response: Thank you for your suggestion; monitoring would occur if the project is implemented. We welcome the formation of or assistance from established groups through our current volunteer and partnership programs to help complete the monitoring.

208. "The project budget should identify expected outlays for monitoring over the life of the project, which could be ten years or longer, and the final plan should also address the expected opportunities for further monitoring beyond this project's timeframe. The budget currently outlined in Table 53 doesn't explicitly address monitoring, although there are presumably monitoring elements within several of the budget categories. The budget for the final plan should include more detailed breakdowns within categories." (171, 5)

FS Response: As stated on EA p. 299, "Table 53 lists the costs included in the PNV analyses, which includes all estimated project costs except for those already included on the timber

appraisal. Planning costs (NEPA) are not included in any of the alternatives since they are sunk costs at the point of alternative selection." Similar to the planning costs, the costs associated with post-implementation monitoring are also not included in the PNV analysis. EA p. 81 explains, "the Forest conducts post-project implementation monitoring per guidance in the Forest Plan."

209. "I think all of us in the public need to realize this temporary loss or reduction in access to the project area is well worth the longer term benefits; I find it discouraging that for many, accepting this sort of even temporary delayed gratification is impossible. I hope the educational/outreach part of this project can successfully tackle these gaps in public acceptance of real world impacts." (175, 3)

FS Response: Thank you for your comment.

210. "The EA Contains No Analysis of Impacts to Traffic, Neighborhood Safety or Noise…The EA contains scant information related to projected effects of logging truck traffic traveling several miles up and down a narrow road through a residential neighborhood with road side schools. It simply says that traffic will be staggered to avoid school bus drop-off and pick-up times. When or how it does not say… the Proposed Action would require over 100 log trucks fully loaded with logs up to 35-40' in length, representing heavy and long loads. Nor are the effects of noise and dust generated by this traffic estimated or revealed." (162, 39)

FS Response: Please see the response to comment #9 above. As discussed in the FAQs (FAQs at http://www.fs.usda.gov/goto/marshallwoods; Project File, Item E-11), "The public could expect temporary closures; trail reroutes, and – depending on the treatments approved – smoke, heavy equipment on popular roads, and machine noise." More information about these impacts is described in the EA on pp. 286-287. Also note Resource Protection Measure #57 which states that dust abatement would occur as necessary "or if conditions were exceedingly bad and could not be mitigated, work would be stopped" (EA p. 287).

211. "Please disclose how you propose to fund and staff the follow up work that will be needed to repair the damage to the recreation resource in the RNRAW even IF all the MW mitigations measures are performed and how many years that will take.´ (153, 2)

FS Response: The Forest Service is allocated annual funding and often there are opportunities to apply for competitive funding for high priority projects like Marshall Woods. For example, the Lolo NF recently received $150,000 to supplement funding for the planning for this important project. It is expected that this project would continue to compete well for targeted implementation funds which would include support for the recreation resource and related resource protection measures.

212. "Please disclose how long the logging was supposed to take in Pattee Canyon, how long it actually took and disclose the likelihood of similar delays and associated impacts for the logging in MW alternatives B and C." (153, 20)

FS Response: It is unclear what the commenter is referring to. Logging has occurred in Pattee Canyon numerous times over the last century, including most recently for the Pattee Blue project (2005) and Peppermint Patty (2014).

GENERAL SUPPORT

213. General Support for Forest Management (no alternative specified) (1; 10; 17; 60; 71; 72; 76):

Sample Statements:

"I favor any effort to harvest excess timber and lean up the forest beds so that forest restoration can take place." (1)

"I have lived in or near mountainous wooded areas for most of my adult life and have recreated in the Rattlesnake Recreation area for over 20 years. I love that area. I have also personally experienced the damage that fire can do in the forest. Although I would much prefer that the Rattlesnake Recreation area and Woods Gulch remain unchanged, I am concerned about the potential for fire to ravage the area without the proposed "maintenance" project. I think the consequences of uncontrolled fire would be worse than the proposed project. Therefore, I am writing in support of the proposed project." (60)

"We have lived on Woods Road for many years and have made much use of the Rattlesnake recreation area. We think the Forest Service has done an excellent job of stewardship; the thinning east of Rattlesnake and in Spring Gulch are much appreciated. We strongly support your planned fuel reduction and trail improvement programs." (72)

"From recent Missoulian reader comments it seem that when the public hears "timber sale" regarding the NRA, they picture past logging on Nat. Forest Lands with clear cuts, soil disturbance, huge slash piles, etc...Somehow the public seems to be missing the point that this is a very selective tree cutting project that is merely using a commercial logging company to do the work that hand-crews cannot do. The purpose is not to sell timber, or set a precedent for laying out timber sales, but merely have professionals assist in improving fire safety and wildlife habitat, and returning the area to what it looked like in the early 1900's, before fire suppression." (76)

FS Response: Thank you for your comment.

214. Support for Management Action – Suggested Alternative (184)

"We would like the Missoula Ranger District to consider a modified alternative that would encompass the current "zone of agreement" on the project and to continue looking for new, creative ways to achieve its ecological goals….<include:>

- All the restoration treatments and road decommissioning activities in Sections 31 & 33.
- Improvements to the road and trail systems.

- Focus on the most strategic vegetative priorities. Don't do ineffectual treatments from an ecological perspective and concentrate on areas where fuels reduction can be maintained over time.
- Commercial thinning in Unit 1.
- Prescribed burning on Strawberry Ridge.
- Aspen restoration in Poe Meadows and meadow restoration near Spring Gulch
- Daylighting (reduce density around) large ponderosa pines (18"+ diameter).
- Not tied to diameter limits; more interested in supporting vigorous, multi-age forest stands and establishing clumps/skips in a mosaic pattern.
- "Hotter" prescribed burn following thinning within the main corridor to create mosaic conditions and achieve natural thinning in forested areas off of main trail.
- Recommend establishing a maintenance schedule for all non-commercial units.
- Clearly explain the history/uniqueness of this area to the public and take advantage of this opportunity for an educational display (for example, a sign at the trailhead about the pine savannah soil types and how the respective treatments will affect dry site conifers).
- Perhaps some of the wood could be used locally in the community as a demonstration of wood by-products.
- Consider including a requirement of the contract(s), a certain number of field tours to help educate the public about mechanical treatment, prescribed burning, and other restoration and fuel reduction treatments.
- Set up annual photo points for education (maybe the LRC can help the agency with this, or include it in contract).
- Reduce ladder fuels and fuel loads near trailhead.
- Maintain a shaded fuel break for the WUI in the upper Rattlesnake
- Keep the scale in balance with the workload and the associated costs of maintaining the Upper Rattlesnake WUI.
- Showcase examples of restoration in a high- visibility area (But recognize this is limited because of the lack of social license for commercial logging.)
- Consider demo units to show creative, socially-acceptable ways of log removal; horse logging? Small equipment? Use of a forwarder instead of a log truck? In-woods sawmill?
- If or when a decision is made, provide the LRC the opportunity to provide input on how contractors are chosen and how the work is carried out to maximize local benefit and public understanding/support.
- Focus on high priority targets for handwork for cost efficiency
- Continue to work to identify the zones of agreement on this project within the LRC, larger stakeholder groups and the community.
- Consider LRC involvement to sponsor a volunteer day/interpretation event and also in monitoring – photo points.

FS Response: Thank you for your comment. The decision-maker may consider and select from within the range of alternatives analyzed by the EA.

215. Support for Management Action – Suggested Alternative (153, 21)

- Focus on Section 31 up Woods Gulch. Do stand improvement and fuels reduction in Section 31.
- Commercially log Unit 1 and areas outside the NRA where you have greater public support and consensus.
- Commercially and/or non commercially log (depending on merchantable logs available) down on the NRA boundaries right in the back yards of the homes and residents at risk of wildfire damage – limit that to 0.25 miles or 1600 feet (like Sawmill Gulch) – work with the residents who have the most at risk for access and log haul routes.
- Accomplish the fuels reduction next to homes…work with Missoula Rural Fire and other cooperators to get grants to help the LNF and landowners do and pay for the work. Go door to door…to build support…If that's too much work for you or you don't know how to do it, pay <somone> to…put together a program…or at least advise you how to...
- No commercial logging or road improvement to accommodate log trucks in the main corridor
- Try the "Wilderness Light" management approach in the main corridor as has been used for the last 35 years.
- Designate the main corridor as a place to think outside the box and try different and/or new ways to cut down the offending trees without commercial logging.
- Since you've logged all the other recreation areas around Missoula (Pattee, Blue and Rock Cr), leave just one drainage unlogged to provide a spectrum of recreation opportunity and experience on the NF lands around Missoula – a place a visitor can go to see the "Wilderness Light" management philosophy…
- Make the main corridor a "Wilderenss Light" demonstration area for UM research demonstrating non-commercial logging ways to treat forest fuels that are not limited to the current state of our knowledge.
- Convene a community brainstorming group to help you think outside the box and try different ways to deal with the trees you don't like in the main corridor.
- Use a Missoula approach where we innovate a bit more and think further outside the box rather than apply the same cookie cutter approach used in general forest recreation areas like Pattee, Blue and Rock Creek."

FS Response: Thank you for your comment. The decision-maker may consider and select from within the range of alternatives analyzed by the EA.

216. General Support for Alternative B (4; 8; 16, 1; 18; 20; 32; 34; 40; 45; 51; 55; 57; 64; 66; 110; 111; 112; 122; 126; 130; 133; 134; 147, 1; 151; 164; 165; 167; 180; 183; 190; 193; 204):

Sample Statements:

"I am writing you in compete support of the Marshall Woods Restoration Project…My only regrets are such. First the project size should have been bigger to address all the forest health issues ion

the Rattlesnake National Recreation Area and adjoining city and private forest lands. I guess baby steps are in order regarding active forest management within this high visibility public recreation lands use are." (18)

"I am writing in support of the Marshall Woods Restoration Project including the units proposed for commercial logging. I am a Missoula resident and frequently recreate in the Rattlesnake. I support the project from the standpoint of improved forest health and reduced fuel loading and wildfire risk to the Missoula valley, watershed, and airshed. I support the proposed commercial logging as the most expedient, cost effective and common sense approach for the project. I urge the USFS to reject arguments against commercial logging and proceed with this project." (20)

"The Marshall Woods project aligns very well with Governor Bullock's Forests in Focus Initiative, from which I quote: "With much of Montana's forests in federal ownership, it's incumbent upon elected officials, state, federal and tribal foresters, and Montanans to support land management activities aimed at restoring forests and watersheds, reducing fire risk, improving habitat and water quality, and the other amenities we rely upon our forests to deliver". The project area is also partially within and immediately adjacent to the 2014 Farm Bill Priority Landscape area nominated by Governor Bullock and designated by the Chief of the Forest Service. The Priority Landscape areas are of high importance for restoration due to their threat from insect and disease and wildfire risk." (190)

"The encroaching ladder fuels, mainly Douglas-fir trees, have become too large to be effectively removed by hand, and the resulting fuel load remaining on the ground after the trees are cut would be unacceptable, both from a fire danger and aesthetic perspective. If this project had been proposed 25 years ago when the encroaching ladder fuels were much smaller, hand cutting and on-site disposal would have been a feasible alternative, but at this point it is not." (193)

FS Response: Thank you for your comment.

<u>Support for Alternative B with Changes</u>

217. "I support Alternative B, even though I'd like to see more!" (11)

FS Response: **Thank you for your comment.**

218. "I do support commercial logging in the main Rattlesnake corridor as it is fairly flat and commercial extraction could be done without causing much harm...I am opposed to commercial logging in <units> 4, 5, and 6. Building temporary roads and logging on steeper slopes will leave scars for a much longer time than would be the case in <unit> 2…I am in favor of doing the best thinning you can in <units> 4, 5, and 6 without resorting to commercial logging." (148)

FS Response: **Thank you for your comment.**

219. "I am supportive of the commercial harvest because it is the right thing to do ecologically. However, I am not sure it is worth the agency's effort unless some more socially acceptable measures are taken such as having truck haul at night, use temp bridges such as a smart lam bridge to keep from doing major work on the bridge or around Spring Creek, or hauling logs some non-conventional way." (159)

FS Response: **Thank you for your comment.**

220. "I am a forester and educator and I have spent my career involved with and experienced in forest ecology and management. I support Alternative B; with some exception…treatment should continue all the way up the main Rattlesnake trail corridor as this area is also in need of management. It would be better to do the entire drainage at one time rather than doing a patchwork of management and leaving the rest to decline. Management of the corridor would also produce a natural break in the crowns, creating a break between the hillsides when there is a fire." (192, 2)

FS Response: **Thank you for your comment. None of the Marshall Woods alternatives include treatment further up the main Rattlesnake corridor; that would have to addressed in a future project proposal.**

221. "I strongly support commercial thinning"…especially in units 2 and 3…"but the proposed alternatives lack creativity. Consider hand thinning followed by a rather hot prescribed burn. A burn that would kill about 30% of the trees. This would meet your objectives and perhaps be socially acceptable, as you are not selling a product. I recognize the hazard snags represent to recreationists. Consider contracting a team of foresters with small, light-on-the-land machines to slowly work these units. Bring in a portable sawmill to produce rough cut boards and beams." (202)

FS Response: **Thank you for your comment.**

222. "In any of the Alternatives, but particularly in B, I would like to see much more discussion of the potential role that small-scale, low-impact logging (via horse/mule) and newer lighter-impact mechanical (mill on-site, etc.) approaches could play. I think that more emphasis on these could dramatically enhance support for at least the thinning components of the project…I think the scale of unit level entries could be re-considered, to potentially break up larger treatment areas (or duration of logging entries) to further mitigate impacts. Also, on the (14 foot) road width requirement, I think this could be re-considered to adopt a slightly narrower width, which could work if smaller scale equipment could be utilized…" (175, 2)

FS Response: **Thank you for your comment.**

223. <u>General Support for Alternative C (27, 1; 39; 47; 65; 68; 80; 96; 130; 138; 168):</u>

Sample Statements:

"I am opposed to the use of trucks and heavy equipment to harvest and remove commercial timber…For this reason I urge you to choose Alternative C." (39)

"I have been a Missoula citizen for over thirty years, active in the conservation of some of our most iconic landscapes. The Rattlesnake National Recreation Areas is one of those iconic places. While I completely understand and appreciate the value of "thinning" the Rattlesnake NRA corridor is not the place for it. Instead, I would urge you to choose Alternative C, which as I understand it would allow some small trees to be cut with a chain saw and piled and burned but won't require heavy equipment and logging traffic." (47)

"I don't object particularly to the proposed logging/thinning project. I DO strenuously object to using heavy equipment to do it. There is no sensible reason not to use lighter technology. Ideally, bow saws and horses would be used. However, I believe Alternative C would be tolerable." (68)

"I am voicing my support for Alternative C in the Marshall Woods Restoration Project. Alternative C will allow thinning, but won't require heavy equipment and logging traffic." (80)

FS Response: Thank you for your comment.

224. General Support for Alternative D (35; 69; 73; 89; 101; 125; 128; 130; 140; 143; 145; 146; 155; 157; 158; 169; 200; 203):

Sample Statements:

"I support Alternative D. It is very important that fire and disease risk mitigation be implemented in this area – because of National Rec. Area status and the area's heavy rec. use, it is also important that the management tools not be so heavy handed, as commercial logging is." (35)

"As longtime residents, backcountry & frontcountry users (horse, bike, hike) of the Rattlesnake NRA, I would support ALTERNATIVE D. There is absolutely no need for a major logging operation in our backyard. Save your money and utilize it for another "new" step to apply this small cutting and understory burns into Woods Gulch and Marshall after you finish the Main Corridor work." (69)

"Regarding the proposal to do some logging on the Rattlesnake Recreation Area, I prefer Alternative D, which includes small-tree cutting and prescribed fire only to treat forest fuels with no commercial harvest." (73)

"I am writing to urge the Forest Service not to include commercial logging in the Marshall Woods Project. I attended the field trip on April 18, and have read your materials, and am impressed with most of what is proposed for fire mitigation, stream and culvert improvement, etc. Aside from the commercial logging component, this seems like a well-considered and necessary project. Hand-

thinning and careful burning are excellent methods for reducing the threat of major wildfire in the National Recreation Area and Marshall Woods/Woods Gulch areas." (146)

FS Response: Thank you for your comment.

225. Support for Alternatives C or D with Changes

"If opposition to Alternative B is so great that it threatens the entire project, I would support Alternatives C or D, but recommend no action at all in Units 2 & 3. The activities proposed by Alternatives C & D in those units will not remove enough large understory trees to realize significant ecological benefit and will be extremely costly." (144, 4)

FS Response: **Thank you for your comment.**

General Opposition

226. General opposition to commercial logging in the Rattlesnake NRA (Alternatives B and C) (21; 25; 26; 28; 29; 30; 31; 38; 41; 48; 50; 54, 1; 58, 61; 62; 67; 75; 77; 78; 79; 84; 85; 86; 87; 91; 92; 93; 94; 97; 99; 100; 102; 105; 106; 107; 108; 109; 113; 114; 115; 118; 119; 120; 121; 123; 127; 128; 129; 132; 135; 137; 139; 149; 152; 154; 161; 166; 170; 177; 178; 179; 181; 185; 187; 196; 197; 199; 201; 205; 206; 207):

Sample Statements:

"As a resident of Missoula and a frequent visitor to the Rattlesnake National Recreation Area I am appalled at the proposal to include commercial logging as way to manage the forest as defined in the Marshall Woods Project proposal. The area has become much too precious, wild and well used to even consider such an operation. Me and my family strongly encourage other methods of forest management for this sensitive and much loved property. Please develop a plan that works for everybody and does not include a commercial logging operation." (21)

"Commercial logging inside the RNRA is not permissible based on both the language and the spirit of the legislation, and may violate the bull trout critical habitat designations and also threatens the integrity of municipal water supply, the Rattlesnake Creek's watershed, so, while logging in similar forest types is ecologically appropriate, the main corridor of the Rattlesnake is not a place to be doing commercial activities. The rest of the Marshall Woods Restoration Project is fine." (25)

"Please be certain to not permit commercial logging on the Rattlesnake National Recreation Area. Not only would such logging be illegal it would also be heartbreaking." (50)

"Been in Missoula all my life and worked in the lumber mills. I have no problem with logging if it is done right and enhances the health of the forest. But I am not in favor of any logging on the Rattlesnake Wilderness area. That is a special water tributary that runs clear even in high water periods. That will change with the logging of this area." (75)

FS Response: Alternatives A and D do not include any commercial harvest; no decision has been made as to which alternative will be selected and there is no "Preferred Alternative". The proposals included in Alternatives B and C, which include commercial logging in the Rattlesnake NRA, are not illegal. No logging, or any other activities in this project, are proposed in the Rattlesnake Wilderness area.

227. General opposition to Alternatives B, C and D – support for Alternative A (42; 43; 56, 2; 63, 2; 81; 83; 103; 104; 116; 117; 141; 142; 150; 156; 173; 174; 176; 188; 191; 195; 198):

Sample Statements:

"I have been a Missoula resident and a resident of the Rattlesnake Valley for 25 years now. I attended the public open house on the matter of the Marshall Woods Restoration Project. l feel that there is a delicate balance in the habitat of this area and would like to tell you that l am for a "No Action" stance on the current Marshall Woods Restoration Project…I believe that as a resident, I have made a choice to live in a forest, with its' inherent dangers." (43)

"Select the No-Action Alternative A." (56)

"I am in favor of Alternative A for the proposed logging in the Rattlesnake. I am opposed to any logging of large trees and to any prescribed burning. I would consider some clean up with clearing brush, but I am definitely against any burning of waste. The Missoula Valley is plagued with wildfire smoke in the summer so to prescribe burn in the off season is totally unthinkable. There are other ways of dealing with forest waste such as chipping where the product can be used as compost or paper products." (81)

"Alternatives B-C and D are unacceptable, the USFS's only choice is to select A-No Action. Alternative A is the only one that will do no harm. The next action should be to pull the Project and re-think." (150)

FS Response: Thank you for your comment.

REVIEW OF REFERENCES CITED IN COMMENTS - DICK ARTLEY ATTACHMENT #3

"Best science shows logging to reduce fuels is not only ineffective at reducing fire intensity and rate of spread but sometimes exacerbates fire behavior. Since fuels reduction is a favorite USFS excuse to log public land its employees are taught to ignore and deny this information."

1	**Agee, James K. Ph.D. "The Severe Weather Wildfire-Too Hot to Handle? *Northwest Science*, Vol. 71, No. 1, 1997** "large, severe wildfires are more weather-dependent than fuel-dependent," **Forest Service Response**: The above quotation was taken out of context. The author says that this statement identified in the provided quotation should not be generalized to all forest types. Fire behavior is a function of fuel, weather, and topography. The author suggests that weather is likely the most influential factor in fire behavior for subalpine forests and moist coastal forests of Douglas-fir and western hemlock which are historically characterized by a high-severity fire regime. However, the author
2	**Barry, Glen. 2002. Commercial Logging Caused Wildfires. Portland Independent Media Center, August 2002. http://portland.indymedia.org/en/2002/08/17464.shtml** *"The biggest ecological con job in years is being waged by the U.S. Republican party and their timber industry cronies. They are blaming the recent Western wildfires on environmentalists, and assuring the public that commercial logging will reduce the risk of catastrophic wildfires."* **FS Response:** The cited article is a 10-year old commentary opposed to the then Bush administration's support for fuels reduction under the National Fire Plan. The Marshall Woods EA displays that harvest, thinning, and prescribed burn treatments will effectively modify fire behavior within treated areas and reduce the intensity of a potential wildfire under normal summer conditions (EA, page 143). Harvest
3	**Berry, Alison Ph.D., 2007. "Forest Policy Up in Smoke: Fire Suppression in the United States." A PERC publication.** *"One reason that fuels reduction treatments should be limited is that they may not address the important effects of climate and weather on fire behavior. Some studies suggest that it is drought and warmer temperatures—not fuels accumulations—that are the major explanatory factors for large fires (O'Toole 2002-2003, Pierce et al. 2004). It is an unrealistic goal to return all forests to historical states, in light of the fact that agencies have no control over drought or temperature." (pgs. 15–16)* **Forest Service Response**: The cited article is opinion commentary about fire suppression policies on the federal lands and recommends changes in funding for suppression efforts to curb spending. The author also recommends that efforts should be focused on fuels reduction and restoring fire-adapted ecosystems, as appropriate for local conditions (page 19). The Marshall Woods vegetation treatments are within warm, dry forest types characteristic of low to mixed severity fire regimes. However, field surveys indicate that tree densities and species composition are outside their historical range (EA, pages 86-91). A combination of prescribed burning and mechanical treatments is prescribed to restore stand structures and compositions more likely to support low and mixed severity wildfire so the landscape as a whole can experience the full spectrum of wildfire intensities as it did in the past. These stand structures and compositions also reduce susceptibility to bark beetles. It is well established that potential fire behavior (intensity) and severity (effect) are dependent on the interaction between fuel, weather, and physical setting (Jain and Graham 2004; Graham et al. 2004). Any particular wildfire's growth and behavior are unique because of the infinite combinations of these factors that can occur over spatial and temporal scales (Graham et al. 2004). Of these three factors, the only thing humans can alter through management is fuel.

4	**Bessie, W. C. Ph.D. and E. A. Johnson Ph.D. "The Relative Importance of Fuels and Weather on Fire Behavior in Subalpine Forests"** ***Ecology*****, Vol. 76,** **No. 3 (Apr., 1995) pp. 747-762. Published by: Ecological Society of America** *"Fire intensity was correlated to annual area burned; large area burned years had higher fire intensity predictions than smaller area burned years. The reason for this difference was attributed directly to the weather variable frequency distribution, which was shifted towards more extreme values in years in which large areas burned. During extreme weather conditions, the relative importance of fuels diminishes since all stands achieve the threshold required to permit crown fire development. This is important since most of the area burned in subalpine forests has historically occurred during very extreme weather (i.e., drought coupled to high winds). The fire behavior relationships predicted in the models support the concept that forest fire behavior is determined primarily by weather variation among years rather than fuel variation associated with stand age."* **Forest Service Response**: The cited article suggests that weather is the primary factor affecting wildfire size in subalpine forests near the boreal forest ecotone in Alberta, Canada. The title of the article clearly states that it focuses on subalpine forests. The Marshall Woods project vegetation treatments are located within an entirely different forest type of dry ponderosa pine and Douglas-fir.
5	**Bird, Bryan "Fires Normal Part of Ecology - Fear of fires ungrounded"** ***Mountain View Telegraph*****, December 20, 2007** *"Climatic conditions drive all big fires— not fuels. All substantial fires occur only if there is extended drought, low humidity, high temperatures and, most importantly, high winds. When conditions are "ripe" for a large blaze, fires will burn through all kinds of fuel loads. For this reason, most fires go out without burning more than a few acres; approximately 1 percent of all fires are responsible for about 95 percent to 99 percent of the acreage burned."* *"Under severe conditions, fires burn through all kinds of fuel loads including thinned/logged forests. Contrary to what the U.S. Forest Service has stated about the Ojo Peak Fire, local witnesses have said the fire blew right through the hotter, drier thinned forests where the cooling effect of forest canopy had been removed."* **Forest Service Response**: The cited article is unsupported opinion commentary published in a newspaper in response to another person's previously published viewpoint. In the cited article, the author opposes the construction of a biomass plant near Estancia, New Mexico and criticizes the previous commenter's statements regarding wildfire risk. The articles themselves are irrelevant to the Marshall Woods project in Montana. In response to the provided quotation above, it is well established that potential fire behavior (intensity) and severity (effect) are dependent on the interaction between fuel, weather, and physical setting (Jain and Graham 2004; Graham et al. 2004). Any particular wildfire's growth and behavior are unique because of the infinite combinations of these factors that can occur over spatial and temporal scales (Graham et al. 2004). Of these three factors, the only thing humans can alter through management is fuel. "Severe" or extreme weather conditions can create fire behavior that would burn through or breach most fuel treatments. Thus, realistic objectives for fuel treatments include reducing the likelihood of crown fire and other fire behavior that would lead to undesirable future conditions.

6	Forests.org. 2002. Bush Fire Policy: Clearing Forests So They Do Not Burn. Forest Conservation News Today, August 27, 2002. http://forests.org/archived_site/today/recent/2002/tiporefl.htm *"The Forest Service is using the fear of wildfires to allow logging companies to remove medium-and large-diameter trees that they can sell, rather than just the small trees and brush that can make fires more severe. There is little evidence to show that such logging will prevent catastrophic fires; on the contrary, logging roads and industrial logging cause wildfires. Bush is a well-known supporter of the timber industry and has accepted huge sums of money from wealthy timber company leaders. He is promoting misinformation about forest fires in order to benefit timber industry campaign contributors."* **FS Response:** The cited article is opinion commentary written 2002 criticizing then President Bush and his administration's support for fuels reduction (Healthy Forests Initiative). This is dated opinion not applicable to the current administration.
7	**Coe, Nathan J. "Forestry shouldn't be an 'industry' " Durango Herald, February 12, 2011** *"As someone with first-hand experience in fire hazard reduction and first-hand knowledge of the forest management field, as well as someone with lifelong roots in the Durango community, I am abhorred by the destruction, nearly amounting to clear cutting, that is taking place around our community under the guise of "fire hazard reduction."* **Forest Service Response**: The cited article is opinion commentary published in a Colorado newspaper criticizing what appears to be ongoing timber harvest near Durango, Colorado for the purpose of fuels reduction. This article is irrelevant to the Marshall Woods project in Montana. Clearcutting is not included in the Marshall Woods project. A combination of prescribed burning and mechanical treatments is prescribed to restore stand structures and compositions more likely to support low and mixed severity wildfire.
8	**Forest Policy Research paper 2008 "Montana: Blackfoot Clearwater Stewardship Proposal is all about selling out to Pyramid lumber"** *"First, most large fires are climatic/weather driven events, not fuels driven. Extended drought, high winds, high temperatures and low humidity enable fires to burn through all fuel loadings. Many of the large Western fires in recent years were in forests that had been previously logged and/or thinned, with little apparent effect on fire spread or severity."* **Forest Service Response**: The cited article is unsupported opinion commentary that questions the effectiveness of thinning to reduce fire hazard. Please see responses to #1, 3, 4, 5, and 9. Fuel modeling suggests the reduction of surface and ladder fuels along with the separation of tree crowns prescribed in the Marshall Woods vegetation treatments will decrease the risk of high severity crown fire (EA, page 143).
9	**Forest Policy Research paper 2008 "California: Too often thinning treatments tend to increase fire hazards"** *"most large fires are climatic/weather driven events, not fuels driven. Extended drought, high winds, high temperatures and low humidity enable fires to burn through all fuel loadings."* **Forest Service Response**: The provided quotation is not contained within the cited article. This article cites a study that suggests that mechanical thinning followed by prescribed fire to reduce surface fuels is effective in creating stands that are more resistant to severe fire effects. The article emphasizes the importance of treating surface fuels with prescribed fire following thinning activities to reduce future fire severity and spread. The Forest Service agrees. The Marshall Woods project includes thinning from below followed by prescribed burning to reduce surface fuels.

10	**Frey, David "Logging Won't Halt Beetles, Fire, Report Says" *NewWest.net*, 3-03-10** *"The primary driver of fire is not beetle kill. It's climate," said Barry Noon, a wildlife ecology professor at Colorado State University and an author of the report. "It's drought and temperature."* *"The report was authored by Noon; Clark University professor Dominik Kulakowski ; Scott Black, executive director of the Xerces Center for Invertebrate Conservation and Dominick DellaSala, president and chief scientist for the National Center for Conservation Science and Policy."* **Forest Service Response**: This article cites a report entitled, "Insects and Roadless Forests: A Scientific Review of Causes, Consequences, and Management Alternatives" issued by a conservation group that specifically addresses a proposal to exempt National Forest roadless areas in Colorado from protections under the 2001 Roadless Area Conservation Rule. The authors suggest that mechanical treatments in roadless areas will not likely reduce forest susceptibility to beetle outbreaks or reduce the risk of fires, especially the risk of fires to communities. The Marshall Woods project does not include salvage of dead and dying trees, nor does it include timber harvest or road construction in roadless areas. Please also see responses to 1, 3, 4, 5, and 8.
11	**Gable, Eryn "Battling beetles may not reduce fire risks – report" The Xerces Society Land Letter, March 4, 2010** *"Extensive areas of dead trees have understandably led to widespread concern about the increased risk for forest fires," said Dominik Kulakowski, one of the report's authors and a professor of geography and biology at Clark University in Worcester, Mass. "This is a logical concern, but the best available science indicates that the occurrence of large fires in lodgepole pine and spruce-fir forests is mainly influenced by climatic conditions, particularly drought."* **Forest Service Response**: This article cites the same report as does the article in #10 above – please see above response. The article is not applicable to the Marshall Woods project. Marshall Woods vegetative treatments are proposed in dry ponderosa pine and Douglas-fir forest types, not the lodgepole pine and spruce-fir forest types discussed in the cited report and identified in the supplied quotation.
12	**Gorte, Ross W. Ph.D. *"Wildfire Damages to Homes and Resources: Understanding Causes and Reducing Losses"* A CRS report for Congress, June 2, 2008** *"Reducing burnable biomass, however, does not eliminate wildfires, because fuel reduction does not directly alter the dryness of the biomass or the probability of an ignition."* **Forest Service Response**: The cited article is a report prepared for Congress that provides an overview of the nature of wildfires followed by a discussion of the options for protecting structures, wildlands, and natural resources from wildfires. Some of the options discussed include those prescribed in the Marshall Woods project (e.g. thinning and prescribed burning). In response to the quotation provided, elimination of wildfire is not an objective. At the beginning of the paragraph where this quotation is found, the author states that the principal goal for land and resource protection is *to reduce the damages caused by wildfire*, which he says can be best achieved by reducing burnable biomass.

13	**GAO. 1999. Western National Forests: A cohesive strategy is needed to address catastrophic wildfire threats. Report to the subcommittee on Forests and Forest Health, Committee on Resources, House of Representatives. April. Available at www.gao.gov. 60 p.** **Cited in attachment as:** **Government Accounting Office "Western National Forests: A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats" GAO/RCED-99-65** *"Most of the trees that need to be removed to reduce accumulated fuels are small in diameter and have little or no commercial value." "Mechanically removing fuels (through commercial timber harvesting and other means) can also have adverse effects on wildlife habitat and water quality in many areas. Officials told GAO that, because of these effects, a large-scale expansion of commercial timber harvesting alone for removing materials would not be feasible. However, because the Forest Service relies on the timber program for funding many of its activities, including reducing fuels, it has often used this program to address the wildfire problem. The difficulty with such an approach, however, is that the lands with commercially valuable timber are often not those with the greatest wildfire hazards."* **FS Response:** The literature citation is a report to Congress from the Government Accounting Office that recommends the development of a cohesive strategy for reducing and maintaining accumulated fuels on national forests of the interior West at acceptable levels. The quotes provided by the commenter are describing what the GAO identifies as some of the barriers to the effective action of addressing catastrophic wildfire (page 7). This literature reference is not relevant to the Marshall Woods project because it recommends a National policy for addressing wildfire and fuel conditions across the interior West, which is not within the scope of this project. The Marshall Woods project proposes various site-specific vegetation treatments including prescribed burning, timber harvest, and non-commercial thinning to improve forest stand resilience and reduce hazardous fuels.
14	**Hanson, Chad, "Commercial Logging Doesn't Prevent Catastrophic Fires, It Causes Them." Published in the New York Times, May 19, 2000** *"In April 1999, the General Accounting Office issued a report that raised serious questions about the use of timber sales as a tool of fire management. It noted that "most of the trees that need to be removed to reduce accumulated fuels are small in diameter" -- the very trees that have 'little or no commercial value.' "* *"As it offers timber for sale to loggers, the Forest Service tends to 'focus on areas with high-value commercial timber rather than on areas with high fire hazards,' the report said. Its sales include 'more large, commercially valuable trees' than are necessary to reduce the so-called accumulated fuels (in other words, the trees that are most likely to burn in a forest fire)."* *"The truth is that timber sales are causing catastrophic wildfires on national forests, not alleviating them. The Sierra Nevada Ecosystem Project Report, issued in 1996 by the federal government, found that 'timber harvest, through its effects on forest structure, local microclimate and fuel accumulation, has increased fire severity more than any other recent human activity.' The reason goes back to the same conflict that the G.A.O. found: loggers want the big trees, not the little ones that act as fuel in forest fires."* *"After a 'thinning' timber sale, a forest has far fewer of the large trees, which are naturally fire-resistant because of their thick bark; indeed, many of these trees are centuries old and have already survived many fires. Without them, there is less shade. The forest is drier and hotter, making the remaining, smaller trees more susceptible to burning. After logging, forests also have accumulations of flammable debris known as "slash piles" -- unsalable branches and limbs left by logging crews."* **FS Response:** The Sierra Nevada Framework is specific to more dry (xeric) forest communities in California and not the inland Northern Rockies. The Marshall Woods project is not intended to "prevent catastrophic fires" but to minimize the probability of extreme fire behavior within the treated areas, among other purposes.

15	**Hermach, Tim. "The Skinny on Thinning, Should we save the forest from itself?" Published by the *Eugene Weekly Viewpoint*, 11/1/07** *"Emerging science demonstrates that the real culprit for creating more wildfires — including southern California's blazes — is not "fuels" but climate and weather. Climate change simply means we must learn to live with more wildfires.* *Humankind can be pretty smart (we made it to the Moon), but we can also be pretty stupid (we're destroying the lungs of the planet for profit). One thing, however, is certain: Mother Nature knows best. So let's be responsible and stop logging the publicly owned forests, let them recover and let God and nature back in."* **Forest Service Response**: The cited article is unsupported opinion commentary written by the executive director of the Native Forest Council in opposition to fuels reduction treatments that involve commercial tree removal. Please see responses to #1, 3, 4, 5, and 8.

16	**Huff, Mark H.; Ottmar, Roger D.; Alvarado, Ernesto; Vihnanek, Robert E.; Lehmkuhl, John F.; Hessburg, Paul F.; Everett, Richard L. 1995. Historical and current forest landscapes in eastern Oregon and Washington. Part II: Linking vegetation characteristics to potential fire behavior and related smoke production Gen. Tech. Rep. PNW-GTR-355. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 43 p. (Everett, Richard L., team leader; Eastside forest ecosystem health assessment; Hessburg, Paul F., science team leader and tech. ed., Volume III: assessment.).** *"In general, rate of spread and flame length were positively correlated with the proportion of area logged (hereafter, area logged) for the sample watersheds. Correlation coefficients of area logged with rate of spread were > 0.57 for five of the six river basins (table 5). Rate of spread for the Pend Oreille and Wenatchee River basins was strongly associated (r-0.89) with area logged. Correlation of area logged with flame length were > 0.42 for four of six river basins (table 5). The Deschutes and Methow River basins showed the strongest relations. All harvest techniques were associated with increasing rate of spread and flame length, but strength of the associations differed greatly among river basins and harvesting methods." (pg.9)* *"As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. The potential rate of spread and intensity of fires associated with recently cut logging residues is high, especially the first year or two as the material decays. High fire-behavior hazards associated with the residues can extend, however, for many years depending on the tree. Even though these hazards diminish, their influence on fire behavior can linger for up to 30 years in the dry forest ecosystems of eastern Washington and Oregon."* **FS Response:** The paper referenced (Huff et al. 1995) above was an attempt to compare the potential fire behavior and smoke production of historical and current time periods for forty-nine 5,100 to 13,500 hectare watersheds. It was a landscape-level modeling exercise based upon vegetation type and timber harvest type classification from aerial photo interpretation of historic (1938-1959) and current (1985-1992) aerial photos. The authors used fuel behavior photo series to assign fuel loading by vegetation type for non-harvested areas and by harvest-type in harvested areas. Due to lack of site-specific information, they assigned a fire behavior photo series that matched older logging slash to the harvests, assuming in the process that no post-treatment fuels reduction treatments had ever taken place. They also only modeled surface and moderate- to low-intensity understory fires and constant weather and topographic conditions. This study has little relevance to the Marshall Woods project that proposes various vegetation treatments including thinning from below and shelterwood cutting followed by prescribed burning to reduce natural and activity-generated fuels. The fuels and fire behavior conditions created by the project will differ greatly than that modeled by Huff et al. (1995). It is important to note that the authors of this study recommend that "prescribed fire, along with mechanical measures if hazardous burning conditions exist, can be used for restoration purposes to regulate stand composition, reduce plant competition, and modify fuels to achieve a desired structure. Over time, prescribed fires, natural fires, selective tree harvesting, or a combination thereof can be used to maintain desired conditions and processes" (page 36). The Marshall Woods project proposes to use a combination of mechanical treatments and prescribed burning to meet vegetation objectives described within the EA.
17	**Ingalsbee, Timothy. 2000. Commercial Logging for Wildfire Prevention: Facts Vs. Fantasies. Unpublished paper Western Fire Ecology Center.** *"The notion that commercial logging can prevent wildfires has its believers and loud proponents, but this belief does not match up with the scientific evidence or history of federal management practices. In fact, it is widely recognized that past commercial logging, road-building, livestock grazing and aggressive firefighting are the sources for "forest health" problems such as increased insect infestations, disease*

outbreaks, and severe wildfires."

"How can the sources of these problems also be their solution? This internal contradiction needs more than propaganda to be resolved. It is time for the timber industry and their supporters to heed the facts, not fantasies, and develop forest management policies based on science, not politics."

FS Response: The cited article is opinion commentary. "Commercial logging" cannot prevent wildfires which the Forest Service has never said it would. To "prevent" wildfires, one would have to stop all human and natural (i.e. lightning) ignition sources. However, vegetation treatments of all kinds are accomplished to modify fire behavior within treated areas. Ample evidence suggests that fuels treatments can be used to modify fire intensity and severity. Examples of this evidence are:

• Ager et al. 2007. A simulation study of thinning and fuel treatments on a wildland-urban interface in eastern Oregon, USA. Landscape and Urban Planning 80 (2007) 292-300.

• Carey, Henry, Schumann, Martha. 2003. Modifying Wildfire Behavior – The Effectiveness of Fuel Treatments. National Community Forestry Center. Southwest Region Working Paper 2.

• Cram, D.S., T.T. Baker, and J.C. Boren. 2006. Wildland fire effects in silviculturally treated versus untreated stand of New Mexico and Arizona. USDA Forest Service Rocky Mountain Research Station. RMRS-Rp-55.

• Dailey et al. 2008. Fire behavior and effects in fuels treatments and protected habitat on the Moonlight Fire. USDA Forest Service, Pacific Southwest Research Station.

• Finney et al. 2005. Stand and landscape-level effects of prescribed burning on two Arizona wildfires. Canadian Journal of Forest Research. 35: 1714-1722

• Fites et al. 2007. Fire behavior and effects relating to suppression, fuel treatments, and protected areas on the Antelope Complex Wheeler Fire. USDA Forest Service, Pacific Southwest Research Station.

• Fule et al. 2001. Potential fire behavior is reduced following forest restoration treatments. Vance, Regina K.; Edminster, Carleton B.; Covington, W. Wallace; Blake, Julie A. comps. 2001. Ponderosa pine ecosystems restoration and conservation: steps toward stewardship; 2000 April 25–27; Flagstaff, AZ. Proceedings RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

• Graham R.T., Harvey, A.E., Jain, T.B., Tonn, J.R. 1999. The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests. USDA Forest Service, Pacific Northwest Research Station. USDI Bureau of Land Management. General Technical Report PNW-GTR-463.

• Graham R.T., McCaffrey, S.l Jain, T.B. 2004. Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. USDA Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-120.

• Hanson, C.T., Odion, D.C. 2006. Fire severity in mechanically thinned versus unthinned forests of the Sierra Nevada, California. In: Proceedings of the 3rd International Fire Ecology and Management Congress, November 13-17, 2006, San Diego, CA.

• Hunter, M.E.; Shepperd, W.D.; Lentile, J.E.; Lundquist, J.E.; Andreu, M.G.; Butler, J.L.; Smith, F.W. 2007. A comprehensive guide to fuels treatment practices for ponderosa pine in the Black Hills, Colorado Front Range, and Southwest. Gen. Tech. Rep. RMRS-GTR-198. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 93 p.

• Jerman et al. 2004. Slash compression treatment reduced tree mortality from prescribed fire in southwestern ponderosa pine. Western Journal of Applied forestry. 19(3)

• Johnson, Morris C.; Peterson, David L.; Raymond, Crystal L. 2007. Guide to fuel treatments in dry forests of the Western United States: assessing forest structure and fire hazard. Gen. Tech. Rep. PNW-GTR-686. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 322 p.

• Keyes and O'Hara. 2002. Quantifying stand targets for silvicultural prevention of crown fires. Western Journal of Applied forestry. 17(2)

• Murphy et al. 2007. An assessment of fuel treatment effects on fire behavior, suppression effectiveness, and structure ignition on the Angora Fire. USDA Forest Service Southwest Region. R5-TP-025

• Omi & Martinson. 2004. Effectiveness of thinning and prescribed fire in reducing wildfire severity. USDA Forest Service Gen. Tech. Rep. PSW-GTR-193

• Omi, Philip N., Martinson, Erik J., Chong, Geneva W. 2006. Effectiveness of Pre-Fire Fuel Treatments. Submitted to the Joint Fire Science Program Governing Board. Final Report JFSP Project 03-2-1-07.

• Peterson, D.L., Johnson, M.C., Agee, J.K., Jain, T.B., McKenzie, D., Reinhardt, E. 2005. Forest Structure and Fire Hazard in Dry Forests of the Western United States. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-628.

• Pollet & Omi.2002.Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. International Journal of Wildland Fire. 11: 1-10

• Roccaforte et al. 2008. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments. International Journal of Wildland Fire. 17: 293-303

• Schroeder. 2006. Effectiveness of forest fuel management: a crown fire case study in the Northwest Territories, Canada. Forest Research Institute of Canada.

• Skinner et al. Effects of prescribed fire and thinning on wildfire severity; the Cone Fire, Blacks Mountain Experimental Forest. Proceedings: 25th Vegetation Management Conference.

• Stephens and Moghaddas. 2005. Experimental fuel treatment impacts on forest structure, potential fire behavior, and predicted tree mortality in a California mixed conifer forest. Forest Ecology and Management. 215: 21-36

• Stephens and Moghaddas. 2005. Silvicultural and reserve impacts on potential fire behavior and forest conservation; 25 years of experience from SierraNevada mixed conifer forests. Biological Conservation. 125: 369-379

• Stephens. 1998. Evaluation of the effects of silvicultural and fuels treatments on potential fire behavior in Sierra Nevada mixed-conifer forests. Forest Ecology and Management. 105: 21-35

• Strom and Fule. 2007. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. International Journal of Wildland Fire. 16: 128-138

• Strom. 2005. Pre-fire treatment effects and post-fire forest dynamics on the Rodeo-Chediski burn area, Arizona. Master's Thesis. Northern Arizona University.

18	**Ingalsbee, Timothy Ph.D. 2000. "Money to Burn: The Economics of Fire and Fuels Management, Part One: Fire Suppression". An American Lands Alliance publication.** *"Problems exist with over-generalizing the effects of fire exclusion, and misapplying data derived from short-interval forest ecosystems (e.g. ponderosa pine stands) to long-interval forest ecosystems that have not missed their fire cycles yet and are still within their historic range of variability for stand-replacing fire events (e.g. high elevation lodgepole pine or fir stands)."* **Forest Service Response**: The provided quotation is not found within the cited article. It instead comes from another of Mr. Ingalsbee's articles, entitled, "Ecological Assessments Should Be Required Prior to Fuels Reduction or Restoration Projects". In the next sentence the author writes, "Fire/fuels management prescriptions should reflect current conditions, and there should be no treatments without prior collection of site-specific field data." The Marshall Woods project is consistent with the author's recommendations. Site-specific assessments have been completed for each treatment area. Silvicultural prescriptions have been tailored to address the existing conditions to meet site-specific objectives. The Marshall Woods project addresses the restoration needs in the dry ponderosa pine and Douglas-fir forest types. The author also suggests that fuels reduction should be recognized as a means of attaining the goals of ecosystem restoration and protection. The Marshall Woods project is consistent with this assessment as it uses fuels reduction actions to restore forest stand resilience (see EA, Appendices D and E).
19	**Ingalsbee, Timothy Ph.D., "National Fire Plan Implementation: Forest Service Failing to Protect Forests and Communities" American Lands Alliance, March 2002** *"Congress should prohibit the use of commercial timber sales and stewardship contracts for hazardous fuels reduction projects. Commercial logging removes the most ecologically valuable, most fire-resistant trees, while leaving behind highly flammable small trees, brush, and logging debris. The use of "goods for services" stewardship contracts also encourages logging larger, more fire-resistant trees in order to make such projects attractive to timber purchasers. The results of such logging are to increase fire risks and fuel hazards, not to reduce them. The financial incentives for abusive logging under the guise of "thinning" must be eliminated."* **Forest Service Response**: The cited article is 12-year old opinion commentary that suggests Congress and the Forest Service adopt the author's fire policy recommendations. Modifying national policies is outside the scope of the Marshall Woods project. However, the Marshall Woods vegetation treatments would retain the largest, most fire-resistant trees as well as the fire-resistant species (EA, page 36). Natural and activity-generated fuels would be treated through prescribed burning.
20	**Ingalsbee, Timothy Ph.D. "The wildland fires of 2002 illuminate fundamental questions about our relationship to fire." The Oregon Quarterly, Winter 2002** *"Thus, the use of commercial logging for fire hazard reduction poses yet another paradox: Logging removes the trees that normally survive fires, leaves behind the trees that are most often killed by fire, increases flammable fuel loads, and worsens fire weather conditions." (pg. 5)* **FS Response:** In the article, immediately following the quote above, the author comments: *"There is a role for strategic thinning of small-diameter understory trees and brush, but thinning should focus on genuinely thin trees, not the thick, tall, mature, and old trees most valuable to wildlife and watersheds. Moreover, thinning proposals should not be falsely advertised as a means of preventing wildfires, but rather, as a means of preparing forests for prescribed and wildland fires."* The article is an opinion piece in which the author provides no supporting material for his conclusions. In the article, he assumes that all "commercial logging for fire hazard" would be "from above" and would leave small trees and slash, increasing fuel loads. The author supports strategic thinning of small-diameter trees as a preparation for prescribed burning. The Marshall Woods treatments would thin-from-below, removing

	small trees and less fire tolerant species of conifers. The thinning activities would be followed by fuels treatments. The article supports the intent of the Marshall Woods project more than it opposes it.
21	**Ingalsbee, Timothy Ph.D. "Fanning the Flames! The U.S. Forest Service: A Fire-Dependent Bureaucracy." Missoula Independent. Vol. 14 No. 24, June 2003** *"In the face of growing public scrutiny and criticism of the agency's logging policies and practices, the Forest Service and their enablers in Congress have learned to mask timber sales as so-called 'fuels reduction' and 'forest restoration' projects. Yet, the net effect of these logging projects is to actually increase fire risks and fuel hazards."* *"Decades of encouraging private logging companies to take the biggest, oldest, most fire-resistant trees from public lands, while leaving behind a volatile fuel load of small trees, brush, weeds, stumps and slash has vastly increased the flammability of forestlands."* *"In addition to post-fire salvage logging, the Forest Service and timber industry advocates in Congress have been pushing pre-fire timber sales, often falsely billed as hazardous fuels reduction or 'thinning' projects, to lower the risk or hazard of future wildfires. In too many cases, these so-called thinning projects are logging thick-diameter fire-resistant overstory trees instead of or in addition to cutting thin-sized fire-susceptible understory trees. The resulting logging slash and the increased solar and wind exposure can paradoxically increase the fuel hazards and fire risks."* **FS Response:** This article is opinion commentary and the points made are essentially the same as those in the above cited articles written by the same author. Please see the responses to #25 to #27.
22	**Ingalsbee, Timothy Ph.D. 2007. "A Reporter's Guide to Wildland Fire." Published by the Firefighters United for Safety, Ethics, and Ecology (FUSE), January 2007** *"More than any other recent human activity, the legacy of commercial timber extraction has made public forests more flammable and less resilient to fire. Firstly, clearcut and high-grade logging have historically taken the largest, most fire-resilient, most commercially-valuable trees, and left behind dead needles and limbs (logging debris called "slash"), along with smaller trees and brush that are less commercially valuable but more flammable than mature and old-growth trees. The net effect is to increase the amount of available hazardous fuel."* *"Secondly, the removal of large overstory trees also changes the microclimate of logged sites, making them hotter, drier, and windier, which increases the intensity and rate of spread of wildfires. Third, the creation of densely-stocked even-aged plantations of young conifers made sites even more flammable since this produced a solid mass of highly combustible conifer needles within easy reach of surface flames. These changes in the fuel load, fuel profile, and microclimate make logged sites more prone to high-intensity and high-severity wildfires."* **FS Response:** The first opposing view is not applicable to the Marshall Woods project as all timber harvest activities would include appropriate slash disposal methods. These methods, such as mechanical piling and subsequent burning of the piles during the right weather conditions, reduce the amount of available hazardous fuel to levels well below those amounts prior to the timber harvest activities. The EA demonstrates how fuel model types are changed from the pre- to post-treatment conditions. In some situations, fuels are indeed temporarily created that would burn at a faster rate of spread, but these fuels are also much easier to control with standard firefighting techniques as the duration and intensity of the burn is so much less than the large, heavy fuels found in the pre-treatment areas.

23	**Ingalsbee, Timothy Ph.D. and Joseph Fox, Ph.D. "Firefighters United for Safety, Ethics, and Ecology (FUSEE): Torchbearers for a New Fire Management Paradigm" A poster presentation at the Third International Fire Ecology and Management Congress, Association for Fire Ecology November 13-17, 2006** *"For example, use of taxpayer dollars and resources on deficit timber sales that remove fire-resilient old-growth trees and leave behind untreated logging slash, violate federal environmental laws in planning or implementation, or are deceptively labeled as "fuels reduction" or "forest restoration" projects when they actually increase fuel hazards or degrade ecological integrity, is an ethical as well as an ecological issue. These kind of anti-ecological, unethical forest management projects also adversely affect firefighter and community safety by diverting limited federal dollars away from genuine hazardous fuels reduction activities, and by degrading ecological conditions in ways that increase wildfire rate of spread, intensity, or severity."* **Forest Service Response**: The cited article provides an overview of the FUSEE organization and its mission. The Marshall Woods project would not harvest old growth trees. Large, fire-resistant trees would be retained. Activity generated slash would be treated by prescribed burning.
24	**Keene, Roy "Logging does not prevent wildfires" Guest Viewpoint, the Eugene Register Guard January 11, 2009** *"History, not science, refutes the claim that logging helps to prevent forest fires. The forests of the West are far more vulnerable to fire due to a century of industrial logging and fire suppression. Logging has removed most of the older, fire-resistant trees from the forests. Fire suppression has encouraged many smaller and more flammable trees, brush and dense plantations to fill the holes. Logging has set the forests of the West up to burn big and hot.* **FS Response**: The article is opinion commentary that was written in response to a guest viewpoint published in an Oregon newspaper. Please see responses to #25, #26, and #27. As stated in #25, logging cannot prevent wildfires and the Forest Service has never said it would. However, vegetation treatments of all kinds are done to modify fire intensity and severity within treated areas, which is supported by numerous studies (see literature citations listed in response to #25. Marshall Woods project would retain the larger, fire resistant trees and fire-resistant tree species.
25	**Keene, Roy. Restorative Logging? "More rarity than reality" Guest Viewpoint, the Eugene Register Guard March 10, 2011** *"Fear of wildfire is heavily used to sell these forest "restoration" schemes. Logging has not been proven, in practice, to reduce fire frequency or intensity. Historically, the largest, most destructive blazes, like the Tillamook conflagration, were caused from logging or fueled by slash. Unlogged forests, cool and shaded, are typically more fire resistant than cut over, dried-up stands choked with slash and weeds. Large-scale logging (by any name) has devalued our forests, degraded our waters, damaged soils, and endangered a wide variety of plants and animals. How will the current round of politically and environmentally propelled 'restorative' logging proposals differ, in practice, from past logging regimes?"* **FS Response:** The article is opinion commentary that was printed in an Oregon newspaper. The Tillamook Burn that the author refers to was a series of large forest fires in the northern Oregon Coast Range mountains 50 miles west of Portland. It began in 1933 and struck at six-year intervals through 1951, burning a combined total of 355,000 acres. The largest of the four fires started in August 1933 within a logging operation. Near record weather conditions with a 104º temperature and relative humidity of about 20 percent combined with dry fuel conditions contributed to the rapid growth and high intensity and severity of the fire. The subsequent fires in 1939, 1945, and 1951 primarily reburned the area affected by the first fire. The harvest proposed in the Marshall Woods project differs greatly from the logging that occurred in the Pacific Northwest in the 1930s. In the 1930s, it is likely that slash was rarely, if ever, treated. The Marshall

	Woods project would treat the natural and activity generated slash. The larger, fire-resistant trees would be retained.
26	**Kelly, Steve Ph.D. 2007. "Cheap Chips, Counterfeit Wilderness: Greenwashing Logging on Montana's Biggest National Forest." Published by the World Prout Assembly** *"There is a gathering body of evidence that large wildfires are not determined by "unnatural" fuel loading. Lodgepole pine, subalpine fir, and aspen depend on infrequent, stand-replacing, high intensity fires. Most of the B-D NF is well within the natural range of variability. In fact, dense forest stands may not be caused by fire exclusion, but by a series of consecutive wet years that boosted seedling survival and expanded the local range.* *Drought, wind, and low humidity, not fuels loads, drive large wildfires. Weather and climatic conditions are also the driving force behind expanding insect populations."* **Forest Service Response**: The cited article is opinion commentary criticizing the then proposed Beaverhead-Deerlodge Conservation, Restoration and Stewardship Act of 2007. This bill did not pass into law and has no relevance to the Marshall Woods project on the Lolo National Forest. The Marshall Woods vegetation treatments are located within dry ponderosa pine and Douglas-fir forest types that typically experienced low to mixed severity fires on a moderately frequent basis. This is a very different forest type than the subalpine forest described in the quotation. Please see responses to #1, 3, 4, 5, and 8.
27	**Laverty, Lyle, USDA Forest Service and Tim Hartzell U.S. Department of the Interior "A Report to the President in Response to the Wildfires of 2000", September 8, 2000.** *"The Congressional Research Service (CRS) recently addressed the effect of logging on wildfires in an August 2000 report and found that the current wave of forest fires is not related to a decline in timber harvest on Federal lands. From a quantitative perspective, the CRS study indicates a very weak relationship between acres logged and the extent and severity of forest fires. To the contrary, in the most recent period (1980 through 1999) the data indicate that fewer acres burned in areas where logging activity was limited." "Qualitative analysis by CRS supports the same conclusion. The CRS stated: "[T]imber harvesting removes the relatively large diameter wood that can be converted into wood products, but leaves behind the small material, especially twigs and needles. The concentration of these fine fuels on the forest floor increases the rate of spread of wildfires." Similarly, the National Research Council found that logging and clearcutting can cause rapid regeneration of shrubs and trees that can create highly flammable fuel conditions within a few years of cutting."* **FS Response:** The cited paper is a report prepared in response to then President Clinton's request for recommendations on how to best respond to the 2000 wildfires, reduce the impacts of the wildland fires on rural communities, and ensure sufficient firefighting resources in the future. The quotes provided by the commenter were made in response to critics of the President's proposal to protect roadless areas. These critics expressed concern that the roadless policy could increase wildfire risks. On the next page, the report supports thinning stands to reduce small diameter trees, underbrush, and accumulated fuels. It cites a study that demonstrated fuel reduction treatments (which included thinning) were effective in mitigating fire severity. In the Marshall Woods project, thinning and other harvest activities would be used to modify fire behavior as well as meet other vegetation objectives. The large, fire-resistant trees would be retained and the natural and activity generated slash would be treated.
28	**Lawrence, Nathaniel, NRDC senior attorney "Gridlock on the National Forests" Testimony before the U.S. House of Representatives Subcommittee on Forests and Forest Health (Committee on Resources) December 4, 2001** *"I will turn first to forest thinning aimed at reducing fire risks. There is surprisingly little scientific information about how thinning actually affects overall fire risk in national forests. How can it be that thinning could increase fire risks? First, thinning lets in sunlight and wind, both of which dry out the forest interior and increase flammability. Second, the most flammable material - brush, limbs, twigs, needles, and saplings - is difficult to remove and often left behind. Third, opening up forests promotes brushy, flammable undergrowth. Fourth, logging equipment compacts soil so that water runs off instead of filtering in to keep soils moist and trees healthy. Fifth, thinning introduces diseases and pests, wounds the trees left behind, and generally disrupts natural processes, including some that regulate forest health, all the more so if road construction is involved."*

	FS Response: The first statement may have been incorrect in 2001 when it was made, and is certainly incorrect now. A number of studies and reports have been made over the years investigating the effect of thinning on fire behavior and effects (refer to the list of some of these studies and reports in the response to #25 above). Because wind exposure may be increased within timber harvest units and surface fuels could be drier as a result, fire researchers indicate it is critical that surface fuels be treated to minimize fire intensity (Graham et al. 1999; Agee and Skinner 2005; Graham et al. 2004; Peterson et al. 2005). Slash reduction would be conducted following harvest. The quotation given above also says that *"logging equipment compacts soil so that water runs off instead of filtering in to keep soils moist."* It is true that logging equipment, particularly ground-based equipment) can compact soils, but project design, resource protection measures, and best management practices effectively minimize soil disturbance. The Marshall Woods project would meet Region 1 soil quality standards (EA page 243). No runoff or erosion is expected because forest floor, ground cover, and soil organic matter would be retained. The quotation says that *"thinning introduces diseases and pests, wounds the trees left behind."* The vegetation treatments proposed in the Marshall Woods project would have the opposite effect on insects and disease (EA pages 106-110). Treatments would leave a more robust stand of residual trees that are more resistant to insects and would also convert stands of species susceptible to disease to those species that are more resistant. Careful logging and contract administration keeps the amount of residual tree damage (i.e. wounds) to a minimum.
29	**Leitner, Brian. "Logging Companies are Responsible for the California Wilfires." The Democratic Underground, October 30, 2003.** *"Those who would argue that this form of logging has any positive effects on an ecosystem are clearly misinformed. This type of logging has side effects related to wildfires, first and foremost being that the lumber companies aren't interested in hauling out all the smaller trees, branches, leaves, pine needles, sawdust, and other debris generated by cutting all these trees. All this debris is left on site, quickly dries out, and is far more flammable sitting dead on the ground than it was living in the trees. Smaller, non-commercially viable trees are left behind (dead) as well - creating even more highly flammable fuel on the ground."* **FS Response:** The "form of logging" that the author is referring to is not a component of the Marshall Woods project. The "smaller trees, branches, leaves, pine needles, sawdust, and other debris generated by cutting all these trees" is specifically treated by either mechanical means or broadcast burning to meet the State of Montana standards for slash treatment. Meeting these standards leave the treatment areas in a fuels conditions that a wildland fire can effectively be suppressed with a minimal amount of resources.
30	**"More Large Forest Fires Linked To Climate Change" Adapted from materials provided by the University of Arizona *ScienceDaily*, July 10, 2006** *"Almost seven times more forested federal land burned during the 1987-2003 period than during the prior 17 years. In addition, large fires occurred about four times more often during the latter period."* *"The increases in fire extent and frequency are strongly linked to higher March-through-August temperatures and are most pronounced for mid-elevation forests in the northern Rocky Mountains.* *The new finding points to climate change, not fire suppression policies and forest fuel accumulation, as the primary driver of recent increases in large forest fires."* **Forest Service Response**: The article is a brief summary of a 2006 publication entitled "Warming and Earlier Spring Increases Western U.S. Forest Wildfire Activity" written by Westerling et al. In their study, the authors compiled a database of large wildfires in the western United States forests since 1970 and compared it with hydro-climatic and land-surface data. Their study indicates that large wildfire activity increased markedly in the mid-1980s, with higher large-wildfire frequency, longer wildfire durations, which they suggest is strongly associated with increased spring and summer temperatures and an earlier spring snowmelt. The authors do not discount the effect of fuels: "In some forest types, past land uses [including

	fire suppression] have probably increased sensitivity of current forest wildfire regimes to climatic variability through effects on the quantity, arrangement, and continuity of fuels." They further state, "The overall importance of climate in wildfire activity underscores the urgency of ecological restoration and fuels management to reduce wildfire hazards to human communities and to mitigate ecological impacts of climate change in forests that have undergone substantial alterations due to past land uses." As described in the Marshall Woods EA, field surveys indicate the warm, dry forest types have higher tree densities than historic conditions and a lower quantity and proportion of fire-resistant tree species likely due to extensive timber harvest, settlement, and occupation of the Rattlesnake Valley, a large-scale human-caused fire in 191, and subsequent timber harvest in the 1950s and 1960s (EA, page 13). The Marshall Woods project would use a combination of prescribed burning and mechanical treatments to lower stand densities and favor fire and disease-resistant tree species. These treatments would increase the likelihood of supporting low and mixed-severity wildfires and decrease the likelihood of supporting high-severity wildfires by reducing crown continuity to limit crown fire spread, reducing understory and mid-story conifers that act as ladder fuels capable of carrying surface fires into the crowns, and reducing ground fuel accumulations to reduce the heat intensity on the tree boles and roots . Resulting stand structures and compositions would also reduce susceptibility to bark beetles.
31	**Morgan, Penelope Ph.D., Emily K. Heyerdahl Ph.D., and Carly E. Gibson 2008 "Multi-season climate synchronized forest fires throughout the 20th century, Northern Rockies", *Ecology*, 89, 3: 717-728.** *"We inferred climate drivers of 20th-century years with regionally synchronous forest fires in the U.S. northern Rockies. We derived annual fire extent from an existing fire atlas that includes 5038 fire polygons recorded from 12070086 ha, or 71% of the forested land in Idaho and Montana west of the Continental Divide. The 11 regional-fire years, those exceeding the 90th percentile in annual fire extent from 1900 to 2003 (>102314 ha or ~1% of the fire atlas recording area), were concentrated early and late in the century (six from 1900 to 1934 and five from 1988 to 2003). During both periods, regional-fire years were ones when warm springs were followed by warm, dry summers and also when the Pacific Decadal Oscillation (PDO) was positive. Spring snowpack was likely reduced during warm springs and when PDO was positive, resulting in longer fire seasons. Regional-fire years did not vary with El Nino-Southern Oscillation (ENSO) or with climate in antecedent years. The long mid-20th century period lacking regional-fire years (1935-1987) had generally cool springs, generally negative PDO, and a lack of extremely dry summers; also, this was a period of active fire suppression. The climate drivers of regionally synchronous fire that we inferred are congruent with those of previous centuries in this region, suggesting a strong influence of spring and summer climate on fire activity throughout the 20th century despite major land-use change and fire suppression efforts. The relatively cool, moist climate during the mid-century gap in regional-fire years likely contributed to the success of fire suppression during that period. In every regional-fire year, fires burned across a range of vegetation types. Given our results and the projections for warmer springs and continued warm, dry summers, forests of the U.S. northern Rockies are likely to experience synchronous, large fires in the future."* **Forest Service Response**: The citation is a research study conducted in Idaho and western Montana to compare fire scars to tree ring reconstructions of climate. The results suggest that regional fire years occurred when spring-summers were significantly warm and summers were significantly warm-dry, Years when fire was recorded at only a few of the study sites appear to have occurred under a broad range of climate conditions. It is unclear what the commenter's point was in including this citation as it contains no discussion of land management actions. It has long been established that weather is a principal factor in fire behavior.
32	**Okoand Ilan Kayatsky, Dan. "Fight Fire with Logging?" Mother Jones, August 1, 2002** *"Still, forestry experts warned in the 2000 plan that logging should be used carefully and rarely; in fact, the*

	original draft states plainly that the "removal of large merchantable trees from forests does not reduce fire risk and may, in fact, increase such risk." *"Now, critics charge that the Bush administration is ignoring that warning. Neil Lawrence, a policy analyst with the Natural Resource Defense Council, claims that Washington has taken a far more aggressive approach to incorporating commercial logging in its wildfire prevention plans. Moreover, critics claim the administration's strategy, far from protecting the lives and homes of those most at risk, could actually increase the likelihood of wildfires"* **FS Response**: The cited article is opinion commentary written over 11 years ago about the implementation of the National Fire Plan, which has little relevance to the Marshall Woods project. Please see responses to #25 to #27 above.
33	**Oregon State University Research *Science Centric,* July 9, 2009** "Fuel reduction treatments should be forgone if forest ecosystems are to provide maximal amelioration of atmospheric carbon dioxide over the next 100 years,' the study authors wrote in their conclusion. 'If fuel reduction treatments are effective in reducing fire severities in the western hemlock, Douglas-fir forests of the west Cascades and the western hemlock, Sitka spruce forests of the Coast Range, it will come at the cost of long-term carbon storage, even if harvested materials are used as biofuels.' " **Forest Service Response**: The cited article is a review of a published study entitled "Forest Fuel Reduction Alters Fire Severity and Long-term Carbon Storage in Three Pacific Northwest Ecosystems" written by Stephen Mitchel, Mark Harmon and Kari O'Connell. The authors of the study used a forest ecosystem simulation model to examine the effects of fuel reduction on fire severity and the resulting long-term carbon storage among three Pacific Northwest ecosystems: the east Cascades ponderosa pine forests, the west Cascades western hemlock-Douglas-fir forests, and the Coast range western hemlock-Sitka spruce forests. Their results suggest that if fuel reduction treatments are effective in reducing fire severities in the western hemlock-Douglas-fir forest of the west Cascades and western hemlock-Sitka spruce forests of the Coast Range, it will come at the cost of long-term carbon storage even if harvested materials are utilized as biofuels. However, they suggest that the application of fuel reduction treatments may be essential for ecosystem restoration in forests with uncharacteristic levels in the ponderosa pine forest ecosystems of the east Cascades. The Marshall Woods vegetation treatments will be conducted in dry forest types where stand densities are high, which is similar to the ponderosa pine forest types of the east Cascades described in the study.
34	**O'Toole Randal. "Incentives, Not Fuels, Are the Problem" Published by the Thoreau Institute** *"While top officials blame recent fires on fuels, all the on-the-ground reports I've read focus on the weather."* **Forest Service Response**: The cited article is opinion commentary that claims that the Forest Service exaggerates wildfire and forest fuels concerns to leverage Congress for a bigger budget. The author also claims the reason for increased fire suppression and fuel reduction costs is due to Congress providing the Forest Service a 'blank check', which he suggests offers no incentive to control costs. How Congress funds the Forest Service is outside the scope of the Marshall Woods project. In the sentence following the provided quotation, the author writes, "I am not saying there is no buildup of fuels, just that the buildup isn't as important as the popular story has led us to believe." It is well established that potential fire behavior (intensity) and severity (effect) are dependent on the interaction between fuel, weather, and physical setting (Jain and Graham 2004; Graham et al. 2004). Of those three factors, the only thing humans can alter through management is fuel. Please also see response to #3.

35	**O'Toole, Randal. 2002. "Reforming the Fire Service: An Analysis of Federal Fire Budgets and Incentives." The Thoreau Institute.** *"This paper will show that built-up fuels are not the main reason, or even a major reason, for recent severe fires or high fire suppression costs. The weather is the prime reason for widespread fires this year as well as in 2000, 1999, and other recent years. But the major reason for increased costs is institutional: The federal land agencies, and especially the Forest Service, have a blank check to put out fires and thus have no reason to control their costs. If fuels are not the problem, then it isn't necessary to spend $400 million a year treating them."* **Forest Service Response**: The cited article is opinion commentary that is a longer version of the article cited in #34 above. Please see response to #34.
36	**O'Toole, Randal. "Money to Burn?" *Regulation*, Winter 2002 - 2003** *"Post-fire reports on individual fires make little or no mention of excess fuels. Instead, fire scientists agree that drought is the cause of the severe fires in recent years. This year's Rodeo- Chedisky Fire, the largest fire in Arizona history, was on heavily managed and thinned federal lands, not an untouched wilderness brimming with excess fuels."* **Forest Service Response**: The cited article is opinion commentary that is essentially the same as what is contained in the articles of #34 and 35 above. Please see response to #34.
37	**Partridge, Arthur Dean Ph.D. Testimony to the Agriculture, Nutrition and Forestry Committee United State Senate. Hearing to Review Healthy Forests Restoration Act, HR 1904 June 26, 2003** *"The current focus on 'fuels' is, in itself, misguided because almost anything in a forest will burn, given the right conditions. Any fire specialist will tell you that the principal factors affecting fire are temperature and moisture, not fuels. No legislation will prevent or even reduce fires in the vast areas of the national forests and to pretend so is fraudulent."* **Forest Service Response**: The cited article is testimony submitted in opposition to the Healthy Forests Restoration Act. The Marshall Woods project is not proposed under this legislation. Please see responses to #1, 3, 4, 5, and 8. The Marshall Woods vegetation treatments are not intended to prevent or reduce fires, but instead to modify fire behavior to reduce the likelihood of high severity crown fires in treated areas through the restoration of forest structure and composition in the dry ponderosa pine and Douglas-fir forest types.
38	**Peters, R.L., E. Frost, and F. Pace. "Managing for forest ecosystem health: A reassessment of the forest health crisis." *Defenders of Wildlife*. April 1996.** *"A number of studies have shown that for some ecosystems, the major factor determining fire intensity and size is weather and not the amount of fuel (Baker 1989, Flannigan and Harrington 1988, Haines and Sando 1969, Rothermel 1995). For example, Bessie and Johnson (1995) found that fire spread and intensity were strongly related to weather conditions and only weakly related to fuel loads in the southern Canadian Rockies. Similarly, many hundreds of the thousands of acres of forests that were intensely burned in the 1994 Tyee Fire on the Wenatchee National Forest had very low fuel loads. The Forest Service and Fish and Wildlife Service concluded that weather patterns and terrain -- not fuels -- were the major reasons why this large fire burned the way it did (U.S. Forest Service 1995, U.S. Fish & Wildlife Service 1994). Such case studies provide little evidence that salvage logging of dead and dying trees will significantly reduce wildfires."* **Forest Service Response**: The Forest Service was unable to access the cited reference, thus the response is to the provided quotation. Please see responses to #1, 3, 4, 5, 8, 9, 18, 26, and 30. The Marshall Woods project

	will not salvage dead and dying trees.
39	**Peterson, Mike testimony to the Senate Agriculture, Nutrition, and Forestry Committee concerning the Healthy Forests Restoration Act, HR 1904. June 26 2003** *"H.R 1904 does not include any specific measures to protect homes or communities. It is also inconsistent with the Western Governors' Association 10-Year Comprehensive Strategy, which does not call for any changes in existing laws. The only proven method to protect homes and communities is to reduce flammable materials in the immediate vicinity of structures, yet the definitions in H.R. 1904 would not require any activities to be near homes. Instead, the bill seeks to further subsidize the timber industry and eliminate obstacles to logging large, fire-resistant trees miles away from the nearest home. The country's top forest scientists, including the Forest Service's own scientists, have found that this kind of logging can actually increase fire risk and make fires larger and more intense."* **Forest Service Response**: The cited testimony is opinion commentary opposing the Healthy Forests Restoration Act as written for various reasons. This article is not relevant to the Marshall Woods project because the project is not proposed under this legislation.
40	**Platt, Rutherford V., Thomas T. Veblen, and Rosemary L. Sherriff. Are Wildfire Mitigation and Restoration of Historic Forest Structure Compatible? A Spatial Modeling Assessment. Annals of the Association of American Geographers, 96(3), 2006, pp. 455–470** *"We question the validity of thinning as a means both to reduce the threat of wildfire and to restore historic forest structure in the absence of site-specific data collection on past and present landscape conditions."* **FS Response:** The paper discusses the historical role of fire in the ponderosa pine ecosystems of the Colorado front. The authors describe the fire regime as "mixed," a designation that includes stand-replacing fire. They conclude that not all ponderosa pine forests should be returned to a "nonlethal" state if the goal is to create historical conditions. This, therefore, was the basis for the conclusion in paragraph 2. Contrary to the conclusions made regarding Boulder County, Colorado, the fire regimes and vegetation/fuel conditions in northwest Montana that are in need of restoration to historical forest structures are not limited to the lower elevations or away from the National Forests. Analysis for the Marshall Woods project included collecting site-specific data on both past and present landscape conditions. Past and current data collection was used to help design the proposed vegetation and fuels treatments.

41	**Power, Thomas Ph.D. "The Politics of Forest Fires -- The Abuse of Other People's Hard Times." 8/15/2000** *"While most of us have suffered with the unavoidable fire-related anxieties, we have also been impressed by the hard work and heroism of both neighbors and anonymous firefighters. But others have tried to profit from the fires and the primordial fears they evoke. The forest products industry has been in the lead in this exploitation of other people's hardtimes.* *The forest products industry wants access as cheaply as it can get it to as much wood fiber as possible. It once had privileged access to forested public lands. As the frontier economy has faded and government give-aways have fallen out of political favor, the forest products industry's privileged grip on public resources has begun to slip. The current forest fires offer them an opportunity to try to regain some of their lost clout.* *The fires, timber industry spokespersons claim, are the result of restrictions on commercial logging on public lands. If all of these lands had been logged, they assert, the fires would not be burning. It is the federal government and the environmentalists they are in cahoots with who have caused the fires that now threaten us. As one timber industry advocate baldly said, "I never saw a clearcut burn."* *Nothing could be further from the truth. Of course clearcuts burn. When long, hot summers dry out the grasses, brush, and logging wastes, they can flare explosively. When they grow thick with closely packed young trees, they present exactly the fire danger we are wrestling with now. The logging roads provide human access that is the source of the vast majority of forest fires.* *If roading and logging eliminated the threat of wildfire, most of the fires that threaten us now would not be burning. Look at where these fires are: They are largely burning on the forest-urban interface in areas adjacent to intense human activity. In Western Montana, for instance, the fires are burning in the forests adjacent to some of the rapidly growing residential areas in the nation, the Bitterroot, Helena, and Clark Fork Valleys. These are not roadless areas that have never been logged. Quite the contrary, they are areas that were roaded and logged in the past. Those roads often have then provided access for the human activity that now dominates these areas, including the home building, residential settlement of the last two decades, and recreational activity. The trees now burning are usually second growth that followed past logging."* **Forest Service Response**: The cited article is 14-year old opinion commentary. The objective of the Marshall Woods vegetation treatments is not to eliminate the threat of wildfire. Treatments are intended to restore forest structure and composition in the dry ponderosa pine and Douglas-fir forest types to improve forest stand resilience. As part of the restoration focus, treatments would modify fire behavior to increase the likelihood that future fires would remain on the ground and burn at a low to mixed severity, which is more characteristic of historic conditions. Resulting stand structures and compositions will also reduce susceptibility to bark beetles.
42	**Roberson, Emily B. Ph.D., Senior Policy Analyst, California Native Plant Society. August 12, 2002 letter to Chief Dale Bosworth** *"It is well established that logging and roadbuilding often increase both fuel loading and fire risk. For example, the Sierra Nevada Ecosystem Project (SNEP) Science Team (1996) concluded that "timber harvest…. has increased fire severity more than any other recent human activity" in the Sierra Nevada. Timber harvest may increase fire hazard by drying of microclimate associated with canopy opening and with roads, by increases in fuel loading by generation of activity fuels, by increases in ignition sources associated with machinery and roads, by changes in species composition due to opening of stands, by the spread of highly flammable non-native weeds, insects and disease, and by decreases in forest health associated with damage to soil and residual trees (DellaSala and Frost, 2001; Graham et al., 2001;*

	Weatherspoon et al., 1992; SNEP Science Team, 1996). Indeed a recent literature review reported that some studies have found a positive correlation between the occurrence of past logging and present fire hazard in some forest types in the Interior Columbia Basin (DellaSala and Frost, 2001)." **FS Response:** Concerns identified in the quotation will be mitigated through project design and resource protection measures (EA, pages 44-80). Natural and project-generated slash will be treated following harvest activities to mitigate fire hazard. The cited letter also says, "*Like most in the scientific and conservation community, California Native Plant Society is neither in favor of or opposed to logging per se. Instead we advocate forest, fire and fuels management practices that minimize danger to lives and property; create and maintain sustainable, productive forest ecosystems dominated by viable plant species; conserve rare and imperiled species through their natural ranges; and protect water quality and supply, soils and other forest ecosystem services and resources."* The Marshall Woods project will maintain sustainable productive forest ecosystems, conserve rare plants, and protect water quality and supply, soils, and other forest resources.
43	**Schoennagel, Tania Ph.D., Thomas T. Veblen Ph.D., and William H. Rommie Ph.D. "The Interaction of Fire, Fuels, and Climate across Rocky Mountain Forests"** *"No evidence suggests that spruce–fir or lodgepole pine forests have experienced substantial shifts in stand structure over recent decades as a result of fire suppression. Overall, variation in climate rather than in fuels appears to exert the largest influence on the size, timing, and severity of fires in subalpine forests (Romme and Despain 1989, Bessie and Johnson 1995, Nash and Johnson 1996, Rollins et al. 2002). We conclude that large, infrequent standreplacing fires are "business as usual" in this forest type, not an artifact of fire suppression." (Pg. 666)* *"Variation in daily area burned was highly correlated with the moisture content of 100-hour (2.5- to 7.6- cm diameter) and 1000-hour dead fuels (Turner et al. 1994). Once fuels reached critical moisture levels later in the season, the spatial pattern of the large, severe standreplacing fires was controlled by weather (wind direction and velocity), not by fuels, stand age, or firefighting activities (Minshall et al. 1989,Wakimoto 1989, Turner et al. 1994)." (Pg. 666)* **Forest Service Response**: The cited article is a case study of large wildfires in the Rocky Mountains to assess the potential effectiveness of fuel reduction treatments across a range of major forest types. The authors discuss the differences between high, mixed, and low severity fire regimes and the different forest types characteristic of each one. They conclude that fire regimes, climate, fuel type and abundance, and stand structure vary significantly across the Rocky Mountain region and thus suggest that a "one-size-fits-all" approach to reducing wildfire hazards in the Rocky Mountain region is unlikely to be effective. The quotations provided by the commenter refer to subalpine forests characterized by high severity fire regimes. These quotations are not applicable to Marshall Woods project because vegetation treatments are focused in the dry ponderosa pine and Douglas-fir habitat types which are characterized by low to mixed severity fire regimes. Within low-severity fire regimes, the authors suggest that "reduction of ladder fuels through mechanical thinning and prescribed fire can effectively reduce the unprecedented occurrence of extensive crown fires and restore the historical fire regime in dry, low-elevation ponderosa pine forests". Within mixed severity fire regimes, the authors conclude, "fuel reduction treatments (mechanical thinning and prescribed burning) may effectively reduce fire severity under moderate weather conditions, but these treatments may not effectively mitigate fire behavior under extreme weather conditions." The fuel modeling conducted for the Marshall Woods project suggests that treatments will be effective at modifying fire behavior to reduce the potential for high severity crown fire within treated areas under normal summer conditions.
44	**Strickler, Karyn and Timothy G. Hermach, "Liar, Liar, Forests on Fire: Why Forest Management**

	Exacerbates Loss of Lives and Property" Published by CommonDreams.org, October 31, 2003 *"Fire, just like insects and disease, are a natural and beneficial part of forest ecosystems and watersheds. Without these natural processes the forest ecosystems quickly degrade. Excessive logging removes and reduces cooling shade adding to the hotter, drier forests along with logging debris creating a more flammable forest. Current "forest management" practices, road building and development cause forest fires to rage for hundreds of miles."* **FS Response:** The cited article is opinion commentary written nearly 10 years ago criticizing the Healthy Forest Restoration Act. The Marshall Woods project is not being proposed under the authority of the Healthy Forests Restoration Act (H.R. 1904). Please see responses to #4, #10, #16, #25, #26, #31, #32, #36, and #48.
45	**Taxpayers for Common Sense. "From the Ashes: Reducing the Harmful Effects and Rising Costs of Western Wildfires. Washington DC, Dec. 2000** *"Commercial logging and logging roads open the forest canopy, which can have two effects. First, it allows direct sunlight to reach the forest floor, leading to increased evaporation and drier forests.[5] As a consequence, ground fuels (grass, leaves, needles, twigs, etc.) dry out more quickly and become susceptible to fire. Second, an open canopy allows more sunlight to reach the understory trees, increasing their growth.[6] This can lead to weaker, more densely-packed forests." (pgs. 19-20)* *"Congress and the Forest Service continue to rely on the commercial logging program to do something it will never accomplish – reduce fire risk. The commercial logging program is designed to provide trees to private timber companies, not to reduce the risk of fire." (pg. 20)* **FS Response:** This paper made sweeping generalized statements about management of the National Forests as a whole. The EA performed site specific analysis of a small watershed in Montana and made informed decisions regarding appropriate management actions. Many of the recommendations in the paper are for National policy changes that are not relevant to project planning at the Ranger District level. Planned piling and burning and underburning would effectively limit logging slash, reducing the intensity of follow-up burns and natural fires. Harvest prescriptions would emphasize retention of the larger, old trees. Even though the rate of fire spread may increase in treated stands (due to drying of fast-burning fuels), fire intensity and fire severity would be reduced. The risk of uncharacteristic fire would be reduced.
46	**Thomas, Craig. "Living with risk: Homeowners face the responsibility and challenge of developing defenses against wildfires." Sacramento Bee newspaper, July 1, 2007.** *"Indiscriminate logging is not a viable solution to reducing wildfire risk. Logging can actually increase fire danger by leaving flammable debris on the forest floor. Loss of tree canopy lets the sun in, encouraging the growth of brush, increases wind speed and air temperature, and decreases the humidity in the forest, making fire conditions even worse."* **FS Response**: The cited article is opinion commentary written in the aftermath of the 2007 Angora fire that destroyed numerous homes near Lake Tahoe, California. The author suggests that a good fuels management plan focuses on reducing the fuels that ignite and spread wildfire while keeping the large, older trees that are resistant to fire. He cautions against a one-size-fits-all fuels reduction prescription. The definition of "indiscriminate" is "haphazard; random; confused; not properly restrained." There is nothing indiscriminate about the vegetation and fuels management activities in the Marshall Woods project. Site-specific assessments were completed to determine appropriate treatments to achieve desired conditions. Planned piling and burning and underburning would effectively limit logging slash, reducing the intensity of follow-up burns and natural fires. Modeling suggests that following all treatments fire intensity will be reduced under normal summer conditions (EA, page 143).

47	**University of California; SNEP Science Team and Special Consultants 1996 "Sierra Nevada Ecosystem Project: Final Report to Congress" Volume 1, Chapter 4 – Fire and Fuels** *"Timber harvest, through its effects on forest structure, local microclimate, and fuels accumulation, has increased fire severity more than any other recent human activity."(pg.62)* **FS Response:** The quote is from the 1996 "Sierra Nevada Ecosystem Project: Final Report to Congress" Chapter 4 (Fire and Fuels) in a list of "Critical Findings". The comment was made by the authors specifically in context of the Sierra Nevada Mountain Range. They discuss the finding in the body of the chapter on page 64, describing the historic timber harvests as: *"The rapid influx of settlers into California following the discovery of gold, however, initiated more profound changes in the role of fire in Sierra Nevada ecosystems. Logging was undertaken initially to supply the mines and later to support the growing population of the new state. Timber volumes harvested in the Sierra Nevada continued to increase into the twentieth century, reaching a peak in the 1970s and 1980s. Typically, loggers harvested fire-resistant species and large trees, and these were replaced by greater numbers of much more fire-susceptible smaller trees. This pattern of biomass removal contrasted markedly with that of presettlement surface fires, which tended to kill (and later consume) small trees and leave many large trees to survive. Large quantities of debris left after logging led to severe fires, establishing vegetation patterns still evident today. A new pattern of ignitions, characterized in part by careless and indiscriminate burning, was introduced by miners, sheepherders, settlers, and loggers."* The historic logging practices described above, and its effects, bears little relationship to the vegetation and fuels treatments which would be followed by fuels reduction activities for the Marshall Woods projectAdditionally, the fire regimes in California described in this article are substantially different from those found in the Marshall Woods project area. As a result, this opposing view has no relevance to the Marshall Woods project.
48	**USDA Forest Service Bald Angel Vegetation Management Project Environmental Assessment. La Grande Ranger District, Wallowa-Whitman National Forest December 2006** *"Why is the natural fire regime in most Rocky Mountain ponderosa pine–Douglas fir forests variable in severity? Extended droughts and high winds can lead to exceptional fire spread across a broad spectrum of fuel loads and forest structures. For example, almost 25,000 ha of ponderosa pine–Douglas fir forest burned on a single day (9 June 2002), driven by strong winds (Finney et al., 2003). Yet, brief episodes when the winds declined and fuel moisture rose, led to low-severity fire in the same landscape (Finney et al., 2003), suggesting that extreme weather, not fuels, was the chief cause of high-severity fire under those conditions. Even during summer, ponderosa pine–Douglas fir landscapes in the Rocky Mountains are subject to rapid increases in wind speed and changes in direction from jet streams or cold fronts (Baker, 2003)." (pg. 5)* **Forest Service Response**: The provided quotation is from the 2006 publication, "Fire, Fuels and Restoration of Ponderosa pine and Douglas-fir Forests in the Rocky Mountains, USA" written by William Baker, Thomas Veblen, and Rosemary Sherriff. This article was included in the Bald Angel EA cited above. The authors suggest that fires in ponderosa pine-Douglas-fir forests in the Rocky Mountains historically varied in severity and that fire exclusion has not clearly and uniformly increased fuels or shifted fire types from low to high severity. The Marshall Woods EA acknowledges that, historically, the warm dry forest types within the project area burned at varied severities with some areas of underburning and other areas resulting in moderate to high tree mortality. In response to the provided quotation above, please see responses to #5 and 43.
49	**Voss, René "Getting Burned by Logging," July 2002 The Baltimore Chronicle** *"Ironically, this very type of logging, experts inform us, is likely to increase, not decrease, the frequency and severity of wildland fires.* *In the Forest Service's own National Fire Plan, agency scientists warned against the use of commercial logging to address fire management. The report found that 'the removal of large, merchantable trees from forests does not reduce fire risk and may, in fact, increase such risk.' "* **FS Response:** The cited article is opinion commentary written over 10 years ago in support of the National

	Forest Protection and Restoration Act, which would eliminate commercial logging on Federal public lands. This bill did not pass into law. Large, mature trees will be retained in the silviculture prescriptions. All stands that meet accepted old growth definitions will be reserved. Natural and activity generated slash will be treated.
50	**Walsh, Jeremy "Scientist: Money to fight beetles as fire mitigation not productive" Durango Herald, April 23, 2010** *"The federal assistance could include funding to help state and local governments mitigate the beetle infestations, the presence of which increases the risk of forest wildfires that endanger surrounding communities and infrastructure, said supporters of the bill."* *"Kulakowski, a former research scientist at the University of Colorado at Boulder and current professor at Clark University in Massachusetts, discounted this notion during his testimony. He said climate, not insects, plays the most important role in forest fires, as wildfires are more likely to occur during droughts."* **Forest Service Response**: The Forest Service could not access this article thus the response is to the quotation provided. The quotation does not appear applicable to the Marshall Woods project because there is no proposal to control beetle infestations in order to reduce wildfire risk.
51	**Westerling, Anthony Ph.D., "Does Global Warming Increase Forest Fires?" NPR, *Talk of the Nation*, July 7, 2006** *"New research published this week in the journal Science says that global warming may be causing more intense wildfires in the western United States. The researchers found that increases in large wildfire activity in the western United States over the past 25 years is 'strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.' "* **Forest Service Response**: Please see response to #30 above.
52	**Wuerthner, George "The Climate Factor - Forest thinning won't deter the coming large fires" *Eugene Weekly*, December 6, 2007** *"Indeed, climatic conditions drive all big fires — not fuels. All substantial fires occur only if there is extended drought, low humidity, high temperatures and, most importantly, high winds. Wind, in particular, is critical. Wind increases fire spread exponentially.* *When conditions are "ripe" for a large blaze, fires will burn through all kinds of fuel loads. By contrast if the forest is wet like Oregon's coastal forests, you can have all the fuel in the world, and it won't burn.* *For this reason, most fires go out without burning more than a few acres. By contrast, when you have drought, low humidity, high temperatures and wind, a few blazes will grow into huge fires. For this reason, approximately 1 percent of all fires are responsible for about 95 to 99 percent of the acreage burned."* **Forest Service Response**: The cited article is unsupported opinion commentary. Please see responses to #1, 3, 4, 5, and 8.

53	**Wuerthner, George. "Logging, thinning would not curtail wildfires" The Eugene Register-Guard, December 26, 2008** *"Another surprising finding is that mechanical fuels treatment, commonly known as logging and thinning, typically has little effect on the spread of wildfires. In fact, in some cases, it can increase wildfires' spread and severity by increasing the fine fuels on the ground (slash) and by opening the forest to greater wind and solar penetration, drying fuels faster than in unlogged forests."* **FS Response:** The citation is opinion commentary that was written in response to another guest viewpoint printed in an Oregon newspaper. Ample evidence suggests that thinning followed by treatment of the surface fuels can be used to modify fire intensity and severity (please see response to #25 above). Modeling described in the Fire and Fuels section of the EA suggests that following all treatments fire intensity and severity would be reduced under normal summer conditions over the pre-treatment condition.
54	**Wuerthner, George "Forest Service misses education opportunity" Published in *NewWest*, June 2010** *"For example, the Forest Service justifies the Elliston Face timber sale on the basis of reducing what they call "hazardous" fuels (which as an ecologist I call woody biomass). To quote the FS, "This project would reduce wildland fire risk and help protect lives, communities, and ecosystems from the potential consequences of a high-intensity wildland fire within treatment areas." "* *"The Forest Service makes these assertions even though the statement is full of falsehoods, misleading and/or unproven assumptions."* *"even the Forest Service's own analysis concludes that logging of the Elliston Face will have some adverse impacts on soils, watersheds, wildlife, scenery and recreation. So we need to ask whether the potential effects of a fire that may not occur for a century or more is worth the negative impacts created by the logging process now?"* *"The Forest Service's own analysis has six indicator species— including pileated woodpecker, hairy woodpecker, martin, northern goshawk. These species depend on dead snags and down wood that pine beetles and wildfire create. But the FS treats beetles and wildfire as unwelcome events."* *"the FS exploits the fears of misinformed citizens. One can only conclude the agency is still the handmaiden to the timber industry rather than a public servant working on behalf of all citizens of the country."* **Forest Service Response**: The cited article is unsupported opinion commentary criticizing a fuels reduction project on the Helena National Forest, which is irrelevant to the Marshall Woods project (refer to the purpose and need discussion in the Marshall Woods EA on pages 13-18).

55	**Wuerthner, George "Pine Beetle Fears Misplaced" *Helena Independent Record*, March 25, 2010** *"Ultimately, fuels do not control fires. If the climate/weather isn't conducive for fire spread, it doesn't much matter how much dead wood you have piled up, you won't get a large fire. As an extreme example, think of all the dead wood lying around on the ground in old-growth West Coast rainforests — tons of fuel, but few fires — because it's too wet to burn.* *Large blazes are driven by a combination of extreme drought, low humidity, high temperatures and, most importantly, wind. These conditions do not occur in the same place at the same time very frequently — which is why there are often decades to centuries between major blazes and most fires go out without burning more than a few acres."* **Forest Service Response**: The cited article is unsupported opinion commentary stating that bark beetle-induced tree mortality creates new ecological opportunities, increases biodiversity, improves ecosystem health, and reduces fire risk. This article is irrelevant to the Marshall Woods project because salvage of dead and dying trees is not proposed. In response to the quotation provided, please also see responses to #5 and 43.
56	**Wuerthner, George. 2009. "Why the National Fire Plan is a Trojan Horse for Logging--Burning Questions" Published by CounterPunch, June 12-14, 2009. http://www.counterpunch.org/2009/06/12/burning-questions/** *"In the last analysis, the politics of forest thinning promotes more logging. The timber industry has successfully sold the idea that fuel reductions work and it has great influence with politicians who buy into to its assurance that logging reduces large fires."* *"So is there any place for forest thinning/fuel reductions? There is. But it should be limited to the areas immediately surrounding homes and communities. Since one can't predict where a fire will start and burn, thinning forest willy-nilly is a waste of effort. Not only are most thinning projects done improperly, most are done for the wrong reasons and lose taxpayer money to boot."* *"Thinning trees/shrubs near homes, combined with a reduction in home flammability by installation of metal roofs, removal of flammable materials adjacent to homes, and other measures can virtually guarantee a home will survive even a severe high intensity forest fire."* **FS Response:** This article is applicable to the project as it supports the purpose and need to reduce fuels in the WUI and near private residences. The Marshall Woods project includes many acres of designated WUI lands. Timber harvest and other vegetation treatment activities in other parts of the project area support reduced wildland fire severity but also accomplish the other purposes of the project.
57	**Egan, Timothy, "Fires Not Caused by Reduced Logging, Congressional Report Finds" Published in the New York Times: September 1, 2000. http://www.nytimes.com/2000/09/01/us/fires-not-caused-by-reduced-logging-congressional-report-finds.html** *"If anything, heavy logging from earlier years may have contributed more to the conditions that have made Western forests ripe for big fires, because more flammable small trees and heavy brush are often left in the forest after the larger stands of timber have been taken out, said the report, by the Congressional Research Service, which analyzes policy for Congress."* **FS Response**: This is a newspaper article arguing whether "Clinton era logging reductions" increased or decreased wildlife risk. It asserts that, Timber harvesting removes the relatively large diameter wood and leaves behind the small material thus increasing the rate of spread of wildlifes." In the Marshall Woods project planned piling and burning and underburning would effectively limit logging slash, reducing the intensity of follow-up burns and natural fires. Harvest prescriptions would emphasize retention of the larger, old trees. Even though the rate of fire spread may increase in treated stands (due to drying of fast-burning fuels), fire intensity and fire severity would be reduced. The risk of uncharacteristic fire would be reduced.
58	**Hanson, Chad, "The Big Lie: Logging and Forest Fires". Published in the Earth Island Journal, Spring 2000.**

	http://yeoldeconsciousnessshoppe.com/art6.html *"The fact is, commercial logging doesn't prevent catastrophic fires; it causes them. In the latter part of the 19th century, this was common knowledge. Relentless clearing of forests in the Great Lakes region left huge areas largely devoid of the cooling shade of trees, replacing moist natural forest microclimates with the hotter, drier conditions characterized by stump fields. Flammable logging "slash debris" covered the landscape."* *"Not long ago, Congress commissioned a study of California's forests that came to be known as the Sierra Nevada Ecosystem Project (SNEP) report. Produced jointly with the US Forest Service in 1996, the report confirmed what people have known for over a century: "timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity" "* **FS Response**: This is an opinion piece that has not been published in a scientifically peer-reviewed outlet. The Earth Island Institute is not a recognized scientific outlet with known and replicated quality assurance and control processes. It contends that logging doesn't reduce catastrophic fires; it causes them. See response to #17.
59	**"Logging can 'greatly increase' fire severity for 50 years, researchers say". Broadcast on ABC News Australia, August 3, 2014. http://www.abc.net.au/news/2014-08-04/logging-greatly-increases-fire-risk-black-saturday-study/5646220** *"Researchers from the Australian National University (ANU) and Melbourne University examined hundreds of thousands of trees burnt in the 2009 bushfires in Victoria, which claimed the lives of 173 people on a day of extreme temperatures and high winds.* *They found that the increased fire risk began about seven years after an area had been logged and lasted for another 50 years.* *Professor David Lindenmayer, from the ANU, said the results showed the fires around Kinglake and Marysville were about 25 per cent more severe due to the clear-felling of forest in the area."* **FS Response**: This is an Australian newspaper article that alleges clearcutting increases fire risk. It has no bearing on the Marshall Woods project in Montana, which is not proposing to clearcut forests.
60	**Campbell, James, "Study finds logging increased intensity of Black Saturday fires". Published in the Herald Sun, August 03, 2014. http://www.heraldsun.com.au/news/victoria/study-finds-logging-increased-intensity-of-black-saturday-fires/story-fni0fit3-1227012027799** *"The scientists say the study showed conclusively that logging in the decades prior to Black Saturday made the deadly blaze much more ¬extreme.* *They also warn that increased fire danger in forests lasts for up to 70 years after an area is logged, with the risk peaking between 10 and 50 years."* **FS Response:** See response to #59 above; this is a similar article on the same subject, published on the same day but in a different Australian newspaper.

REVIEW OF REFERENCES CITED IN COMMENTS - DICK ARTLEY ATTACHMENT #8

The Natural Resources in the Forest Benefit from Fire

Comment: There are negative effects caused by nearly all actions…this includes the actions that manipulate and change the landscape after a fire. When such manipulation is proposed on public land, the public owners deserve to know the pros and cons of the project. The only time a wildfire should be considered 'catastrophic' is when it burns homes. The following statements described why post-fire landscapes should be left alone and never manipulated for money."

FS Response: The Marshall Woods project is not proposing activities on a landscape that has recently experienced wildfire.

Author/Date/Title	Response to literature cited in opposing views
Campbell, John L. Ph.D, Dan C. Donato, Joe B. Fontaine J. Boone Kauffman Ph.D., Beverly E. Law Ph.D., and Doug Robinson. "Biscuit Fire Study." Oregon State University Department of Forest Science. Terrestrial Ecosystem Research and Regional Analysis. 2003. http://zircote.forestry.oregonstate.edu/terra/biscuit.htm	*Opposing View #1 - "Recently burned areas represent an important type of habitat that many species of animals have evolved to utilize. Snags (standing dead trees) provide critical nesting and foraging habitat for birds and small mammals, and as they decay and fall, create additional habitat for small mammals and terrestrial amphibians as coarse woody debris."* **FS Response: This scientific paper, in part, studied post-fire logging effects on small mammals. The Marshall Woods project does not propose post-fire logging.**
Chronicle Staff, "Yellowstone fires have potential to grow much larger". BozemanDailyChronicle.com, September 24, 2009. http://bozemandailychronicle.com/articles/2009/09/25/news/70fires.txt	*Opposing View #2 - "Yellowstone is a 'fire-adapted ecosystem,' which means wildfire helps maintain the health of the area's wildlife and vegetation. Most park fires are caused by lightning and, whenever possible, monitored and managed, but not necessarily extinguished."* **FS Response: This is a newspaper article about two fire starts in Yellowstone National Park in 2009. The commenter does not identify any relevance to the Marshall Woods project.**

Congressional Research Service Report "Forest Fire/Wildfire Protection". February 14, 2005. http://www.coloradofirecamp.com/congressional_research/forest-fire-wildfire-effects.htm	*Opposing View #3 - "Finally, as mentioned above, wildfires can also generate benefits. Many plants regrow quickly following wildfires, because fire converts organic matter to available mineral nutrients. Some plant species, such as aspen and especially many native perennial grasses, also regrow from root systems that are rarely damaged by wildfire. Other plant species, such as lodgepole pine and jack pine, have evolved to depend on stand replacement fires for their regeneration; fire is required to open their cones and spread their seeds. One author identified research reporting various significant ecosystems threatened by fire exclusion — including aspen, whitebark pine, and Ponderosa pine (western montane ecosystems), longleaf pine, pitch pine, and oak savannah (southern and eastern ecosystems), and the tallgrass prairie. [57] Other researchers found that, of the 146 rare, threatened, or endangered plants in the coterminous 48 states for which there is conclusive information on fire effects, 135 species (92%) benefit from fire or are found in fire-adapted ecosystems." [58]* *"Animals, as well as plants, can benefit from fire. Some individual animals may be killed, especially by catastrophic fires, but populations and communities are rarely threatened. Many species are attracted to burned areas following fires — some even during or immediately after the fire. Species can be attracted by the newly available minerals or the reduced vegetation allowing them to see and catch prey. Others are attracted in the weeks to months (even a few years) following, to the new plant growth (including fresh and available seeds and berries), for insects and other prey, or for habitat (e.g., snags for woodpeckers and other cavity nesters). A few may be highly dependent on fire; the endangered Kirtland's warbler, for example, only nests under young jack pine that was regenerated by fire, because only fire-regenerated jack pine stands are dense enough to protect the nestlings from predators."* **FS Response: This report speaks to both, the ecological benefits of fire and the damage to resources. The Marshall Woods project is consistent with this science.**
"Dead Trees and Healthy Forests : Is Fire Always Bad?". The Wilderness Society, March 2003. http://www.wildfirelessons.net/documents/Dead-Trees-and-Healthy-Forests.pdf	*Opposing View #4 - "Forested landscapes may be thought of as living "crazy quilts," with patches formed occasionally through the action of natural and human-caused disturbances like fire, windstorms, and logging. Prior to the advent of modern logging technology, virtually every North American forest experienced occasional renewal through the action of fire. In some places, fire was a frequent visitor, killing very few large trees as it burned harmlessly through the forest litter and grass. In most places, though, fire burned only occasionally, creating patches of severely burned forest as it raced through the canopy under extreme weather conditions. In these patches, old forests were killed, soon to be replaced by young, rejuvenated stands. This cycle of forest maturation, death, and replacement was critical to maintaining the diversity and vitality of the ecosystem."* **FS Response: This article is not from a peer reviewed scientific publication and represents a position statement for the Wilderness Society. This article discusses how fire and other disturbances are essential processes of forest renewal and that salvage harvest and thinning are not always appropriate or necessary. The Marshall Woods project does not propose salvage harvest. It proposes to move the area toward desired future conditions with vegetation management, road and trail treatments and noxious weed treatments.**

Duncan, Sally Ph.D. "Postfire Logging: Is it Beneficial to a Forest?" USDA Forest Service. PNW Science Findings. issue 47. October 2002. http://www.fs.fed.us/pnw/sciencef/scifi47.pdf	*Opposing View #5 - "Trees killed by wildfire and left standing take on roles that change the ecological services they previously provided as components of a green-tree system. They still offer some shade, which in a burned environment can slow the heating of surface waters and the soil surface. They may also provide more rapid recruitment of large wood into streams. Decomposing fallen trees provide nutrients, shelter, and early structure for a rejuvenating forest floor."* *"Burned forests typically support significantly different bird communities, with many species dependent on stand-replacement fires to maintain their populations across the landscape. Usually there's an increase in cavity-nesting, insectivorous birds such as woodpeckers and certain species of flycatchers."* **FS Response: This article discusses controversy over benefits of post-fire logging. The Marshall Woods project does not propose post-fire salvage logging.**
"Fighting fire in the forest" CBC News, June 17, 2009. http://www.cbc.ca/canada/story/2009/06/17/f-forest-fires.html	*Opposing View #6 - "Since those early days, millions of dollars have been spent on campaigns to prevent forest fires. But researchers now know that fire is not necessarily bad. It can be a natural part of a healthy grassland or forest ecosystem.* *Fire reduces the buildup of dead and decaying leaves, logs and needles that accumulate on the forest floor. It reduces or eliminates the overhead forest canopy, increasing the sunlight that stimulates new growth from seeds and roots.* *Many plants and animals have adapted to fire.* *Both lodgepole pine and jack pine have resin-sealed cones that stay on trees for many years. The heat of fire melts the resin and the cones pop open. Thousands of seeds then scatter to the ground and grow into new stands of pine.* *Woodpeckers feast on bark beetles and other insects that colonize in newly burned trees.* *And so, 20 years ago, Parks Canada decided that it wouldn't interfere in natural processes such as fire, insects and disease unless it had to — that is, unless people or neighbouring lands were threatened."* **FS Response: This is a media story that discusses firefighting in Canada as well as Canadian policy.**
"Forest Fires". The Environmental Literacy Council, 2008. http://www.enviroliteracy.org/article.php/46.html	*Opposing View #7 - "Wildfires are a natural occurrence and serve important ecosystem functions. Forest landscapes are dynamic and change in response to variations in climate and to disturbances from natural sources, such as fires caused by lightning strikes. Many tree species have evolved to take advantage of fire, and periodic burns can contribute to overall forest health. Fires typically move through burning lower branches and clearing dead wood from the forest floor which kick-starts regeneration by providing ideal growing conditions. It also improves floor habitat for many species that prefer relatively open spaces."* **FS Response: This article discusses wildfires role and how current practices use a combination of containment measures in an attempt to balance the importance of periodic fires to ecosystem health and the danger of uncontrolled burns to human communities. It is consistent with literature used in the analysis.**

"Forest Fire/Wildfire Protection" Congressional Research Service Report for Congress, February 14, 2005. http://www.coloradofirecamp.com/congressional_research/forest-fire-wildfire-effects.htm	*Opposing View #8 - "Animals, as well as plants, can benefit from fire. Some individual animals may be killed, especially by catastrophic fires, but populations and communities are rarely threatened. Many species are attracted to burned areas following fires — some even during or immediately after the fire. Species can be attracted by the newly available minerals or the reduced vegetation allowing them to see and catch prey. Others are attracted in the weeks to months (even a few years) following, to the new plant growth (including fresh and available seeds and berries), for insects and other prey, or for habitat (e.g., snags for woodpeckers and other cavity nesters). A few may be highly dependent on fire; the endangered Kirtland's warbler, for example, only nests under young jack pine that was regenerated by fire, because only fire-regenerated jack pine stands are dense enough to protect the nestlings from predators.* *In summary, many of the ecological benefits of wildfire that have become more widely recognized over the past 30 years are generally associated with light surface fires in frequent-fire ecosystems. This is clearly one of the justifications given for fuel treatments. Damage is likely to be greater from stand replacement fires, especially in frequent-fire ecosystems, but even crown fires produce benefits in some situations (e.g., for the jack pine regeneration needed for successful Kirtland's warbler nesting)."* **FS Response: This report speaks to both, the ecological benefits of fire and the damage to resources. The Marshall Woods project is consistent with this science.**
Franklin, Jerry F. Ph.D. and James K. Agee Ph.D. "Forging a Science-Based. National Forest Fire Policy." Issues in Science and Technology Fall 2003. http://inr.oregonstate.edu/download/forging_a_science_based_national_forest_fire_policy.pdf	*Opposing View #9 - "Natural forest disturbances, including fire, kill trees but remove very little of the total organic matter. Combustion rarely consumes more than 10 to 15 percent of the organic matter, even in stand-replacement fires, and often much less. Consequently, much of the forest remains in the form of live trees, standing dead trees, and logs on the ground. Also, many plants and animals typically survive such disturbances. This includes living trees, individually and in patches."* *"These surviving elements are biological legacies passed from the pre-disturbance ecosystem to the regenerating ecosystem that comes after. Biological legacies are crucial for ecological recovery. They may serve as lifeboats for many species, provide seed and other inocula, and enrich the structure of the regenerated forest. Large old trees, snags, and logs are critical wildlife habitat and, once removed, take a very long time to replace."* **FS Response: In this article, a multi-disciplinary group of scientists discuss ecosystem based management approaches to keep watersheds and forests functioning properly. The Marshall Woods project activities are consistent with the approaches discussed. It is not a fire salvage project. Sufficient amounts of down, woody material would be left to sustain soil productivity.**
Gorte, Ross W. Ph.D. from a CRS report for Congress, January 18, 2006. http://www.ncseonline.org/nle/crsreports/06Feb/RL30755.pdf	*Opposing View #10 - "Research had documented that, in some situations, wildfires brought ecological benefits to the burned areas — aiding regeneration of native flora, improving the habitat of native fauna, and reducing infestations of pests and of exotic and invasive species." (pg 2)* **FS Response: The Marshall Woods project activities are consistent with the FP direction for this area; it does not include post-fire logging.**

Gregory, Lisa Dale Ph.D. "Wildland Fire Use: An Essential Fire Management Tool" A Wilderness Society Policy and Science Brief. December 2004. http://wilderness.org/Library/Documents/upload/ScienceBrief-WildlandFireUseEssentialTool.pdf	*Opposing View #11 - "Ecologists and fire experts unanimously agree that fire has served an essential role in certain ecosystems for millennia. The ecological benefits of fire include: the creation of critical wildlife habitat in standing dead trees, increased nutrients and productivity in soil systems when burned material decomposes, improved conditions for surviving old growth trees when a surface fire moves through a system, and the regeneration of some fire dependent trees like lodgepole pine (Pinus contorta). Fire also increases availability of other fundamental building blocks of ecosystems such as moisture and sunshine by opening up the canopy and returning nutrients to the soil. Natural fire cycles maintain the diversity of habitats available to all the species in the ecosystem, from wildlife to wildflowers to fungi."* **FS Response: : The Marshall Woods project activities are consistent with the FP direction for this area; it does not include post-fire logging.**
Hanson, Chad Ph.D. February 2, 2010 "New Report Debunks Myth of 'Catastrophic Wildfire' "http://johnmuirproject.org/documents/Myth%20of%20Catastrophic%20Wildfire%20Media%20Release.pdf	*Opposing View #12 - "We do not need to be afraid of the effects of wildland fire in our forests. Fire is doing important and beneficial ecological work," said the report's author, Dr. Chad Hanson, a forest and fire ecologist and Director of the John Muir Project. "It may seem counterintuitive, but the scientific evidence is telling us that some of the very best and richest wildlife habitat in western U.S. forests occurs where fire kills most or all of the trees. These areas are relatively rare on the landscape, and the many wildlife species that depend upon the habitat created by high-intensity fire are threatened by fire suppression and post-fire logging."* **FS Response: This opinion piece is not a peer reviewed scientific document.**
Hutto, Richard L. Ph.D. "The Ecology of Severely Burned Forests" Counterpunch, July 19 / 20, 2008. http://www.counterpunch.org/hutto07192008.html	*Opposing View #13 - "As summer wildfire season begins in earnest throughout much of the West, it's important for the public and policymakers to recognize the important role that severely burned forests play in maintaining wildlife populations and healthy forests. Severely burned forests are neither "destroyed" nor "lifeless."* *From my perspective as an ecologist, I have become aware of one of nature's best-kept secrets - there are some plant and animal species that one is hard-pressed to see anywhere outside a severely burned forest."* *"An appreciation of the biological uniqueness of severely burned forests is important because if we value and want to maintain the full variety of organisms with which we share this Earth, we must begin to recognize the healthy nature of severely burned forests. We must also begin to recognize that those are the very forests targeted for postfire logging activity. Unfortunately, postfire logging removes the very element - dense stands of dead trees - upon which many fire-dependent species depend for nest sites and food resources."* **FS Response: The Marshall Woods project is not a post-fire logging project.**

Karr, James R. Ph.D., "Nature doesn't Benefit from Logging Fire-Damaged Lands". Op-Ed Tacoma News Tribune. December 8, 2005. http://www.docstoc.com/docs/122585663/Nature-doesn%EF%BF%BDt-benefit-from-logging-fire-damaged-lands	*Opposing View #14 - "Trees in a burned landscape, both dead and alive, continue to provide homes for wildlife after a fire and form the building blocks of new forests."* **FS Response**: **This letter is a rebuttal to the Forest Service Chief's testimony regarding the "Beschta report" which pertains to post-fire salvage logging. The Marshall Woods project is not a post-fire salvage project.**
Mark, Jason "Mission Impossible". Earth Island Journal, winter 2009. http://www.earthisland.org/journal/index.php/eij/article/mission_impossible/	*Opposing View #15 - "For Pyne and many others who study wildfires, the conventional understanding of firefighting has led us to the misguided conclusion that this is a struggle we can win. In much of the West, fire is an ordinary part of the landscape, a feature as essential to many ecosystems as rivers and grasses. Periodic fires are nothing more than regular disturbances; it is us who have made them into disasters."* **FS Response: This is an opinion piece.**
Marks, Raissa. Fish and Wildlife Habitat Management Leaflet number 37. Published by the Natural Resources Conservation Service, USDA, April 2006. ftp://ftp-fc.sc.egov.usda.gov/NHQ/ecs/Wild/ImportofDisturbInHabMgt.pdf	*Opposing View #16 - "Fire releases nutrients and uncovers bare soil. The blackened, bare soil warms quickly, which stimulates soil microbial activity, nutrient cycling, and plant growth. In forests, fire opens up part of the canopy to sunlight, which allows sun-loving plant species to recolonize the site."* *"Following fires, plant communities go through successional changes. Many native wildlife species and popular game species, such as bobwhite quail, white-tailed deer, and wild turkey, are dependent on periodic fire to create and maintain suitable habitat. Surface fires can stimulate the growth of herbaceous foods for deer, elk, moose, and hares, and can enhance berry production for black bears and other wildlife. Small mammal populations generally increase in response to new vegetation growth, providing a food source for carnivores. Fire can also reduce internal and external parasites on wildlife." (pg. 2)* *"natural disturbance such as fires, floods, and herbivory are critical in maintaining valuable ecosystem functions and creating and restoring wildlife habitat." (pg. 7)* **FS Response: This article describes post-fire plant community processes. The cited excerpts explain the processes and importance of disturbance in habitat management. This appears to be focused on post-fire activities and effects. The Marshall Woods project is not a post-fire salvage project.**
Martinez, Lori "Applications of Tree-Ring Dating. Laboratory of Tree-Ring Research at the niversity of Arizona. February, 2000. http://www.ltrr.arizona.edu/lorim/apps.html	*Opposing View #17 - "During recent decades, ecologists have learned that forest fires were a pervasive phenomenon in practically all forests of the world, even the rainforests. Humans have severely disrupted the natural pattern of fire across the landscape, especially during the last 100 years. Therefore, if forests are to be returned to their more 'natural' state, fire will have to be reintroduced."* **FS Response: This document uses a study of tree rings to explore the effects of fire on tree growth.**

Nappi, Antoine Ph.D., Pierre Drapeau Ph.D., Jean-François Giroux Ph.D. and Jean-Pierre Savard Ph.D. "Snag use by foraging black-backed woodpeckers (Picoides articus) in a recently burned eastern boreal forest." The Auk 120(2): 505-511. 2003. http://www.borealcanada.ca/research_arc_hot_e.cfm	*Opposing View #18 - "Contrary to what you may think, a forest fire does not reduce everything to a lifeless ash. Instead, it leaves behind a landscape of blackened trees interspersed with remnants of green, intact forest. Post-fire specialists such as wood-boring insects quickly colonize the dead trees (snags), attracting an array of woodpeckers."* *"Identifying the ecological value of a post-fire structure and the characteristics that make it attractive to wildlife is important."* **FS Response: This is not a post-burn project. The project was designed to meet Forest Plan snag guidelines. Black-backed woodpecker habitat has been analyzed for this project.**
Noss, Reed F. Ph.D., Jerry F. Franklin Ph.D., William Baker, Ph.D., Tania Schoennagel, Ph.D., and Peter B. Moyle, Ph.D. "Ecological Science Relevant to Management Policies for Fire-prone Forests of the Western United States" Society for Conservation Biology, February 24, 2006. http://www.nifc.gov/fuels/downloads/planning/EcologicalScience.pdf	*Opposing View #19 - "Trees that survive the fire for even a short period of time are critical as seed sources and as habitat that will sustain many elements of biodiversity both above and below ground. The dead wood, including large snags and logs, is second only to live trees in overall ecological importance."* **FS Response: This is general information and is consistent with the Marshall Woods project.**
Reice, Seth, Ph.D. from a press conference with Senator Robert Torricelli, April 28, 1998. http://www.saveamericasforests.org/news/ScientistsStatement.htm	*Opposing View #20 - "Disturbances, from windthrown trees to fires, are natural in forests and are essential for forest ecosystem well being. For example, fire is a disturbance in forests, but it is also beneficial. While disturbances kill some individuals, they also open up ecological living space for recolonization by many previously excluded species."* *"Without fire, natural succession is upset. In a forest where fire has been unnaturally suppressed for many years (50 or more), fire intolerant trees grow unchecked, suppressing and outcompeting the normally dominant fire resistant trees. Overall biodiversity is reduced. As the tree diversity declines, the habitat becomes unsuitable for a large portion of the forest species. Animal species are lost, since the animals use the fire tolerant variety of tree species for food, shelter and nest sites."* **FS Response: This is a press conference statement concerning the Act to Save America's Forests. This opinion piece discusses the effects of logging and road building on streams and terrestrial biodiversity and calls for a ban on clearcutting.**

"Rising from the ashes: Forest fires give way to new growth" Science Buzz, May 2007 (supported by the National Science Foundation). http://www.sciencebuzz.org/blog/rising_from_the_ashes_forest_fires_give_way_to_new_growth	*Opposing View #21 - "As a rule of thumb, timber experts say that any particular chunk of ground in the forest should be touched by intense fire every 50 to 100 years.* *But the power of the fire is just the first step in forest regrowth. Weather patterns in the affected area over the nest year will play a big role in how the new forests develop. A summer of drought could kill the newly released seeds and short-circuit any new growth. That could give new species of trees a chance to grow in the area. Normal rains mixed with the nutrients left on the ground from the fire could be a great booster shot to getting the seeds off to a flying start.* *Other natural benefits can be seen from fires. For instance, the once-rare black-backed woodpecker is now a regular site in the BWCA with the abundance of dead trees from recent smaller fires and the 1999 wind blow down of trees. New shrubs and ground vegetation is appealing to different kinds of wildlife to snack on."* **FS Response: This paper discusses the 2007 Minnesota fires and the resource benefits from this disturbance.**
"Rotting Wood and how it affects the Environment" MamasHealth.com. http://www.mamashealth.com/saveearth	*Opposing View #22 - "Rotting logs are a very common feature of wild ecosystems. Rotting logs recycles nutrients back into the soil and provides a healthy habitat for a wide range of insects, plants, and animals. Rotting log provides homes for small mammals, insects, worms, and spiders. The rich, organic soil provides a unique habitat for fungi, tree seedlings, wildflowers, mosses, and ferns."* **FS Response: This is general information. Marshall Woods project design measures, including retention of downed woody material and standing trees in treatment areas, would assure the project would maintain soil stability and productivity and meet Regional soil standards for coarse woody material.**
Schneider, Gary "Dead trees (they're still full of life!)" 2008 Macphail Woods Ecological Forestry Project. http://www.macphailwoods.org/wildlife/deadtrees.html	*Opposing View #23 - "More and more woodlot owners are taking a broader view of their forests. They look for values other than the immediate return on wood harvested. These values include other forest products such as ground hemlock and mushrooms; carbon storage; water purification; leaving a legacy for their children; and healthy wildlife populations.* *Wildlife trees (dead or dying trees used for nesting, feeding, denning and roosting) go through several stages that can start with ants tunneling into the rotting centre to flycatchers perching on the bare branches. For cavity-nesting birds they are critical habitat. Some species excavate cavities for their nests, while others take over and enlarge existing holes. Many of these birds in turn help the forest, eating insects which can damage trees."* **FS Response: This is general information. Marshall Woods project design measures, including retention of downed woody material and standing trees in treatment areas, would assure the project would maintain soil stability and productivity and meet Regional soil standards for coarse woody material.**
Smith, Jane Kapler, ed. "Wildland Fire in Ecosystems: Effects of Fire on Fauna" USDA Forest Service Rocky Mountain Research Station. General Technical Report RMRS-GTR-42-volume 1. January 2000. http://nps.gov/fire/download/fir_eco_wildlandfireJan2000.pdf	*Opposing View #24 - "Species that breed exclusively in the first 30 years after fire may be difficult to maintain in the ecosystem without fire. Fire exclusion and post-fire salvage of dead trees after fire may reduce populations of these species over large geographic areas."* **FS Response: This is general information. The Marshall Woods project was designed to emulate fire's natural role on the landscape through vegetative treatments including using prescribed fire.**

Tanner, G.W. Ph.D., W.R. Marion Ph.D., and J.J. Mullahey Ph.D. "Understanding Fire: Nature's Land Management Tool" A Florida Cooperative Extension Service publication, July, 1991. http://edis.ifas.ufl.edu/UW124	*Opposing View #25 - "Ecological benefits of fire:* • *Promotes flowering of herbaceous species and fruit production of woody species.* • *Improves nutritional quality of plants for both wild and domestic animals.* • *Enhances nutrient cycling of some elements and elevates soil pH.* • *Maintains required habitat conditions for fire-adapted plant and animal species.* • *Results in a more heterogenous and diverse habitat--if natural fires are patchy--leaving pockets of unburned areas.* • *Prohibits wildfire conditions from developing (i.e., vast accumulation of highly-flammable, dead vegetation.)"* **FS Response: This quotation is from a pamphlet produced by the Florida Cooperative Extension Service discussing fire ecology in Florida. The Marshall Woods project is on the Lolo National Forest in Montana. Fire ecology in Florida is not relevant to the Marshall Woods project. However, local fire ecology was considered and impacts to vegetation, soils, wildlife were analyzed.**
Thomas, Jack Ward Ph.D., US Forest Service Chief "Dead Wood: From Forester's Bane to Environmental Boon". Keynote address at the symposium on ecology and management of deadwood in western forests, Reno, Nevada. 1999. http://www.fs.fed.us/psw/publications/documents/gtr-181/003_Thomas.pdf	*Opposing View #26 - "In retrospect, it is amazing that forest managers did not realize that dead wood was a critical habitat component for vertebrate and invertebrate wildlife and for the forest itself."* **FS Response: Marshall Woods project design measures, including retention of downed woody material and standing trees in treatment areas, would assure the project would maintain soil stability and productivity and meet Regional soil standards for coarse woody material.**
Vernetti, Toni "Are You Wildfire Aware?" June 07, 2005. http://www.googobits.com/articles/p0-547-are-you-wildfire-aware.html	*Opposing View #27 - "Wildfires have been a natural part of our environment since time began. Under the right circumstances these wildfires can be beneficial to an ecosystem."* *"Wildfires consume vegetation that would otherwise become overgrown, creating ideal conditions for a catastrophic wildfire. Wildfires allow more open spaces for new and different kinds of vegetation to grow and receive sunlight. This, in turn, provides fresh nutrients and shelter for forest plants and animals. Wildfires also keep our forests healthy by consuming harmful insects and diseases."* **FS Response: This is an article discussing wildfire causes, benefits, types, suppression and prevention; the commenter does not identify its relevance to the Marshal Woods project.**
Voss, René, Ph.D. "Getting Burned by Logging," July 2002. The Baltimore Chronicle. http://www.baltimorechronicle.com/firelies_jul02.shtml	*Opposing View #28 - "Fire is an essential, natural and necessary part of Western forest ecology. Many species of trees can only reproduce after fires occur. Wildland fires burn underbrush and return important nutrients to the soil."* **FS Response: This is an opinion piece; not a scientific peer-reviewed document.**

"Wildfire in British Columbia" BC Forest Facts, September 2003. http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/364421/wildfire_bc.pdf	*Opposing View #29 - "Wildfire is a natural part of most ecosystems across British Columbia. It helps to renew the forest, maintain the diversity of plant and animal life, and keep insects and disease in check. It opens up dense forest to allow the growth of shrubs and grasses, creating browse for deer, moose, elk and other animals. It releases nutrients locked in slowly decaying logs."* **FS Response: This is an opinion piece specific to British Columbia.**
Woodford, Riley "Regeneration Following Fire Creates Fertile Habitat for Wildlife" Alaska Fish and Wildlife News, August 2003. http://www.wildlife.alaska.gov/index.cfm?adfg=wildlife_news.view_article&issue_id=5&articles_id=60	*Opposing View #30 - " "People are bombarded with the negative aspects of fire," Paragi said. "You hear terms like 'destroyed thousands of acres of forest,' and the thought of destruction gets embedded in the public mind. But fire is a natural part of the ecosystem and it is actually very important." "* *"Fire opens up the forest canopy and allows sunlight to reach the ground, stimulating the organisms that decompose organic matter and make nutrients available to plants. Fire burns off the insulating layer of moss and duff, allowing sunlight to further warm the soil. The ash can release nutrients back into the soil and change soil chemistry, promoting plants growth."* **FS Response: This is an opinion piece on prescribed fire in Alaska and the benefits it brings.**
Wuerthner, George. "Logging, thinning would not curtail wildfires" The Register - Guard (Eugene Ore.), December 26, 2008. http://wuerthner.blogspot.com/2008/12/logging-thinning-would-not-curtail.html	*Opposing View #31 - "Healthy ecosystems burn, and often burn by the tens of millions of acres. The spate of large wildfires we are experiencing now are not "abnormal" or an indication of "unhealthy" forest. Rather, we are seeing the natural response of a healthy forest ecosystem.* *Given that wildfire was so common for thousands of years, it is not surprising that recent research shows that wildfires, particularly severe wildfires, increase biodiversity.* *If anything, we probably need more wildfire, not less. With global warming we will probably get it, as vegetative communities adapt to new climatic realities."* **FS Response: This is not a peer reviewed article. It contends that mechanical treatments can increase wildfires' spread and severity by increasing the fine fuels on the ground (slash) and by opening the forest to greater wind and solar penetration, drying fuels faster than in unlogged forests. This project proposes treatment of activity fuels following timber harvest.**
Published by the Center for Biological Diversity and the John Muir Project, January 2014. http://www.biologicaldiversity.org/species/birds/black-backed_woodpecker/pdfs/Nourished_by_Wildfire.pdf	*Opposing View #32 -"The Rim fire was not ecologically damaging, but rather biologically restorative. Without fire, including high-intensity fire, the biological diversity of the Sierras would not exist as we know it. In contrast to the Rim fire, the Forest Service salvage logging plans would cause real and tangible harm to the ecologically important habitats created by the fire as well as the future biological diversity of the region." (page 9)* FS Response: This report discusses post-fire treatments in the Rim Fire in California. The Marshall Woods project does include activities in a recently burned area.

REVIEW OF REFERENCES CITED IN COMMENTS - DICK ARTLEY ATTACHMENT #9A

Herbicides Containing Glyphosate should Never be Applied to Areas where

Mammals (including humans), Fish, or Birds Might be Present

Research shows Even Casual Contact with the Chemical Causes Serious Health Problems

Glyphosate safety opposing view #1 - "Chronic Effects of Glyphosate versus Formulations: Throughout this study glyphosate itself showed no chronic effects on developing tadpoles. The tadpoles reared in the formulations Roundup Original® and Transorb® did show significant physical abnormalities. Abnormalities were also found upon exposure to the surfactant POEA. For all endpoints POEA showed practically identical results to the Roundup Original® formulation whereas the same cannot be said for the Transorb® formulation. The surfactant used in the Transorb formulation is not known (being protected as "Trade Secret"), but has been described as a "surfactant blend". This "surfactant blend" may be responsible for inhibition of metamorphosis, as well as the skewed sex ratio towards female seen in the present study.

Developmental abnormalities induced by Roundup are likely a result of endocrine disruption. The thyroid axis can be greatly affected by corticoids and sex steroids which influence hypothalamic and pituitary control (See Dodd and Dodd, 1976, and Hayes, 1997 for review). Corticoids, sex steroids and prolactin have caused delayed metamorphosis and decreased size by both antagonizing and inhibiting thyroid action (Hayes, 1997). Sex steroid can induced sex reversal and intersex in amphibians and mammals, while low thyroid levels interfere with vitellogenesis. A concentration at which the animals were not effected (NOEC) by The Roundup formulations was not determined by this study.

Howe, Christina Ph.D., Michael Berrill Ph.D., and Bruce D. Pauli

2001 "The Acute and Chronic Toxicity of Glyphosate-Based

Pesticides in Northern Leopard Frogs"

http://www.trentu.ca/biology/berrill/Research/Roundup_Poster.htm

Glyphosate safety opposing view #2 - "After spraying, glyphosate herbicides can remain in soils for long periods. The herbicide can drift onto neighbouring fields, streams or hedges. Roundup kills beneficial insects. It wipes out habitat for birds and animals. Glyphosate causes genetic damage to fish. It is "extremely lethal to amphibians", according to assistant professor of biology Rick Relyea at the University of Pittsburgh. It is hazardous to earthworms. Glyphosate reduces nitrogen fixation. Roundup reduces the growth of mycorrhizal fungi. Roundup can increase the spread and severity of plant diseases (see WRM Bulletin no. 18)."

"Glyphosate herbicides can have a range of impacts on human health, including genetic damage, skin tumours, thyroid damage, anaemia, headaches, nose bleeds, dizziness, tiredness, nausea, eye and skin irritation, asthma and breathing difficulties. Several studies have indicated a link between glyphosate herbicides and non-Hodgkin's lymphoma, a type of cancer."

Lang, Chris "Glyphosate herbicide, the poison from the skies"

WRM's bulletin Nº 97, August 2005

http://chrislang.org/2005/08/28/glyphosate-herbicide-the-poison-from-the-skies/

Glyphosate safety opposing view #3 - "In California, where there is a mandatory system of reporting pesticide poisoning, Glyphosate is the third most common cause of pesticide illness in farm workers. It is the most common form of reported pesticide poisoning in landscape gardeners."

"Two separate studies in Sweden have linked exposure to Glyphosate to Hairy Cell Leukemia and Non Hodgkins Lymphoma. These types of cancers were extremely rare, however non-Hodgkins lymphoma is the most rapidly increasing cancer in the Western world. It has risen by 73% in the USA since 1973. Another study has found a higher incidence of Parkinson disease amongst farmers who used herbicides, including glyphosate."

"Other studies show that Glyphosate and commercial herbicides containing Glyphosate cause a range of cell mutations and damage to cell DNA. These types of changes are usually regarded as precursors to cancer and birth defects."

"Studies show that exposure to Glyphosate is associated with a range of reproductive effects in humans and other species. Research from Ontario, Canada found that a father's exposure to Glyphosate was linked to an increase in miscarriages and premature births in farm families."

"Glyphosate caused a decrease in the sperm count of rats and an increase in abnormal and dead sperms in rabbits. Pregnant rabbits exposed to Glyphosate had a decrease in the weight of their babies."

Leu, Andre "Monsanto's Toxic Herbicide Glyphosate: A

Review of its Health and Environmental Effects"

Organic Producers Association of Queensland, May 15, 2007

http://www.organicconsumers.org/articles/article_5229.cfm

Glyphosate safety opposing view #4 - "Symptoms of exposure to glyphosate include eye irritation, blurred vision, skin rashes, burning or itchy skin, nausea, sore throat and difficulty breathing, headache, lethargy, nose bleeds and dizziness.

In lab tests, glyphosate and herbicides containing glyphosate caused genetic damage to human and animal cells.

Studies of farmers and other people exposed to glyphosate herbicides link this exposure to increased risks of cancer, miscarriages and attention deficit disorder. Additional laboratory tests have confirmed the results of these studies.

Laboratory evidence indicates that glyphosate herbicides can reduce production of sex hormones.

Studies of glyphosate contamination of water are limited, but new results indicate that it can easily contaminate streams in both agricultural and urban areas.

Glyphosate herbicides cause more off-target damage incidents than all but one other herbicide — 2, 4-D.

Glyphosate herbicides cause genetic damage and harm to the immune system in fish. In frogs, glyphosate herbicides cause genetic damage and abnormal development."

Long, Cheryl. "Hazards of the World's Most Common Herbicide"

Mother Earth News, October/November 2005

http://www.motherearthnews.com/Organic-Gardening/2005-10-01/Hazards-of-the-Worlds-Most-Common-Herbicide.aspx

Glyphosate safety opposing view #5 - "Very low doses of some types of the herbicide Roundup can endocrine disruptor the formulations' toxicity may be tied to their "inactive" ingredients rather than the active weed-killing ingredient glyphosate.

French scientists report that a number of Roundup formulations tested at very dilute concentrations can alter hormone actions and cause human liver cells to die within 24 hours of treatment.

The toxicity of some of the formulations was independent of how much glyphosate - the active herbicide in Roundup - they contained, suggesting it is other "inert" ingredients that may alone - or in combination with each other and/or the weed killer - assault the cells. This study's results are similar to prior studies - as reported in a recent Environmental Health News article - that find human embryo cells are affected more by the Roundup formulations and an inert ingredient than by the active ingredient.

The levels of Roundup used in this study are similar to what is typically found in food crops or animal feed treated with Roundup. Because of this, it is possible that people, livestock and wildlife may be exposed to levels of the herbicide mix that can damage cells."

Martin, Negin P. Ph. D. "Monsanto's Roundup More

Deadly to Liver Cells than Glyphosate Alone"

Organic Consumers Assn., August 18, 2009

http://www.organicconsumers.org/articles/article_18842.cfm

Glyphosate safety opposing view #6 - "It's shameful how few American media outlets have written about the latest scientific studies linking Roundup, the world's most popular and profitable weed killer, and cancer. Might it be because Monsanto, makers of Roundup and as we all know a generally bad corporate citizen with a litany of alleged crimes against humanity, spends billions in advertising and marketing and dedicates a good portion of that budget to print and television ads?

Monsanto spent $1.28 billion on its various marketing programs in fiscal 2012, according to the company's annual report. All that money seems to have had an impact. I am only speculating, of course. But why else would the American media ignore the mounting evidence of links between Roundup and cancer?

The latest is a groundbreaking study showing that the active ingredient in the hugely popular herbicide fuels breast cancer by increasing the number of breast cancer cells through cell growth and cell division. This should be front-page news."

Reno, Jamie, "BREAKING NEWS: America's Favorite Weed Killer Linked to Cancer"

Reno Dispatch, July 1, 2013

http://therenodispatch.blogspot.com/2013/07/breaking-news-americas-favorite-weed.html

Glyphosate safety opposing view #7 - "A new review of hundreds of scientific studies surrounding glyphosate—the major component of Monsanto's Roundup herbicide— sheds light on its effects within the human body. The paper describes how all of these effects could work together, and with other variables, trigger health problems in humans, including debilitating diseases like gastrointestinal disorders, diabetes, heart disease, obesity and Alzheimer's disease.

Glyphosate impairs the cytochrome P450 (CYP) gene pathway, which creates enzymes that help to form and also break down molecules in cells. There are myriad important CYP enzymes, including aromatase (the enzyme that converts androgen into estrogen) and 21-Hydroxylase, which creates cortisol (stress hormone) and aldosterone (regulates blood pressure). One function of these CYP enzymes is also to detoxify xenobiotics, which are foreign chemicals like drugs, carcinogens or pesticides. Glyphosate inhibits these CYP enzymes, which has rippling effects throughout our body.

Because the CYP pathway is essential for normal functioning of various systems in our bodies, any small change in its expression can lead to disruptions. For example, humans exposed to glyphosate have decreased levels of the amino acid tryptophan, which is necessary for active signaling of the neurotransmitter serotonin. Suppressed serotonin levels have been associated with weight gain, depression, and Alzheimer's disease.

Reed, Genna "New Review Points to Glyphosate's Dangerous Health Effects"

Food & Water Watch, April 30, 2013

http://www.foodandwaterwatch.org/blogs/new-review-points-to-glyphosates-dangerous-health-effects/

Glyphosate safety opposing view #8 - "The carcinogenic potential of glyphosate has been known since the 1980s. An excellent review on glyphosate toxicity written by Caroline Cox of Northwest Coalition for Alternatives to Pesticides, Eugene, Oregon in the US published in 1995 showed that most if not all the toxic effects of glyphosate had already been demonstrated in laboratory studies [7]. Glyphosate was not only acutely toxic to animals and human beings; subchronic studies showed that feeding glyphosate to animals for three months caused "reduced weight gain, diarrhea, and salivary gland lesion." Lifetime feeding caused "excess growth and death of liver cells, cataracts and lens degeneration, and increase in the frequency of thyroid, pancreas and liver tumors." Also documented were effects on fertility: reduced sperm counts in males and lengthening of the oestrus cycle in females.

But the public were kept in the dark through a litany of outright fraud committed by testing companies working for the corporations, deception, and half-truths.

On carcinogenicity, Cox wrote [8]: "The potential of glyphosate to cause cancer has been a controversial subject since the first lifetime feeding studies were analyzed in the early 1980s. The first study (1979-1981) found an increase in testicular interstitial tumors in male rats at the highest dose tested (30 mg/kg of body weight per day) [9], as well as an increase in the frequency of a thyroid cancer in females [10]. The second study (completed in 1983) found dose-related increases in the frequency of a rare kidney tumor in male mice [11]. The most recent study (1988-1990) found an increase in the number of pancreas and liver tumors in male rats together with an increase of the same thyroid cancer found in the 1983 study in females [12].

But the US Environment Protection Agency (EPA) explained all that away. Cox continued [8]: "All of these increases in tumor incidence are "not considered compound-related" [12] according to EPA. In each case, different reasons are given for this conclusion. For the testicular tumors, EPA accepted the interpretation of an industry pathologist who said that the incidence in treated groups (12 percent) was similar to those observed in other control (not glyphosate-fed) rat feeding studies (4.5 percent) [13]. [This is a blatant, illicit use of controls.] For the thyroid cancer, EPA stated that it was not possible to consistently distinguish between cancers and tumors of this type, so that the incidences of the two should be considered together [a questionable manipulation of data]. The combined data are not statistically significant [10]. For the kidney tumors, the registrants reexamined slides of kidney tissue, finding an additional tumor in untreated mice so that statistical significance was lost. This was despite a memo from EPA's pathologist stating that the lesion in question was not really a tumor [11] [and hence amounts to a falsification of data]. For the pancreatic tumors, EPA stated that there was no dose-related trend and no progression to malignancy [this is frequently the case in endocrine disrupting chemicals]. For the liver tumors and the thyroid tumors, EPA stated that pairwise comparisons between treated and untreated animals were not statistically significant and there was no progression to malignancy [12]." (Comments between square brackets added).

Ho, Mae Wan Ph.D. "Glyphosate and Cancer"

The Institute of Science in Society, Report 26, March 2014

http://www.i-sis.org.uk/Glyphosate_and_Cancer.php

Glyphosate safety opposing view #9:

"Pesticides, including herbicides, insecticides, and fungicides are used extensively to improve crop yields and as a result, they accumulate in the environment and humans unavoidably exposed to them [1]. Pesticides tend to be very reactive compounds that can form covalent bonds with various nucleophilic centers of cellular biomolecules, including DNA [2–4]. Because of their biological activity, the indiscriminate use of pesticides may cause undesired effects to human health. For instance, the induction of DNA damage can potentially lead to adverse reproductive outcomes, the induction of cancer, and many other chronic diseases [5–8]. Epidemiological studies demonstrated that occupational exposure to some pesticides may be related to several kinds of cancer, including leukemia [9], bladder [10], and pancreatic cancers [11]."

Prasad, Sahdeo, Ph.D., Smita Srivastava Ph.D.,

Madhulika Singh Ph.D., and Yogeshwer Shukla Ph.D.

"Clastogenic Effects of Glyphosate in Bone Marrow Cells of Swiss Albino Mice"

Journal of Toxicology, December 15, 2008

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2809416/

Glyphosate safety opposing view #10 - "PITTSBURGH--The herbicide Roundup® is widely used to eradicate weeds. But a study published today by a University of Pittsburgh researcher finds that the chemical may be eradicating much more than that.

Pitt assistant professor of biology Rick Relyea found that Roundup®, the second most commonly applied herbicide in the United States, is "extremely lethal" to amphibians. This field experiment is one of the most extensive studies on the effects of pesticides on nontarget organisms in a natural setting, and the results may provide a key link to global amphibian declines.

In a paper titled "The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities," published in the journal Ecological Applications, Relyea examined how a pond's entire community--25 species, including crustaceans, insects, snails, and tadpoles--responded to the addition of the manufacturers' recommended doses of two insecticides--Sevin® (carbaryl) and malathion--and two herbicides--Roundup® (glyphosate) and 2,4-D.

Relyea found that Roundup® caused a 70 percent decline in amphibian biodiversity and an 86 percent decline in the total mass of tadpoles. Leopard frog tadpoles and gray tree frog tadpoles were completely eliminated and wood frog tadpoles and toad tadpoles were nearly eliminated. One species of frog, spring peepers, was unaffected."

Hoffmann, Karen, "Roundup®highly lethal to amphibians, finds University of Pittsburgh researcher"

University of Pittsburgh News Services, March 31, 2005

http://www.news.pitt.edu/news/roundup%C2%AE-highly-lethal-amphibians-natural-setting-finds-university-pittsburgh-researcher

Glyphosate safety opposing view #11 - "For all nine species of larval anurans, the Kruskal-Wallis analyses detected significant effects of pesticide concentration on mortality (p # 0.002; Fig. 1). The subsequent mean comparisons, using Dunnett's tests, indicated the lowest concentrations that caused significantly greater mortality than the control (p , 0.05). For two species (bullfrogs and spring peepers), 1 mg a.e./L of glyphosate caused significantly greater mortality than the control. For the remaining seven species (green frogs, leopard frogs, wood frogs, Cascades frogs, American toads, western toads, and gray tree frogs), 2 mg a.e./L of glyphosate was the lowest concentration to cause significantly greater mortality than the control. Based on the probit analyses, the estimated LC5096-h values for the nine species of larval anurans ranged from 0.8 to 2.0 mg a.e./L (Table 2)."

Relyea, Rick A. Ph.D. and Devin K. Jones "The Toxicity of Roundup

Original Max to 13 Species of Larval Amphibians"

Environmental Toxicology and Chemistry, Vol. 28, No. 9, pp. 2004–2008, 2009

http://www.pitt.edu/news2009/Roundup.pdf

Glyphosate safety opposing view #12 - "A recent study of Roundup presents new evidence that the glyphosate-based herbicide is far more toxic than the active ingredient alone. The study, published in the June 2005 issue of Environmental Health Perspectives, reports glyphosate toxicity to human placental cells within hours of exposure, at levels ten times lower than those found in agricultural use. The researchers also tested glyphosate and Roundup at lower concentrations for effects on sexual hormones, reporting effects at very low levels. This suggests that dilution with other ingredients in Roundup may, in fact, facilitate glyphosate's hormonal impacts."

"The evidence presented in the recent study is supported by earlier laboratory studies connecting glyphosate with reproductive harm, including damaged DNA in mice and abnormal chromosomes in human blood. Evidence from epidemiological studies has also linked exposure to the herbicide with increased risk of non-Hodgkin's lymphoma, and laboratory studies have now begun to hone in on the mechanism by which the chemical acts on cell division to cause cancer. A Canadian study has linked glyphosate exposure in the three months before conception with increased risk for miscarriage and a 2002 study in Minnesota connected glyphosate exposure in farm families with increased incidence of attention deficit disorder."

"Rethinking Roundup"

Pesticide Action Network North America (PANNA) Update, August 5, 2005

http://www.panna.org/node/466

Glyphosate safety opposing view #13 - "Our studies show that glyphosate acts as a disruptor of mammalian cytochrome P450 aromatase activity from concentrations 100 times lower than the

recommended use in agriculture, and this is noticeable on human placental cells after only 18 hr, and it can also affect aromatase gene expression. It also partially disrupts the ubiquitous reductase activity but at higher concentrations. Its effects are allowed and amplified by at least 0.02% of the adjuvants present in Roundup, known to facilitate cell penetration, and this should be carefully taken into account in pesticide evaluation. The dilution of glyphosate in Roundup formulation may multiply its endocrine effect. Roundup may be thus considered as a potential endocrine disruptor. Moreover, at higher doses still below the classical agricultural dilutions, its toxicity on placental cells could favor some reproduction problems."

Richard, Sophie Ph.D., Safa Moslemi Ph.D., Herbert Sipahutar, Nora Benachour and Gilles-Eric Seralini Ph.D., 2005 "Differential effects of glyphosate and Roundup on human placental cells and aromatase"

Mindfully.org

http://www.mindfully.org/Pesticide/2005/Glyphosate-Roundup-Placental24feb05.htm

Glyphosate safety opposing view #14 - "There are serious health implications from the use of this pesticide. There is a long list of reported toxic effects from glyphosate exposure and this Swedish study provides compelling evidence of the links between glyphosate and cancer."

"Swedish study shows links between glyphosate and cancer"

The European NGO Network on Genetic Engineering, 1999

http://www.gene.ch/genet/1999/Jun/msg00018.html

Glyphosate safety opposing view #15 - "This review suggests that the silvicultural use of glyphosate needs to be re-evaluated with respect to non-target impacts on amphibians in B.C. In addition, knowledge gaps hinder effective and realistic assessment of these impacts. Glyphosate impacts can be species-specific in amphibians, but acute toxicity values are known for only two native B.C. amphibians (the Wood Frog, Rana sylvatica, and the Leopard Frog, R. pipiens). The impact of glyphosate herbicides on salamander species and on terrestrial stages of amphibians is not well understood. There is insufficient information on the levels of glyphosate contamination in small ephemeral wetlands, which are favoured habitats of amphibians, and which may be exposed to direct overspraying with herbicide under current use guidelines. Although the surfactant in glyphosate herbicides, POEA, has been identified as potentially the primary ingredient causing toxicity to amphibians, the option of using surfactants of lower toxicity has not been assessed. These knowledge gaps need to be addressed so that best management practices can be developed to minimize non-target impacts on amphibians from the use of glyphosate herbicides in forestry." (Pg. iii)

Govindarajulu, Purnima P. Ph.D. "Literature review of impacts of glyphosate herbicide on amphibians: What risks can the silvicultural use of this herbicide pose for amphibians in B.C.?"

British Columbia Ministry of Environment, Wildlife Report No. R-28, June 2008

http://www.llbc.leg.bc.ca/public/pubdocs/bcdocs/442206/finishdownloaddocument.pdf

Glyphosate safety opposing view #16 - "E. Wider ecological concerns of the genetically engineered soya beans

1. Glyphosate is a broad-spectrum herbicide which will have major impacts on biodiversity (see Greenpeace Report, 1998, and references therein). It kills all plants indiscriminately. This will destroy wild plants as well as insects, birds, mammals and other animals that depend on the plants for food and shelter. In addition, Roundup (Monsanto's formulation of glyphosate) can be highly toxic to fish. Glyphosate also harms earthworms and many beneficial mycorrhizal fungi and other microorganisms that are involved in nutrient recycling in the soil. It is so generally toxic that researchers are even investigating its potential as an antimicrobial (Roberts et al, 1998)."

Affidavit submitted by Mae-Wan Ho Ph.D. , August 12, 1998

http://www.i-sis.org.uk/greenpeace.php?printing=yes

Glyphosate safety opposing view #17 - "Glyphosate was formerly considered relatively non-toxic however there is now a considerable body of evidence for deleterious effects of Roundup, glyphosate and its adjuvants on a wide range of non-target species, including humans.

In 2003 the Danish Government announced unprecedented restrictions on glyphosate following analyses which demonstrated that it had been percolating through the soil and polluting the ground water at a rate 5-times that allowable for drinking water. Subsequently, another study confirmed that both glyphosate and its degradation product amino-methylphosphonic acid (AMPA) can leach through structured soils thereby posing a potential risk to the aquatic environment (5). More recently, an analytical method for glyphosate and AMPA based on liquid chromatography coupled to electrospray tandem mass spectrometry has been applied to water samples previously found to contain glyphosate (6). The glyphosate concentrations in the re-anaylzed samples were found to be 2 – 14 –fold higher than previously (6) suggesting that contamination of groundwater and other aquatic systems by glyphosate may be even greater than previously thought."

Brennan-Rieder, Denise Ph.D. June, 2008 "PROPOSED COSMETIC PESTICIDE BAN IN PROVINCE OF ONTARIO SCIENTIFIC BASIS FOR BANNING BOTH SALE AND USE OF SYNTHETIC PESTICIDES"

http://www.pesticidereform.ca/RoundupDrBrennan-Rieder.PDF

Glyphosate safety opposing view #18 - "1. Glyphosate was ranked third worst among all pesticides causing severe health problems among those working in agriculture in the State of California.

2. The application of glyphosate causes the production of phyto-oestrogens in legumes. These phyto-oestrogens mimic the role of hormones in the bodies of mammals who ingest them. Hence, they may cause severe reproductive system disruptions. The data on estrogen-content of the plants submitted by Monsanto does not reflect the real scope of this problem, because the tested plants were grown in a glyphosate-free environment (see above)."

Tappeser, Beatrix Ph.D. and Christine von Weizsacker "Possible

human health impacts of Monsanto's transgenic glyphosate-resistant soybeans"

Third World Network

http://www.twnside.org.sg/title/weiz-cn.htm

Glyphosate safety opposing view #19 - "A recently published study by Italian researchers [3] examined the toxicity of four popular glyphosate based herbicide formulations on human placental cells, kidney cells, embryonic cells and neonate umbilical cord cells and surprisingly found total cell death of each of these cells within 24 hours. The researchers reported several mechanisms by which the herbicides caused the cells to die including: cell membrane rupture and damage, mitochondrial damage and cell asphyxia. Following these findings, the researchers tested G, AMPA and POEA by themselves and concluded that, 'It is very clear that if G, POEA, or AMPA has a small toxic effect on embryonic cells alone at low levels, the combination of two of them at the same final concentration is significantly 'deleterious'.

Although previous researchers have proposed that the supposed 'inert ingredients' alter the role of cell membrane disruptors in fish, amphibians, microorganisms [4] and plants [5], independent of G, this study is the first of its kind to report similar findings in human cells. The researchers concluded that, "the proprietary mixtures available on the market could cause cell damage and even death around residual levels to be expected, especially in food and feed derived from R [Roundup] formulation-treated crops" which are pervasive in GM-soya."

"Toxicity of Glyphosate"

Natural Communities magazine, July 16th, 2009

http://naturalcommunitiesmag.com/2009/07/16/gm-soy-destroy-the-earth-and-humans-for-profit/

Glyphosate safety opposing view #20 - "A study released by an Argentine scientist earlier this year reports that glyphosate, patented by Monsanto under the name "Round Up," causes birth defects when applied in doses much lower than what is commonly used in soy fields.

The study was directed by a leading embryologist, Dr. Andres Carrasco, a professor and researcher at the University of Buenos Aires. In his office in the nation's top medical school, Dr. Carrasco shows me the results of the study, pulling out photos of birth defects in the embryos of frog amphibians exposed to glyphosate. The frog embryos grown in petri dishes in the photos looked like something from a futuristic horror film, creatures with visible defects—one eye the size of the head, spinal cord deformations, and kidneys that are not fully developed."

Trigona, Marie "Study Released in Argentina Puts Glyphosate Under Fire"

Znet, July 28, 2009

http://www.zcommunications.org/study-released-in-argentina-puts-glyphosate-under-fire-by-marie-trigona

Glyphosate safety opposing view #21 - "Controversy exists around the use of herbicides more commonly used by home gardeners, such as, 2, 4-D and Roundup. A manufacturer supported review of studies found Roundup safe for use around humans while anti-herbicide groups cite studies that find it affecting human embryonic, placental, and umbilical cells in vitro as well as testosterone development in mice."

Vinje, Eric, "Chemical Quandary: The Problem with

Pesticides, Herbicides and Chemical Fertilizer"

Planet Natural

http://www.planetnatural.com/site/garden-chemicals.html

Glyphosate safety opposing view #22 - "According to Mr. Carrasco's research, even tiny quantities of glyphosate could cause embryonic malformations in frogs and thus, by extrapolation, may have implications for humans.

"I suspect the toxicity classification of glyphosate is too low ... in some cases this can be a powerful poison," Mr Carrasco told the Financial Times in an interview. He says residents near soya-producing areas began reporting problems from 2002, a couple of years after the first big harvests using genetically modified seeds, which were approved for use in Argentina in 1996.

Research by other Argentine scientists and evidence from local campaigners has indicated a high incidence of birth defects and cancers in people living near crop-spraying areas. One study conducted by a doctor, Rodolfo Páramo, in the northern farming province of Santa Fé reported 12 malformations per 250 births, well above the normal rate."

Weber, Jude and Hal Weitzman "Argentina Pressed to Ban Crop Chemical"

The Financial Times, UK, May 29, 2009

http://www.gene.ch/genet/2009/Jun/msg00006.html

Glyphosate safety opposing view #23 - "Fish and aquatic invertebrates are more sensitive to Roundup than terrestrial organisms.[24] Glyphosate is generally less persistent in water than in soil, with 12 to 60 day persistence observed in Canadian pond water, yet persistence of over a year have been observed in the sediments of ponds in Michigan and Oregon."[9]

"The EU classifies Roundup as R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment."[25]

"Although Roundup is not registered for aquatic uses[26] and studies of its effects on amphibians indicate it is toxic to them,[27] scientists have found that it may wind up in small wetlands where tadpoles live, due to inadvertent spraying during its application. A recent study found that even at concentrations one-third of the maximum concentrations expected in nature, Roundup still killed up to 71 percent of tadpoles raised in outdoor tanks."[28]

"In 1996, Monsanto was accused of false and misleading advertising of glyphosate products, prompting a law suit by the New York State attorney general.[42] Monsanto had made claims that its spray-on glyphosate based herbicides, including Roundup, were safer than table salt and "practically non-toxic" to mammals, birds, and fish."[43]

"Environmental and consumer rights campaigners brought a case in France in 2001 for presenting Roundup as biodegradable and claiming that it left the soil clean after use; glyphosate, Roundup's main ingredient, is classed by the European Union as "dangerous for the environment" and "toxic for aquatic organisms". In January 2007, Monsanto was convicted of false advertising.[44] The result was confirmed in 2009."[45]

"On two occasions, the United States Environmental Protection Agency has caught scientists deliberately falsifying test results at research laboratories hired by Monsanto to study glyphosate.[46][47][48] In the first incident involving Industrial Biotest Laboratories, an EPA reviewer stated after finding "routine falsification of data" that it was "hard to believe the scientific integrity of the studies when they said they took specimens of the uterus from male rabbits".[49][50][51] In the second incident of falsifying test results in 1991, the owner of the lab (Craven Labs), and three employees were indicted on 20 felony counts, the owner was sentenced to 5 years in prison and fined 50,000 dollars, the lab was fined 15.5 million dollars and ordered to pay 3.7 million dollars in restitution.[32][52][53] Craven laboratories performed studies for 262 pesticide companies including Monsanto."

"Monsanto has stated that the studies have been repeated, and that Roundup's EPA certification does not now use any studies from Craven Labs or IBT. Monsanto also said that the Craven Labs investigation was started by the EPA after a pesticide industry task force discovered irregularities."[54]

Wikipedia, the free encyclopedia, April 10, 2010

http://en.wikipedia.org/wiki/Roundup#Toxicity_2

Glyphosate safety opposing view #24 - "In the study published in the 15 March 1999 Journal of American Cancer Society, the researchers also maintain that exposure to glyphosate 'yielded increased risks for NHL.' They stress that with the rapidly increasing use of glyphosate since the time the study was carried out, 'glyphosate deserves further epidemiologic studies.' "

DaSilva, Guy MD, "New Study Links Monsanto's Roundup to Cancer"

daSilva Institute - Antiaging & Functional Medicine

http://www.dasilvainstitute.com/article.asp?artid=18&areacode=ITN

Glyphosate safety opposing view #25 - "These latest studies confirm a wealth of evidence on the toxicities of glyphosate and Roundup formulations [2] (Glyphosate Toxic & Roundup Worse , SiS 26), and pinpoint the different sites of action, all of which result in cell death. Epidemiological studies have previously linked glyphosate to spontaneous abortions, non-Hodgkin lymphoma, and multiple myeloma. Laboratory studies showed that glyphosate inhibits transcription in sea urchin

eggs and delays development. Brief exposures to glyphosate in rats caused liver damage, and adding the surfactant in Roundup had a synergistic effect, causing greater liver damage. Roundup was also found to be much more lethal to frogs than to weeds, and could have contributed to the global demise of amphibians within the past decades," [3]

Ho Mae-Win Ph.D. and Brett Cherry "Death by

Multiple Poisoning, Glyphosate and Roundup"

an Institute of Science in Society news release submitted to the USDA

November 2, 2009

http://current.com/146im4c

Glyphosate safety opposing view #26 - "Terrestrial toxicity:

A number of species of birds, mammals and beneficial insects suffer population loses through habitat and/or food supply destruction resulting from the use of glyphosate. There are also direct lethal and sublethal effects.

- Birds LD50 (mg/kg body weight) >3851

- Beneficial Insects oral LD50 >100ug/bee. (Cox 1995b; IPCS 1994)

Exposure to freshly applied Roundup killed more than half of three species - a parasitoid wasp, a lacewing, and a ladybug - and more than 80 percent of a predatory beetle. Carabid beetle populations have shown significant decline and slow recovery after glyphosate application (Asterarki et al., 1992; Brust, 1990; Hassan 1988)

Glyphosate adversely affects a number of soil and plant fauna, such as the beneficial predatory mites. However, it prolonged larval survival of the foliar-feeding nematode Nothanguinea by 50% thus increasing the damage done by this pest. (Carlisle & Trevore, 1987; Eijsackers 1985)

Glyphosate may inhibit a number of fungi that decompose dead plant material. Roundup applied to the soil in repeated doses had a substantial adverse effect on the growth rate of earthworms. The reproductive capacity and the total population in the soil could be expected to fall following repeated low doses of biocides. IPCS, however, classifies glyphosate as having low toxicity to earthworms with a No Observed Effects Concentration of 158mg/kg. (Grossbard 1985; IPCS, 1994; Springett and Gray, 1992)

Laboratory studies show significant effects on nitrogen fixation, denitrification and nitrification. (IPCS 1994)

Watts, Meriel and Ronald Macfarlane, "Glyphosate"

A Pesticide Action Network - Asia and the Pacific publication, 1999

http://www.poptel.org.uk/panap/pest/pe-gly.htm

Glyphosate safety opposing view #27 - Regarding your article, Mystery of Disappearing Honeybees (SiS 34), I am a Dutch beekeeper in the east of the Netherlands near Germany, and we see the same problem with bees, as in Belgium, Germany, France and the whole of Europe. In the Netherlands the government is set to give permission for growing GMOs, even in such a very small country. It will cause a lot of damage: bad for biodiversity, the earth, water, air, drinking water and food.

I just lost 68 percent of my bees, and I blame the city workers who sprayed glyphosate twice at the end of October last year. My beehives were 4 metres from the spray, whereas the legal distance is 200 metres. By the beginning of January 2008, the bees started to die. The municipal authorities in villages and small cities spray glyphosate on weeds in public places, gardens and footpaths. In big cities, they would use steam instead of weed killers.

I did a 'test' in September 2007 with a bit of glyphosate, and within three or five minutes, the bees were dead. It is very important for the city workers to give people warning when they spray, but they never do.

We must study the toxic effects of GMOs and glyphosate, for the sake of the next generation, our children, as well as the sick and old people.

Broek, Hans van den, "Glyphosate kills bees"

The Institute of Science in Society

Science in Society #38, summer 2008

http://www.i-sis.org.uk/SIS38lettersToTheEditor.php

Glyphosate safety opposing view #28 - "Glyphosate herbicides can have a range of impacts on human health, including genetic damage, skin tumours, thyroid damage, anaemia, headaches, nose bleeds, dizziness, tiredness, nausea, eye and skin irritation, asthma and breathing difficulties. Several studies have indicated a link between glyphosate herbicides and non-Hodgkin's lymphoma, a type of cancer.

Not surprisingly, considering the amount of money that Monsanto makes from sales of glyphosate products, the company plays down the health risks of glyphosate. Monsanto claims that glyphosate herbicides pose only a "low risk to human health" as long as glyphosate is used "according to label directions". "

Lang, Chris, "Glyphosate herbicide, the poison from the skies"

WRM's bulletin Nº 97, August 2005

http://www.wrm.org.uy/bulletin/97/Glyphosate.html

Glyphosate safety opposing view #29 - "A 1999 study, A Case-Control Study of Non-Hodgkin Lymphoma and Exposure to Pesticides, (American Cancer Society, 1999), found that people exposed to glyphosate are 2.7 times more likely to contract non-Hodgkin Lymphoma.

A Finnish study shows that glyphostate decreases the defenses of enzymes of the liver and intestines.18 RoundUp, as a mixture of all its ingredients, has been shown to shut down a powerful antioxidant in the liver that detoxifies harmful compounds so they can be excreted through bile. A paper published in August 2000 shows that RoundUp alters gene expression and inhibits necessary steroid production by disrupting a particular protein expression. In 2002, a paper shows that RoundUp can also affect early cell division processes in embryos.19"

"chemicalWATCH Factsheet"

Published by Beyond Pesticides, August 2009

http://www.beyondpesticides.org/pesticides/factsheets/Glyphosate.pdf

Glyphosate safety opposing view #30 - "The USDA first deregulated Roundup Ready alfalfa in 2005. Internal emails recently obtained by Truthout show that Monsanto worked closely with regulators to edit its original petition to deregulate the alfalfa. One regulator accepted Monsanto's help in conducting the USDA's original environmental assessment of the alfalfa.

Farmers and biotech opponents soon filed a lawsuit against the USDA to challenge the initial deregulation. In 2007, a federal court ruled that the USDA did not consider the full environmental impacts of Roundup Ready alfalfa and vacated the agency's decision to deregulate the alfalfa. Monsanto and its allies appealed the decision, and last year, the Supreme Court reversed the lower court's ruling, but ordered the USDA to produce an Environmental Impact Statement (EIS) on the alfalfa before allowing it back into America's fields.

The USDA released a final EIS on Roundup Ready alfalfa in late 2010, and the GE alfalfa was fully deregulated on January 27. The USDA went on to approve two more GE seeds within weeks of the alfalfa decision.

Roundup Ready alfalfa was deregulated just weeks after USDA Secretary Tom Vilsack was pressed by Republican Congressmen, some of whom recently received campaign contributions from Monsanto and the biotech industry, to dump a proposal to geographically isolate Roundup Ready alfalfa from organic and conventional alfalfa and, instead, legalize the GE seed without any government oversight.

The latest lawsuit filed by CFS and its allies argues that the final EIS ignores or downplays the threats Roundup Ready alfalfa poses to conventional alfalfa farms and the environment."

Ludwig, Mike "Farmers Sue USDA Over Monsanto Alfalfa – Again"

Truthout, March 25, 2011

http://www.truth-out.org/farmers-sue-usda-over-monsanto-alfalfa-again68656

Glyphosate safety opposing view #31 - "JH: You said you had found that very low doses of glyphosate had caused these effects on aromatase. Are they the kind of doses that would be used in practical agriculture in the European Union?"

"GE-S: They are about ten to 100 times less than the doses used by agricultural workers. One has to be cautious because these are in vitro results but we do not want to wait for death when the precautionary principle suggests a need for measures to avoid any harmful effects on foetuses and children."

"Glyphosate disrupts of human hormones"

An interview with Professor Gilles-Eric Seralini Ph.D.

Published by ecochem

http://www.ecochem.com/ENN_glyphosate(2).html

Glyphosate safety opposing view #32 - "The December/January 2010 issue of The Organic & Non-GMO Report featured an interview with Robert Kremer, an adjunct professor in the Division of Plant Sciences at the University of Missouri, whose research showed negative environmental impacts caused by glyphosate, the main ingredient in Monsanto's Roundup herbicide, which is used extensively with Roundup Ready genetically modified crops."

"The widespread use of glyphosate is causing negative impacts on soil and plants as well as possibly animal and human health. These are key findings of Don Huber, emeritus professor of plant pathology, Purdue University."

Roseboro, Ken "Monsanto's Glyphosate Problems: Scientist Warns of Dire Consequences with Widespread Use"

The Organic and Non-GMO Report, Posted June 14, 2010

http://www.organicconsumers.org/articles/article_21039.cfm

Glyphosate safety opposing view #33 - "There is, indeed, direct evidence that glyphosate inhibits RNA transcription in animals at a concentration well below the level that is recommended for commercial spray application. Transcription was inhibited and embryonic development delayed in sea urchins following exposure to low levels of the herbicide and/or the surfactant polyoxyethyleneamine. The pesticide should be considered a health concern by inhalation during spraying [4]."

"New research shows that a brief exposure to commercial glyphosate caused liver damage in rats, as indicated by the leakage of intracellular liver enzymes. In this study, glyphosate and its surfactant in Roundup were also found to act in synergy to increase damage to the liver [5]."

Ho, Mae-Wan Ph.D. and Prof. Joe Cummins Ph.D. "Glyphosate Toxic & Roundup Worse"

An Institute of Science in Society publication, 07/03/05

http://www.i-sis.org.uk/GTARW.php

Glyphosate safety opposing view #34 - "In contrast to malathion, Roundup had strong direct effects on the tadpoles. Roundup caused a 40% reduction in total tadpole survival and biomass. The impact of Roundup (with POEA [polyethoxylated tallow-amine] surfactant) is consistent with previous laboratory studies in a variety of species. Mann and Bidwell (1999) estimated LC5048h at 3.9 to 15.5 mg active ingredient (AI)/L in four species of Australian tadpoles while Perkins et al. (2000) estimated LC5096h values of 12.4 mg AI/L in the African clawed frog (Xenopus laevis). In both studies, it was clear that the high toxicity of Roundup was caused by the POEA surfactant and not from the active ingredient (glyphosate). 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 LC5048h of 1.74 mg AI/L. In North American tadpoles (Bufo americanus, Rana pipiens, and R. clamitans), Edginton et al. (2004) found LC5096h of 1.5–4.7 mg AI/l using Vision (a formulation that also includes the POEA surfactant). For the three species used in our mesocosm experiment, Relyea (2005b) found LC5016d values of 1.4 mg AI/L for gray tree frogs, 2.5 mg AI/L for American toads, and 2.5 mg AI/L for leopard frogs. All of this suggests that Roundup with the POEA surfactant can cause substantial mortality in larval amphibians."

Relya, Rick A. Ph.D., Nancy Schoeppner and Jason T. Hoverman, "Pesticides and Amphibians: The Importance of Community Context"

Ecological Applications, 15(4), July 1, 2005, pp. 1125–1134

http://www.mindfully.org/Pesticide/2005/Roundup-Amphibians-Community1jul05.htm

Glyphosate safety opposing view #34 - "The decline in amphibians across the globe has sparked a search for the causes, and recent evidence suggests a connection with pesticides. However, for most pesticides, tests on amphibians are rare and conducted only for short durations (1 to 4 days) and without natural stressors. Recent studies have discovered that the stress of predator cues in the water can make insecticides much more lethal to larval amphibians, but it is unknown whether this phenomenon can be generalized to other types of pesticides. Using six species of North American amphibian larvae (Rana sylvatica, R. pipiens, R. clamitans, R. catesbeiana, Bufo americanus, and Hyla versicolor), I examined the impact of a globally common herbicide (Roundup) on the survival of tadpoles for 16 days with and without the chemical cues emitted by predatory newts (Notophthalmus viridescens). LC5016-d estimates varied from 0.55 to 2.52 mg of active ingredient (AI)/L, which was considerably lower than the few previous studies using Roundup (1.5 to 15.5 mg AI/L). Moreover, in one of the six species tested (R. sylvatica), the addition of predatory stress made Roundup twice as lethal. This discovery suggests that synergistic interactions between predatory stress and pesticides may indeed be a generalizable phenomenon in amphibians that occurs with a wide variety of pesticides."

Relyea, R.A. Ph.D. "The Lethal Impacts of Roundup and Predatory Stress on Six Species of North American Tadpoles"

Archives of Environmental Contamination and Toxicology v 48, n. 3, April 1, 2005

http://www.mindfully.org/Pesticide/2005/Roundup-Tadpoles-Relyea1apr05.htm

Glyphosate safety opposing view #35 - "Species richness was reduced by 15% with Sevin, 30% with malathion, and 22% with Roundup, whereas 2,4-D had no effect. Both insecticides reduced zooplankton diversity by eliminating cladocerans but not copepods (the latter increased in abundance). The insecticides also reduced the diversity and biomass of predatory insects and had an apparent indirect positive effect on several species of tadpoles, but had no effect on snails. The two herbicides had no effects on zooplankton, insect predators, or snails. Moreover, the herbicide 2,4-D had no effect on tadpoles. However, Roundup completely eliminated two species of tadpoles and nearly exterminated a third species, resulting in a 70% decline in the species richness of tadpoles. This study represents one of the most extensive experimental investigations of pesticide effects on aquatic communities and offers a comprehensive perspective on the impacts of pesticides when nontarget organisms are examined under ecologically relevant conditions."

Relyea, R.A. Ph.D. "The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities"

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

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

Glyphosate safety opposing view #36 - "He is joined in his conclusions by Robert Bellé, from the National Center for Scientific Research (CNRS) biological station in Roscoff (Finistere), whose team has been studying the impact of glyphosate formulations on sea-urchin cells for several years. This recognized model for the study of early stages of cancer genesis earned Tim Hunt the 2001 Nobel Prize in medicine. In 2002, the Finisterian team had shown that Roundup acted on one of the key stages of cellular division.

The Breton team has recently demonstrated (Toxicological Science, December 2004) that a "control point" for DNA damage was affected by Roundup, while glyphosate alone had no effect. "We have shown that it's a definite risk factor, but we have not evaluated the number of cancers potentially induced, nor the time frame within which they would declare themselves," the researcher acknowledges. A sprayed droplet could affect thousands of cells. On the other hand, "the concentration in water and fruits is lower, which is rather reassuring."

Morin, Herve "Roundup Doesn't Poison Only Weeds"

Le Monde (France) March 12, 2005

http://www.mindfully.org/GE/2005/Roundup-Poison12mar05.htm

Glyphosate safety opposing view #37 - "We have evaluated the toxicity of four glyphosate (G)-based herbicides in Roundup (R) formulations, from 105 times dilutions, on three different human cell types. This dilution level is far below agricultural recommendations and corresponds to low levels of residues in food or feed. The formulations have been compared to G alone and with its main metabolite AMPA or with one known adjuvant of R formulations, POEA. HUVEC primary neonate umbilical cord vein cells have been tested with 293 embryonic kidney and JEG3 placental cell lines. All R formulations cause total cell death within 24 h, through an inhibition of the mitochondrial

succinate dehydrogenase activity, and necrosis, by release of cytosolic adenylate kinase measuring membrane damage. They also induce apoptosis via activation of enzymatic caspases 3/7 activity. This is confirmed by characteristic DNA fragmentation, nuclear shrinkage (pyknosis), and nuclear fragmentation (karyorrhexis), which is demonstrated by DAPI in apoptotic round cells. G provokes only apoptosis, and HUVEC are 100 times more sensitive overall at this level. The deleterious effects are not proportional to G concentrations but rather depend on the nature of the adjuvants. AMPA and POEA separately and synergistically damage cell membranes like R but at different concentrations. Their mixtures are generally even more harmful with G. In conclusion, the R adjuvants like POEA change human cell permeability and amplify toxicity induced already by G, through apoptosis and necrosis. The real threshold of G toxicity must take into account the presence of adjuvants but also G metabolism and time-amplified effects or bioaccumulation. This should be discussed when analyzing the in vivo toxic actions of R. This work clearly confirms that the adjuvants in Roundup formulations are not inert. Moreover, the proprietary mixtures available on the market could cause cell damage and even death around residual levels to be expected, especially in food and feed derived from R formulation-treated crops."

Benachour, Nora and Gilles-Eric Séralini "Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells"

Chem. Res. Toxicol., 2009, 22 (1), pp 97–105 DOI: 10.1021/tx800218n

Publication Date (Web): December 23, 2008

http://pubs.acs.org/doi/abs/10.1021/tx800218n

Glyphosate safety opposing view #38 - "We exposed human liver HepG2 cells, a well-known model to study xenobiotic toxicity, to four different formulations and to glyphosate, which is usually tested alone in chronic in vivo regulatory studies. We measured cytotoxicity with three assays (Alamar Blue®, MTT, ToxiLight®), plus genotoxicity (comet assay), anti-estrogenic (on ERα, ERβ) and anti-androgenic effects (on AR) using gene reporter tests. We also checked androgen to estrogen conversion by aromatase activity and mRNA. All parameters were disrupted at sub-agricultural doses with all formulations within 24 h. These effects were more dependent on the formulation than on the glyphosate concentration. First, we observed a human cell endocrine disruption from 0.5 ppm on the androgen receptor in MDA-MB453-kb2 cells for the most active formulation (R400), then from 2 ppm the transcriptional activities on both estrogen receptors were also inhibited on HepG2. Aromatase transcription and activity were disrupted from 10 ppm. Cytotoxic effects started at 10 ppm with Alamar Blue assay (the most sensitive), and DNA damages at 5 ppm. A real cell impact of glyphosate-based herbicides residues in food, feed or in the environment has thus to be considered, and their classifications as carcinogens/mutagens/reprotoxics is discussed."

Gasnier, Céline Ph.D., Coralie Dumont Ph.D., Nora Benachour Ph.D., Emilie Clair Ph.D., Marie-Christine Chagnon Ph.D. and Gilles-Eric Séralini Ph.D. "Glyphosate-based herbicides are toxic and endocrine disruptors in human cell lines"

Available online 17 June 2009

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TCN-4WJBC0R-1&_user=10&_coverDate=08%2F21%2F2009&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_searchStrId=1591140451&_rerunOrigin=scholar.google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=2adfd01803a911a1ff1eda15564d337e&searchtype=a

Glyphosate safety opposing view #39 - "In the study published in the 15 March 1999 Journal of American Cancer Society, the researchers also maintain that exposure to glyphosate 'yielded increased risks for NHL.' They stress that with the rapidly increasing use of glyphosate since the time the study was carried out, 'glyphosate deserves further epidemiologic studies.' "

"New Study Links World's Biggest Selling Pesticides to Cancer Swedish Study Finds Exposure to Glyphosate and MCPA Increases Risk for Non-Hodgkin's Lymphoma"

Press Release PAN AP, June 21, 1999

http://www.mindfully.org/Pesticide/Monsanto-Roundup-Glyphosate.htm

Glyphosate safety opposing view #40 - "There is, indeed, direct evidence that glyphosate inhibits RNA transcription in animals at a concentration well below the level that is recommended for commercial spray application. Transcription was inhibited and embryonic development delayed in sea urchins following exposure to low levels of the herbicide and/or the surfactant polyoxyethyleneamine. The pesticide should be considered a health concern by inhalation during spraying [4]."

New research shows that a brief exposure to commercial glyphosate caused liver damage in rats, as indicated by the leakage of intracellular liver enzymes. In this study, glyphosate and its surfactant in Roundup were also found to act in synergy to increase damage to the liver [5].

Three recent case-control studies suggested an association between glyphosate use and the risk of non-Hodgkin lymphoma [6-8]; while a prospective cohort study in Iowa and North Carolina that includes more than 54 315 private and commercial licensed pesticide applicators suggested a link between glyphosate use and multiple myoeloma [9]. Myeloma has been associated with agents that cause either DNA damage or immune suppression."

Ho, Mae-Wan Ph.D. and Prof. Joe Cummins "Glyphosate Toxic & Roundup Worse"

Institute of Science in Society report 07/03/05

http://www.i-sis.org.uk/GTARW.php

Glyphosate safety opposing view #41 - "New scientific studies link Roundup (glyphosphate), the most widely used herbicide in the world, to a host of health risks, such as cancer, miscarriages and disruption of human sex hormones."

Long, Cheryl "Hazards of the World's Most Common Herbicide"

Mother Earth News, October/November 2005

http://www.motherearthnews.com/Organic-Gardening/2005-10-01/Hazards-of-the-Worlds-Most-Common-Herbicide.aspx

Glyphosate safety opposing view #42 - "A series of studies has found that farmers develop non-Hodgkin's lymphoma more often than other people do, but until now it has been difficult for scientists to explain why this increase occurs. New research, however, shows that exposure to the herbicide glyphosate, commonly sold as Roundup, is one explanation. The study was published in 2003 by researchers at the National Cancer Institute, the University of Nebraska Medical Center, Kansas University Medical Center, and the University of Iowa College of Medicine."

Study Links Herbicide use and Cancer

A Northwest Coalition for Alternatives to Pesticides publication, 2010

http://www.pesticide.org/the-buzz/study-links-herbicide-use-and-cancer

Glyphosate safety opposing view #43 - "5. SUMMARY OF GLYPHOSATE IMPACTS ON AMPHIBIANS

This summary is derived almost entirely from toxicological studies on tadpoles and late-stage anuran embryos. The impact of glyphosate herbicides on other amphibians and other life stages is virtually unknown.

• Recent studies have shown that tadpoles are one of the vertebrate groups most sensitive to the toxicity effects of most commercial formulations of glyphosate herbicides, including Vision.

• The estimated LC50 values for some species of amphibians are at or below the expected environmental concentration (EEC) of 1.43 mg a.e./L of Vision (Table 1). Most LC50 values are calculated from experimental durations of 24 to 96 hours, but at low concentrations death may not occur until after 96 hours. This suggests that amphibians may be even more sensitive than the published LC50 values suggest.

• Although LC50 values have traditionally been used to set hazard quotients, recent risk analysis methodology suggests that LC10 values are better for judging population-level impacts of environmental contaminants (Solomon and Thompson 2003). In at least one published study, all North American amphibian larvae tested to date had LC10 values estimated at or below the EEC for Vision, especially at pH higher than 7.0.

• In addition to direct mortality effects, glyphosate herbicides also cause sublethal effects, including reduced growth and development rates, behavioural impairment, and genomic effects. The population-level consequences of these sublethal effects have not been tested under field conditions. For example, reduced growth and development rates, which have been documented under laboratory conditions, could translate into increased mortality if amphibian larvae are unable to metamorphose before the end of the season. Similarly, impaired behavioural response to prodding under laboratory conditions could translate to increased susceptibility to predators under field conditions.

• Impacts have been shown to be synergistically enhanced by interaction with some environmental factors. Of particular concern is that the effects of glyphosate herbicide may be greater when pond pH is 7 or higher (Edginton et al. 2004a). Amphibians in general avoid acidic conditions, preferring to breed in ponds with higher pH, which could increase their vulnerability to glyphosate herbicide impacts.

• More detailed toxicological studies indicate that the toxicity of glyphosate herbicides arises not from the active ingredient, glyphosate, but from the surfactant, POEA.

• POEA is thought to interfere with the synthesis of collagen and to reduce the branchial cartilage in the gills of tadpoles and to cause lysis of gill epithelial cells in fish. This could result in loss of osmotic stability and asphyxiation. The toxic mode of action in terrestrial, postmetamorphic amphibians is not known at formulations without POEA surfactants, such as Rodeo, and formulations with other surfactants, such as Roundup Biactive, have reduced toxicity to amphibians. (pg. 31)

Govindarajulu, Purnima P. Ph.D., "Literature review of impacts of glyphosate herbicide on amphibians: What risks can the silvicultural use of this herbicide pose for amphibians in B.C.?"

British Columbia Ministery of the Environment, Wildlife Report No. R-28, June 2008

http://www.llbc.leg.bc.ca/public/pubdocs/bcdocs/442206/finishdownloaddocument.pdf

Glyphosate safety opposing view #44 - "Chronic Effects of Glyphosate versus Formulations: Throughout this study glyphosate itself showed no chronic effects on developing tadpoles. The tadpoles reared in the formulations Roundup Original® and Transorb® did show significant physical abnormalities. Abnormalities were also found upon exposure to the surfactant POEA. For all endpoints POEA showed practically identical results to the Roundup Original® formulation whereas the same cannot be said for the Transorb® formulation. The surfactant used in the Transorb formulation is not known (being protected as "Trade Secret"), but has been described as a "surfactant blend". This "surfactant blend" may be responsible for inhibition of metamorphosis, as well as the skewed sex ratio towards female seen in the present study. Developmental abnormalities induced by Roundup are likely a result of endocrine disruption. The thyroid axis can be greatly affected by corticoids and sex steroids which influence hypothalamic and pituitary control (See Dodd and Dodd, 1976, and Hayes, 1997 for review). Corticoids, sex steroids and prolactin have caused delayed metamorphosis and decreased size by both antagonizing and inhibiting thyroid action (Hayes, 1997). Sex steroid can induced sex reversal and intersex in amphibians and mammals, while low thyroid levels interfere with vitellogenesis. A concentration at which the animals were not effected (NOEC) by The Roundup formulations was not determined by this study."

Christina Howe, Ph.D., Michael Berrill Ph.D., and Bruce D. Pauli "The Acute and Chronic Toxicity of Glyphosate-Based Pesticides in Northern Leopard Frogs"

Amphibian Ecology and Pathobiology, August 14, 2002

http://www.trentu.ca/biology/berrill/Research/Roundup_Poster.htm

Glyphosate safety opposing view #45 - "Concern #1: Roundup is only intended for terrestrial use, not aquatic use.

While it may be intended for terrestrial use, there is overwhelming evidence that Roundup gets into aquatic habitats, typically through inadvertent (or unavoidable) aerial overspray (Newton et al. 1984, Goldsborough and Brown 1989, Feng et al. 1990, Thompson et al. 2004). To determine the effect on amphibians, Relyea (2005a) simulated a direct overspray of a small wetland using pond mesocosms (1000-liter tanks). The result was widespread death for many species and the death rate was much higher than expected based on previous studies of Roundup. It is relatively common knowledge that Roundup should not be applied to large ponds and lakes, but it seems to be much less commonly appreciated that many amphibians are not produced in large ponds and lakes due to predation by fish. Instead, small temporary wetlands that may appear to be unimportant and only have 6" of water can, in fact, produce thousands of tadpoles. These small, temporary pools are either not avoided or not avoidable by aerial pesticide applications.

Moreover, Roundup is not only lethal to amphibian larvae. New studies have found that Roundup can be highly lethal to terrestrial amphibians as well (Relyea 2005c)."

"Concern #2: The application rate of Roundup was 7 times too high

The application rate of 6 ounces per 300 square feet came directly from the label of Monsanto's "Roundup Weed and Grass Killer". What Monsanto is claiming is that the application rate for this Roundup is higher than their listed application rate for other forms of Roundup. However, both application rates come from Monsanto. Moreover, it is well accepted by Monsanto and the applicators of Roundup that some types of weeds require up to four times the recommended application rate to be effective."

"Concern #4: A past risk assessment has shown that Roundup poses minimal risk to amphibians

The risk assessment was conducted by Giesy et al. (2000), in cooperation with Monsanto, and the assessment was based on the available data at that time. For amphibians, data only existed for four species of Australian tadpoles and one species of African frog. From these studies, the LC50 estimates (the amount of pesticide needed to kill 50% of the animals) were 4 to 16 mg a.i./L (Mann and Bidwell 1999, Perkins et al. 2000).

More recent LC50 laboratory data for North American amphibians demonstrate that North American amphibians are much more sensitive; LC50 values range from 0.5 to 4.7 mg a.i./L (Edginton et al. 2004, Relyea 2005b). According to U.S. Fish and Wildlife classifications, this means that Roundup can no longer be considered slightly to moderately toxic, but rather moderately to highly toxic to North American amphibians."

Relya, Rick Ph.D. "Roundup is Highly Lethal"

Dr. Relya Responds to Monsanto's Concerns Regarding Recent Published Study

Mindfully.org, April 1, 2005

http://www.mindfully.org/GE/2005/Relyea-Monsanto-Roundup1apr05.htm

Glyphosate safety opposing view #46 - "Based on the best available information, the Agency makes a Likely to Adversely Affect determination for the CRLF from the use of glyphosate. Additionally, the Agency has determined that there is the potential for modification of CRLF designated critical habitat from the use of the chemical.

This assessment indicates that direct effects to the terrestrial-phase CRLF eating broadleaf plants, small insects and small herbivorous mammals on a dietary-basis may be at risk following chronic exposure to glyphosate at application rates of 7.5 lb a.e./A and above (forestry, areas with impervious surfaces and rights of way). In addition, for one particular formulation (Registration No. 524-424), medium and large-sized CRLF's eating small herbivorous mammals on a dose-basis may be at risk following acute exposure at an application rate of 5.5 lb formulation/A (industrial outdoor uses). At the lowest application rate of 1.1 lb formulation/A, there is potential risk to medium-sized CRLF's eating small herbivorous mammals on a dose-basis (ornamental lawns and turf)." (Pg. 173)

Carey, Stephen, Tanja Crk, Colleen Flaherty, Pamela Hurley, James Hetrick, Keara Moore, and Silvia C. Termes "Risks of Glyphosate Use to Federally Threatened California Red-legged Frog (Rana aurora draytonii) -- Pesticide Effects Determination"

A Report by the Environmental Fate and Effects Division Office of Pesticide Programs Washington, D.C. 20460, October 17, 2008

http://www.epa.gov/espp/litstatus/effects/redleg-frog/glyphosate/determination.pdf

Glyphosate safety opposing view #47 - "Glyphosate is the poster child for the global pesticide controversy due to its place in the ongoing debate over mega-farming and genetically engineered crops. Industry scientists say it's one of the safest herbicides in the world, while independent scientists have discovered potential links among the widespread use of glyphosate-based herbicides and non-Hodgkin's lymphoma, birth defects and even attention deficit disorder. Research also shows that additives like surfactants in glyphosate in herbicides like Roundup are more toxic than glyphosate itself and can increase the toxicity of glyphosate."

"The war on invasive species is a war on a fact of life. Humans have caused or exacerbated these species "invasions" by changing habitats and introducing species to new areas, and now we are trying to turn back the clock in an attempt to prevent nature from taking its new course. As long as people attempt to dominate the land, extract its resources and shape it to their liking, there will be money to be made and dramatic consequences for other livings things. The search for a balance between supporting our collective desire to prosper and a healthy natural world is sure to spark more heated debates for years to come."

Ludwig, Mike "Special Investigation: The Pesticides and Politics of America's Eco-War"

Published by Truthout, June 9, 2011

http://www.truth-out.org/pesticides-and-politics-americas-eco-war/1307539754

Glyphosate safety opposing view #48 - "We also observed a gradual loss of the r3 and r5domains in embryos treated with GBH (compare Figure 5E,Fwith D), which resembles the results observed in frog embryosin the krox-20 domains (Figures 1B and 2E). Hybridization withthe c-shh probe showed that, as in Xenopus, the prechordalmesoderm domain is preferentially lost in GBH-treated chickembryos (compare Figure 5G with H,I). As the GBH concentra-tion increases, the expression along the embryonic dorsal midlinealso gradually disappears (Figure 5H,I).Therefore, our experiments with chick embryos further extendconclusions from studies about the teratogenic effects of GBHin amphibians to other vertebrate species.DiscussionThe results presented above argue that both GBH andglyphosate itself interfere with key molecular mechanismsregulating early development in both Xenopus and chickenembryos, leading to congenital malformations. Sublethal dosesof the herbicide (430 μM of glyphosate in 1/5000 dilutions ofGBH) and injections leading to a final concentration of 8 to 12μM of glyphosate in the injected side of the embryo weresufficient to induce serious disturbances in the expression ofslug, otx2, and shh. These molecular phenotypes were correlatedwith a disruption of developmental mechanisms involving theneural crest, embryonic dorsal midline formation, and cephalicpatterning. Because glyphosate penetration through the cellmembrane requires facilitation by adjuvants present in com-mercial formulations (5, 6), we tested the effects of glyphosatealone by directly microinjecting it into Xenopus embryos. Thesimilarity of the phenotypes obtained in both situations suggeststhat they are attributable to the active principle of GBH andnot to the adjuvants.We will discuss our results in the following context: (1) thecorrelation of our phenotypes with those observed in animalmodels with an impairment of RA signaling or deficits in theexpression of critical genes that control embryonic development;(2) the probable mechanisms underlying the phenotypes inducedby GBH and glyphosate; (3) possible correlations with clinicalcases of human offspring exhibiting malformations in zonesexposed to GBH.Misregulation of RA, shh, and otx2 Are Involved inCephalic Malformations and Neural Crest-Derived Pheno-types Reminiscent of the Effects of GBH and Glyphosate.The phenotypes obtained after GBH treatments or injections ofglyphosate alone are strikingly reminiscent of those observedas a consequence of an excess of RA signaling in vertebratesand humans. Acute or chronic increase of RA levels leads toteratogenic effects during human pregnancy and in experimentalFigure 4. Phenotype induced by GBH is mediated by an increase ofRA signaling (A). Analysis of RA activity with the reporter plasmidRAREZ. All embryos were injected with the reporter plasmid RAREZ,except for uninjected controls, and left untreated or were treated asindicated in the figure until stage 14-15, when they were processed.Results are expressed as arbitrary luminiscence units per μg of protein.A two-tailed t test was employed to analyze the significance in thedifference of the means. ** $p < 0.01$; *** $p < 0.0001$. (B-G) WMISHfor shh and otx2 at tailbud stages. (B) Control embryo. Notochord (n);floor plate (fp); brain (space between bars), eye (arrowhead). (C)Embryo treated with 1/5000 GBH manifesting microcephaly (spacebetween bars), reduced eyes (arrowhead), diminished Shh signalingfrom the prechordal mesoderm (arrow), and shortened A-P axis (78%,n)9)." (Pg. 6)

Alejandra Paganelli, Victoria Gnazzo, Helena Acosta, Silvia L. López, and Andrés E. Carrasco "Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling"

Publicado por NOGAL DE VIDA, May 20, 2010

http://nogaldevida.blogspot.com/2010/08/glyphosate-based-herbicides-produce.html

Glyphosate safety opposing view #49 - "Although there is only a handful of studies on the safety of GM soybeans, there is considerable evidence that glyphosate—especially in conjunction with the other ingredients in Roundup—wreaks havoc with the endocrine and reproductive systems. 'I think the concentration of glyphosate in the soybeans is the likely cause of the problem,' says Ewen.

Glyphosate throws off the delicate hormonal balance that governs the whole reproductive cycle. 'It's an endocrine buster,' says Ewen, 'that interferes with aromatase, which produces estrogen.' Aromatase is required by luteal cells to produce hormones for the normal menstrual cycle, but it's those luteal cells that have shown considerable alterations in the rats fed GM soybeans.

Glyphosate is also toxic to the placenta, the organ which connects the mother to the fetus, providing nutrients and oxygen, and emptying waste products. In a 2009 French study at the University of Caen, scientists discovered that glyphosate can kill the cells in the outer layer of the human placenta (the trophoblast membrane), which in turn can kill the placenta. The placenta cells are, in Ewen's words, 'exquisitely sensitive to glyphosate.' Only 1/500th the amount needed to kill weeds was able to kill the cells. The amount is so small, according to the study authors the 'residual levels to be expected, especially in food and feed derived from R[oundup] formulation-treated crops' could be enough to 'cause cell damage and even [cell] death.' Furthermore, the effect of the toxin may bioaccumulate, growing worse with repeated consumption from Roundup laden foods.

Smith, Jeffery "Genitically Modified Soy Diets Lead and Uterus Changes in Rats"

foodconsumer.org, September 22, 2010

http://www.foodconsumer.org/newsite/Safety/gmo/genetically_modified_soy_diets_0910100128.html

Glyphosate safety opposing view #50 - "Such reports gained further traction after an Argentine government scientist, Andres Carrasco conducted a study, "Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling" in 2009.

The study, published in the journal Chemical Research in Toxicology in 2010, found that glyphosate causes malformations in frog and chicken embryos at doses far lower than those used in agricultural spraying. It also found that malformations caused in frog and chicken embryos by Roundup and its active ingredient glyphosate were similar to human birth defects found in genetically modified soy-producing regions.

"The findings in the lab are compatible with malformations observed in humans exposed to glyphosate during pregnancy," wrote Carrasco, director of the Laboratory of Molecular Embryology at the University of Buenos Aires. "I suspect the toxicity classification of glyphosate is too low." "

"Fagan told HuffPost that among developmental biologists who are not beholden to the chemical industry or the biotechnology industry, there is strong recognition that Carrasco's research is credible."

"For me as a scientist, one of the reasons I made the effort to do this research into the literature was to really satisfy the question myself as to where the reality of the situation lies," he added. "Having thoroughly reviewed the literature on this, I feel very comfortable in standing behind the conclusions Professor Carrasco came to and the broader conclusions that we come to in our paper."

"We can't figure out how regulators could have come to the conclusions that they did if they were taking a balanced took at the science, even the science that was done by the chemical industry itself."

Graves, Lucia. "Roundup: Birth Defects Caused By World's Top-Selling Weedkiller, Scientists Say"

by Lucia Graves

Published on Friday, June 24, 2011 by Huffington Post

http://www.commondreams.org/headline/2011/06/24-4

Glyphosate safety opposing view #51 - "This study was just routine," said Russian biologist Alexey V. Surov, in what could end up as the understatement of this century. Surov and his colleagues set out to discover if Monsanto's genetically modified (GM) soy, grown on 91% of US soybean fields, leads to problems in growth or reproduction. What he discovered may uproot a multi-billion dollar industry.

After feeding hamsters for two years over three generations, those on the GM diet, and especially the group on the maximum GM soy diet, showed devastating results. By the third generation, most GM soy-fed hamsters lost the ability to have babies. They also suffered slower growth, and a high mortality rate among the pups.

And if this isn't shocking enough, some in the third generation even had hair growing inside their mouths—a phenomenon rarely seen, but apparently more prevalent among hamsters eating GM soy."

"In addition to the GMOs, it could be contaminants, he said, or higher herbicide residues, such as Roundup. There is in fact much higher levels of Roundup on these beans; they're called "Roundup Ready." Bacterial genes are forced into their DNA so that the plants can tolerate Monsanto's Roundup herbicide. Therefore, GM soy always carries the double threat of higher herbicide content, couple with any side effects of genetic engineering.

Without detailed tests, no one can pinpoint exactly what is causing the reproductive travesties in Russian hamsters and rats, Italian and Austrian mice, and livestock in India and America. And we can only speculate about the relationship between the introduction of genetically modified foods in 1996, and the corresponding upsurge in low birth weight babies, infertility, and other problems among the US population. But many scientists, physicians, and concerned citizens don't think that the public should remain the lab animals for the biotech industry's massive uncontrolled experiment.

Alexey Surov says, "We have no right to use GMOs until we understand the possible adverse effects, not only to ourselves but to future generations as well. We definitely need fully detailed studies to clarify this. Any type of contamination has to be tested before we consume it, and GMO is just one of them."

Smith, Jeffery "Genetically Modified Soy Linked to Sterility, Infant Mortality"

foodconsumer.org, September 22, 2010

http://www.foodconsumer.org/newsite/Watch-List/genetically_modified_soy_linked_to_sterility_infant_mortality_22.html

Glyphosate safety opposing view #52 - "A study released by an Argentine scientist earlier this year reports that glyphosate, patented by Monsanto under the name "Round Up," causes birth defects when applied in doses much lower than what is commonly used in soy fields.

The study was directed by a leading embryologist, Dr. Andres Carrasco, a professor and researcher at the University of Buenos Aires. In his office in the nation's top medical school, Dr. Carrasco shows me the results of the study, pulling out photos of birth defects in the embryos of frog amphibians exposed to glyphosate. The frog embryos grown in petri dishes in the photos looked like something from a futuristic horror film, creatures with visible defects—one eye the size of the head, spinal cord deformations, and kidneys that are not fully developed.

"We injected the amphibian embryo cells with glyphosate diluted to a concentration 1,500 times than what is used commercially and we allowed the amphibians to grow in strictly controlled conditions." Dr. Carrasco reports that the embryos survived from a fertilized egg state until the tadpole stage, but developed obvious defects which would compromise their ability to live in their normal habitats.

Trigona, Marie "GMO – Monsanto Soy Herbicide could Pose Health Risks"

Americas Program, Center for International Policy (CIP), July 13, 2009

http://www.internationalnews.fr/article-36061426.html

Glyphosate safety opposing view #53 - "A study released by an Argentine scientist earlier this year reports that glyphosate, patented by Monsanto under the name "Round Up," causes birth defects when applied in doses much lower than what is commonly used in soy fields.

The study was directed by a leading embryologist, Dr. Andres Carrasco, a professor and researcher at the University of Buenos Aires. In his office in the nation's top medical school, Dr. Carrasco shows me the results of the study, pulling out photos of birth defects in the embryos of frog amphibians exposed to glyphosate. The frog embryos grown in petri dishes in the photos looked like something from a futuristic horror film, creatures with visible defects-one eye the size of the head, spinal cord deformations, and kidneys that are not fully developed."

Trigona, Marie "Study released in Argentina puts glyphosate under fire"

SOURCE Americas Program, Center for International Policy, USA, July 13, 2009

Published by Prism Webcast News

http://prismwebcastnews.com/2009/08/06/study-released-in-argentina-puts-glyphosate-under-fire/

Glyphosate safety opposing view #54 - "Relyea found that Roundup caused a 70 percent decline in amphibian biodiversity and an 86 percent decline in the total mass of tadpoles. Leopard Frog tadpoles and Gray Treefrog tadpoles were completely eliminated and Wood Frog tadpoles and toad (Bufo) tadpoles were nearly eliminated. One species of frog, Spring Peepers, was unaffected. "The most shocking insight coming out of this was that Roundup, something designed to kill plants, was extremely lethal to amphibians," said Relyea, who conducted the research at Pitt's Pymatuning Laboratory of Ecology. "We added Roundup, and the next day we looked in the tanks and there were dead tadpoles all over the bottom." "

Roundup Ravages Riparian Residents"

The Center for North American Herpetology. NEWS RELEASE 18 April 2005

http://www.csupomona.edu/~cmbrady/courses/bio304/Roundup.htm

Glyphosate safety opposing view #55 - "False Research

The EPA has twice caught scientists deliberately falsifying results at research laboratories hired by Monsanto to study glyphosate.

In 1983, the EPA revealed that Industrial Biotest Laboratories (IBL) routinely falsified results of their 1971 research performed on glyphosate. Tests performed at IBL included eleven out of nineteen total chronic toxicology studies on glyphosate; studies instrumental in its retaining registration in 1974.

In 1991, the EPA alleged that Craven Laboratories, another lab hired by Monsanto to study the effects of glyphosate, had falsified test results. Several methods were used, including manipulation of equipment and notebook entries."

"Alaska has an economic and cultural dependence on the welfare of salmon and other fish species, so it is particularly vital for Alaskans to know that glyphosate, and even more so glyphosate herbicides, are acutely toxic to fish.

The toxicity of glyphosate, which is most potently dangerous to younger fish, increases as water temperature rises. Ironically, the use of glyphosate causes water temperatures to increase for several years following treatment, as the herbicide kills shading vegetation. This is significant in more than one way for salmon, as juvenile salmon require cold water to thrive under even normal environmental circumstances.

The effects of glyphosate on fish have been documented using rainbow trout, which exhibited erratic swimming and labored breathing, effects which can increase the risk that fish will be eaten, as well as affecting ability to feed, migrate, and reproduce."

James, Carrie "Aerial Herbicide Spraying"

SitNews (Ketchikan, Alaska) June 19, 2004

http://www.sitnews.us/0604Viewpoints/061904_carrie_james.html

Glyphosate safety opposing view #56 - "Worldwide, amphibian populations are reported to be in a state of decline. Causative factors are incompletely understood. In ecosystems of northeastern North America, multiple stressors of pesticide contamination and acidification may be involved. As an initial component of a multi-tier investigation, the effects of forest-use herbicides Vision® (glyphosate) andRelease® (triclopyr) are being studied using Xenopus laevis, Rana pipiens and Rana clamitans. Two different life stages of amphibians, embryos (blastula stage) and larvae (Gosner stage 25), are being used. Interactive effects of various herbicide concentrations and pH (5.5 and 7.5) are being studied using the organisms exposed in 96hr static renewal tests. The Frog Embryo Teratogenesis Assay - Xenopus (FETAX) protocol is used for the embryo stage for the determination of mortality, malformation and growth data. The larval exposures are being developed and refined to compare sensitivities to the FETAX assay. The larval 96hr static renewal exposure is followed by a 10-day water-only recovery period. Sensitivities are being compared to determine the appropriateness of the exotic amphibian Xenopus laevis for toxicity testing. Results on toxicity to date indicate that Vision® is more toxic to all species at pH 7.5 than at pH 5.5. The reverse has been shown for Release®. In addition, the larval stage has consistently been shown to be more sensitive than the blastula stage. Understanding species sensitivities and herbicide/pH interactions will aid in altering forestry herbicide use patterns to minimize effects on amphibians and other non-target organisms."

Edginton, Andrea N.Ph.D. "Multiple stressor effects in amphibians: herbicide/pH interaction"

A presentation at the 5th Annual of the Canadian Amphibian and Reptile Conservation Network, September 22-25, 2000

http://www.carcnet.ca/past_meetings/2000/pastmeeting2000.php

Glyphosate safety opposing view #57 - "We have evaluated the toxicity of four glyphosate (G)-based herbicides in Roundup (R) formulations, from 105 times dilutions, on three different human cell types. This dilution level is far below agricultural recommendations and corresponds to low levels of residues in food or feed. The formulations have been compared to G alone and with its main metabolite AMPA or with one known adjuvant of R formulations, POEA. HUVEC primary neonate umbilical cord vein cells have been tested with 293 embryonic kidney and JEG3 placental cell lines. All R formulations cause total cell death within 24 h, through an inhibition of the mitochondrial succinate dehydrogenase activity, and necrosis, by release of cytosolic adenylate kinase measuring membrane damage. They also induce apoptosis via activation of enzymatic caspases 3/7 activity. This is confirmed by characteristic DNA fragmentation, nuclear shrinkage (pyknosis), and nuclear

fragmentation (karyorrhexis), which is demonstrated by DAPI in apoptotic round cells. G provokes only apoptosis, and HUVEC are 100 times more sensitive overall at this level. The deleterious effects are not proportional to G concentrations but rather depend on the nature of the adjuvants. AMPA and POEA separately and synergistically damage cell membranes like R but at different concentrations.

Benachour, Nora and Gilles-Eric Seralini "Glyphosate Formulations

Induce Apoptosis and Necrosis in Human Umbilical, Embryonic,

and Placental Cells"

Chemical Research in Toxicology, 2009, 22 (1), pp 97–105

http://pubs.acs.org/doi/abs/10.1021/tx800218n

Glyphosate safety opposing view #58 - "Case example: Okanogan NF Integrated Weed Management Environmental Assessment (EA) (1997, 1999)

The Okanogan NF Integrated Weed Management EA for 1997 received many comments from the public asking for documentation and analysis of the risks of herbicides to human health and safety, yet all of these concerns for safety were lumped into a single issue on p. 15-16:

Noxious weed populations can degrade recreational experiences by decreasing the desirability of campsites, replacing native plant populations in developed and dispersed areas and changing the scenery. Herbicide contact could pose risks to human health through skin exposure, inhalation, or ingestion. Some noxious weeds also pose risks to human health.

The marginalization of human health as mere "issues" rather than actual hazards suggests that there was never any intention of questioning the safety or use of herbicides, except in a very limited fashion, and this is borne out in the analysis section.

Two years later the Okanogan NF prepared a second EA (1999) and through another public comment process, the issues identified through public comments were exactly the same.

Why are the issues of public health ignored? According to the rationalization given in the EA (Okanogan NF, 1997, p. 17), public comments were addressed in a "higher level document". In other words, concerns about human health and safety were not considered in the EA. By its limited scope, the agency effectively avoids having to consider issues that it doesn't want to.

The purpose of an EA is to assess a problem, propose and evaluate alternatives and select the most effective remedy, which should be the least harmful to the environment. In this case, the alternative to use herbicides had been selected prior to doing an analysis. The EA was only used to justify a predetermined decision rather than truly explore alternatives."

From Chapter 3. Adverse impacts in the report: "Risky Business: Invasive species management on National Forests - A review and summary of needed changes in current plans, policies and programs"

A publication of the Kettle Range Conservation Group, February, 2001

http://kettlerange.org/weeds/Chapter-3.html

Glyphosate safety opposing view #59 - "In one study, for instance, we exposed neural stage embryos and newly hatched tadpoles of green frogs to low levels of the herbicide glyphosate. Following 96 hours of exposure to the herbicide, surviving animals were moved to fresh water. Nominal glyphosate concentrations of 1.2 to 4.0 ppm initially caused tadpoles paralysis from which they eventually recovered. During the first 24 hours of exposure to 8.0 ppm, all tadpoles either died or were completely paralysed. Furthermore, almost all of the survivors from the first 24 hours of exposure died before the completion of the 96-hour exposure period. Follow-up tests indicated that much of the toxicity could be attributed to the surfactant used in the RoundUp® formulation of glyphosate."

Pauli, Bruce and M. Berrill Ph.D. "Pesticides and Behaviour in Tadpoles"

In Environmental Contaminants and Amphibians in Canada

http://www.open.ac.uk/daptf/froglog/FROGLOG-16-5.html

Glyphosate safety opposing view #60 - "BUENOS AIRES – The herbicide used on genetically modified soy – Argentina's main crop – could cause brain, intestinal and heart defects in fetuses, according to the results of a scientific investigation released Monday.

Although the study "used amphibian embryos," the results "are completely comparable to what would happen in the development of a human embryo," embryology professor Andres Carrasco, one of the study's authors, told Efe."

"Carrasco said that the research found that "pure glyphosate, in doses lower than those used in fumigation, causes defects ... (and) could be interfering in some normal embryonic development mechanism having to do with the way in which cells divide and die."

" "The companies say that drinking a glass of glyphosate is healthier than drinking a glass of milk, but the fact is that they've used us as guinea pigs," he said."

"Herbicide Used in Argentina Could Cause Birth Defects"

Latin American Herald Tribune, April 30, 2009

http://www.progressiveconvergence.com/roundup-report-Argentina.htm

Glyphosate safety opposing view #61 - "DENVER, Colo.— Recognizing the threat posed by expanding use of dangerous pesticides across 18 western states, competition from invading bullfrogs, nonnative diseases, and loss of wetlands, the U.S. Fish and Wildlife Service will announce tomorrow their conclusion that western populations of the northern leopard frog may warrant protection under the Endangered Species Act."

"The use of Roundup (a proprietary herbicide containing glyphosate), which is lethal to amphibians even at recommended levels according to recent studies, also threatens the western leopard frog. Roundup Ready crops (resistant to Roundup so the herbicide can be broadly applied to kill weeds) comprise a significant portion of crop acreage in the midwestern United States. In 2004, Roundup Ready soybean crops comprised 89 percent of all soybean crops in Iowa, 82 percent in Minnesota, 92 percent in Nebraska, 82 percent in North Dakota, and 95 percent in South Dakota."

Western Leopard Frogs Move a Step Closer to Protection -- U.S. Fish and Wildlife Service: Pesticides, Disease, Invasive Species, and Habitat Loss May Threaten Native Frogs with Extinction

Center for Biological Diversity news release, June 30, 2009

http://www.biologicaldiversity.org/news/press_releases/2009/western-leopard-frog-06-30-2009.html

Glyphosate safety opposing view #62 - "Eduardo Neaves, a 12-year-old, went swimming in a canal in Coral Gables, Florida that was contaminated with four times the recommended amount of RoundUp herbicide. The child became completely paralyzed, and five years after the incident suffers residual nervous system damage.

The EPA, according to this article, in 1985 reported on the case of a 59-year-old woman in Tennessee who has suffered central nervous system damage after exposure to RoundUp.

Monsanto's original neurotoxicity studies on RoundUp were ruled invalid by the EPA due to "extensive gaps in the raw data supporting study findings and conclusions. There has been no requirement for a new study on the neurotoxicity of RoundUp."

"Anecdotal Evidence of RoundUp's Toxicity"

Natures Country Store

From July 1987 edition of The Progressive, and article entitled 'Weed Killer'

http://www.naturescountrystore.com/roundup/page7.html

Glyphosate safety opposing view #63 - "A group of international scientists has released a report detailing health and environmental hazards from the cultivation of genetically modified (GM) Roundup Ready soy and the use of glyphosate (Roundup®) herbicide.

The report, GM Soy: Sustainable? Responsible?,[1] highlights new research by Argentine government scientist, Professor Andrés Carrasco,[2] which found that glyphosate causes malformations in frog and chicken embryos at doses far lower than those used in agricultural spraying.

"The findings in the lab are compatible with malformations observed in humans exposed to glyphosate during pregnancy," said Carrasco."

Antoniou, Michael, Paulo Brack Ph.D., Andrés Carrasco Ph.D., John Fagan, Mohamed Ezz El-Din Mostafa Habib Ph.D., Paulo Yoshio Kageyama Ph.D., Carlo Leifert Ph.D, Rubens Onofre Nodari Ph.D., Walter A. Pengue Ph.D. "GM Soy: Sustainable? Responsible?"

GM Watch, 13 September 2010

http://www.globalresearch.ca/index.php?context=viewArticle&code=ANA20101010&articleId=21382

Glyphosate safety opposing view #64 - "Three recent studies show that Roundup, which is used by farmers and home gardeners, is not the safe product we have been led to trust.

A group of scientists led by biochemist Professor Gilles-Eric Seralini from the University of Caen in France found that human placental cells are very sensitive to Roundup at concentrations lower than those currently used in agricultural application.

An epidemiological study of Ontario farming populations showed that exposure to glyphosate, the key ingredient in Roundup, nearly doubled the risk of late miscarriages. Seralini and his team decided to research the effects of the herbicide on human placenta cells. Their study confirmed the toxicity of glyphosate, as after eighteen hours of exposure at low concentrations, large proportions of human placenta began to die. Seralini suggests that this may explain the high levels of premature births and miscarriages observed among female farmers using glyphosate."

Heong, Chee Yoke "New Evidence Establishes Dangers of Roundup"

Third World Resurgence, No. 176, April 2005

Re-published by Project Censored

http://www.projectcensored.org/top-stories/articles/13-new-evidence-establishes-dangers-of-roundup/

Glyphosate safety opposing view #65 - "Colombia - A Colombian court on Friday ordered the government to suspend immediately aerial spraying of drug crops with the herbicide glyphosate, a potential blow to President Andres Pastrana's anti-cocaine offensive.

Bogota Judge Gilberto Reyes Delgado, ruling in favor of indigenous groups that had protested the spraying program, said he had asked the government to provide studies on glyphosate's effects on the environment and human health."

"Ecuador recently asked Colombia to stop aerial crop spraying near the border the two nations share over fears glyphosate could harm Ecuadoreans' health and damage subsistence crops in the region's jungle towns."

"Columbian Court Suspends Aerial Spraying of Roundup on Drug Crops"

Reuters, July 27, 2001

Republished by Mindfilly.org

http://www.mindfully.org/Pesticide/Roundup-Drug-Spray-Colombia.htm

Glyphosate safety opposing view #66 - "In short, Monsanto's Roundup Ready technology is emerging as an environmental disaster. The question isn't why a judge demanded an environmental impact study of Roundup Ready sugar beets in 2010; it's that no one did so in 1996 before the technology was rolled out. After all, the Union of Concerned Scientists was already quite, well, concerned back then."

"As I wrote in June, rather than spark a reassessment of the wisdom of relying on toxic chemicals, the failure of Roundup Ready has the U.S. agricultural establishment scrambling to intensify chemical use. Companies like Dow Agriscience are dusting off old, highly toxic poisons like 2, 4-D and promoting them as the "answer" to Roundup's problems."

Philpott, Tom. "Why Monsanto is paying farmers to spray its rivals' herbicides"

Grist, October 20, 2010

http://www.grist.org/article/food-2010-10-20-why-monsanto-paying-farmers-to-spray-rival-herbicides/

Glyphosate safety opposing view #67 - "Glyphosate is no more than slightly toxic to fish, and practically non-toxic to amphibians (McComb 1990) and aquatic invertebrate animals." (page 4)

"For glyphosate and its formulations, findings are from studies conducted by the manufacturer. These studies have been presented to EPA to support product registration, but may not be available to the public. (page 5)

"Since the 1988 rating, EPA has concluded that glyphosate should be classified as having evidence of noncarcinogenicity for humans. There was no convincing evidence of carcinogenicity in new studies in two animal species (Dykstra and Ghali 1991). (page 7)

"Glyphosate Herbicide Information Profile"

Forest Service Pacific Northwest Region, February, 1997

http://www.fs.fed.us/r6/nr/fid/pubsweb/gly.pdf

Glyphosate safety opposing view #68 - "Two new studies indicate that Monsanto's herbicide, Roundup, is a hormone-disruptor and is associated with birth defects in humans.

Farm families that applied pesticides to their crops in Minnesota were studied to see if their elevated exposure to pesticides caused birth defects in their children. The study found that two kinds of pesticides -- fungicides and the herbicide Roundup -- were linked to statistically significant increases in birth defects. Roundup was linked to a 3-fold increase in neurodevelopmental (attention deficit) disorders. [EHP Supplement 3, Vol. 110 (June 2002), pgs. 441-449.]

"A recent test tube study reveals that Roundup can severely reduce the ability of mouse cells to produce hormones. Roundup interferes with a fundamental protein called StAR (steroidogenic acute regulatory protein). The StAR protein is key to the production of testosterone in men (thus controlling male characteristics, including sperm production) but also the production of adrenal hormone (essential for brain development), carbohydrate metabolism (leading to loss or gain of

weight), and immune system function. The authors point out that "a disruption of the StAR protein may underlie many of the toxic effects of environmental pollutants." [EHP Vol. 108, No. 8 (August 2000), pgs. 769-776.]"

"Monsanto's Roundup Herbicide Threatens Public Health"

Rachel's Environment and Health News, issue 751, Sept. 5, 2002.

Reprinted by Organic Consumers Association

http://www.organicconsumers.org/Monsanto/roundup92502.cfm

http://www.whale.to/b/roundup_h.html

Glyphosate safety opposing view #69 -"Exposure of mammals to glyphosate may cause loss of mitochondrial transmembrane potential and result in oxidative stress to liver and brain [27, 28]. Both apoptosis and autophagy are involved in glyphosate toxicity mechanisms [29] Case reports indicated that exposure to glyphosate was related to Parkinsonism [19, 30].

Conclusions

Glyphosate residue could reach humans and animals through feed and excreted in urine. Presence of glyphosate in urine and its accumulation in animal tissues is alarming even at low concentrations. Unknown impacts of glyphosate on human and animal health warrants further investigations of glyphosate residues in vertebrates and other non-target organisms."

Krüger, Monica Ph.D. et al. "Detection of Glyphosate Residues in Animals and Humans"

Journal of Environmental & Analytical Toxicology, 2014, 4:2

http://omicsonline.org/open-access/detection-of-glyphosate-residues-in-animals-and-humans-2161-0525.1000210.pdf

Glyphosate safety opposing view #70 -"Only 23 of the 9,990 food samples tested, says the USDA, showed pesticide residues exceeding the established tolerance levels. Based on this, the agency is now claiming that the food supply doesn't pose a safety concern, and that consumers can eat up without worry.

But what the agency isn't divulging is that tolerance levels continually change as a result of corporate lobbying. As more pesticides are needed to grow genetically-modified organisms (GMOs) and other unnatural factory foods, more residues remain, thus the need for new limits.

Not only does the EPA continue to evaluate the safety of pesticides in isolation, ignoring the effects of synergistic, real-life exposures to many different pesticides, but the agency has also repeatedly succumbed to corporate lobbying pressures to up the safety limits for known hazardous pesticides."

"USDA refuses to test foods for glyphosate contamination, says pesticides are safe to eat"

Published in Natural News, January 9, 2015

http://www.naturalnews.com/048237_glyphosate_contamination_USDA.html

http://agrihunt.com/agri-news/6528-usda-refuses-to-test-foods-for-glyphosate-contamination.html

http://carlislewellnessnetwork.blogspot.com/2015/01/usda-refuses-to-test-foods-for.html

Glyphosate safety opposing view #71 -"As the years roll on, such suspicions are becoming increasingly validated. In recent weeks, we've not only learned that GE corn is in no way comparable to natural corn in terms of nutrition, we're also discovering the ramifications of dousing our crops with large amounts of glyphosate — the active ingredient in Monsanto's broad-spectrum herbicide Roundup."

"While Monsanto insists that Roundup is safe and "minimally toxic" to humans, Samsel and Seneff's research tells a different story altogether. Their report, published in the journal Entropy,1 argues that glyphosate residues, found in most commonly consumed foods in the Western diet courtesy of sugar, corn, soy and wheat, "enhance the damaging effects of other food-borne chemical residues and toxins in the environment to disrupt normal body functions and induce disease." According to the authors:

"Negative impact on the body is insidious and manifests slowly over time as inflammation damages cellular systems throughout the body."

"Research Reveals Previously Unknown Pathway by which Glyphosate Wrecks Health"

By Dr. Mercola

Published by Mercola.com, May 14, 2013

http://articles.mercola.com/sites/articles/archive/2013/05/14/glyphosate.aspx

Glyphosate safety opposing view #72 -"Glyphosate may be the motivating factor for the autism rate increase projected by 2015. MIT Computer Science and Artificial Intelligence Laboratory's Dr. Stephanie Seneff said that half of the children in the United States will be born with autism in the next decade.

Autism and glyphosate are linked, according to Dr. Stepanie Seneff, and a host of other researchers who have studied the chemical, which is very popular with biotech giants like Monsanto and Syngenta. Dr. Seneff asks the following:

"Is there a toxic substance that is currently in our environment on the rise in step with increasing rates of Autism that could explain this?… The answer is yes, I'm quite sure that I'm right, and the answer is glyphosate."

"Autism Will Afflict Half Of The American Children By 2025, And Glyphosate Is To Blame, MIT Doctor Says"

Published in Inquisitr, January 7, 2015

http://www.inquisitr.com/1735694/autism-will-afflict-half-of-the-american-children-by-2025-and-glyphosate-is-to-blame-mit-doctor-says/

Glyphosate safety opposing view #73 -"In the first ever testing on glyphosate herbicide in the breast milk of American women, Moms Across America and Sustainable Pulse have found 'high' levels in 3 out of the 10 samples tested. The shocking results point to glyphosate levels building up in women's bodies over a period of time, which has until now been refuted by both global regulatory authorities and the biotech industry."

"There is currently no regulatory limit for the amount of glyphosate in breast milk anywhere in the world. However, the EPA has set a legally enforceable maximum contaminant level (MCL) for glyphosate of 700 ug/l in drinking water, which is 7,000 times higher than the MCL in Europe."

"Earth Open Source Research Director Claire Robinson said, "Regulators and industry always say it is the dose that makes the poison, and even the increasing levels of glyphosate currently found in food and feed and the environment are not a problem. However, that argument only holds true if glyphosate doesn't build up in the human body and is excreted as fast as we take it in. These breast milk results suggest glyphosate may bio-accumulate. That means that our body tissues might be exposed to higher levels than the so-called safe levels set by regulators. So the regulations are not protecting us."

"Shockingly, the new US testing by Moms Across America and Sustainable Pulse, with support from Environmental Arts & Research, found maximum glyphosate levels in urine over 8 times higher than those found in Europe."

"Glyphosate Testing Full Report: Findings in American Mothers' Breast Milk, Urine and Water."

Published by Moms Across America, April 7, 2014

http://www.momsacrossamerica.com/glyphosate_testing_results

Glyphosate safety opposing view #74 -"The GMA lattice hypothesis gives rational and consistent explanations to the many observations and unanswered questions associated with the mysterious kidney disease in rural Sri Lanka. Furthermore, it may explain the similar epidemics of CKDu observed in Andra Pradesh, India and Central America. Although glyphosate alone does not cause an epidemic of chronic kidney disease, it seems to have acquired the ability to destroy the renal tissues of thousands of farmers when it forms complexes with a localized geo environmental factor (hardness) and nephrotoxic metals. It is logical to find out other agricultural areas in the World where excessive use of glyphosate and drinking ground water with high hardness and the contamination of ground water and food with nephrotoxic metals have overlapped in causing kidney damage." (under 5. Conclusions)

Jayasumana, Channa, Ph.D., Gunatilake, Sarath, Ph.D. and Senanayake, Priyantha, "Glyphosate, Hard Water and Nephrotoxic Metals: Are They the Culprits Behind the Epidemic of Chronic Kidney Disease of Unknown Etiology in Sri Lanka?

Int. J. Environ. Res. Public Health 2014, 11(2), 2125-2147

http://www.mdpi.com/1660-4601/11/2/2125/htm

Glyphosate safety opposing view #75 -"Caiman embryos were exposed at early embryonic stage to different sub-lethal concentrations of Roundup (50, 100, 200, 300, 400, 500, 750, 1000, 1250 and 1750microg/egg). At time of hatching, blood samples were obtained from each animal and two short-term tests, the Comet assay and the Micronucleus (MN) test, were performed on erythrocytes to assess DNA damage. A significant increase in DNA damage was observed at a concentration of 500microg/egg or higher, compared to untreated control animals ($p<0.05$). Results from both the Comet assay and the MN test revealed a concentration-dependent effect. This study demonstrated adverse effects of Roundup on DNA of C. latirostris and confirmed that the Comet assay and the MN test applied on caiman erythrocytes are useful tools in determining potential genotoxicity of pesticides. The identification of sentinel species as well as sensitive biomarkers among the natural biota is imperative to thoroughly evaluate genetic damage, which has significant consequences for short- and long-term survival of the natural species."

Poletta GL, Ph.D, Larriera A, Ph.D., Kleinsorge E, Ph.D., and Mudry MD, Ph.D., " Genotoxicity of the herbicide formulation Roundup (glyphosate) in broad-snouted caiman (Caiman latirostris) evidenced by the Comet assay and the Micronucleus test."

Mutat Res. 2009 Jan 31;672(2):95-102.

http://www.ncbi.nlm.nih.gov/pubmed/19022394

Glyphosate safety opposing view #76 -"The broad spectrum herbicide glyphosate is widely used in agriculture worldwide. There has been ongoing controversy regarding the possible adverse effects of glyphosate on the environment and on human health. Reports of neural defects and craniofacial malformations from regions where glyphosate-based herbicides (GBH) are used led us to undertake an embryological approach to explore the effects of low doses of glyphosate in development. Xenopus laevis embryos were incubated with 1/5000 dilutions of a commercial GBH. The treated embryos were highly abnormal with marked alterations in cephalic and neural crest development and shortening of the anterior-posterior (A-P) axis. Alterations on neural crest markers were later correlated with deformities in the cranial cartilages at tadpole stages. Embryos injected with pure glyphosate showed very similar phenotypes. Moreover, GBH produced similar effects in chicken embryos, showing a gradual loss of rhombomere domains, reduction of the optic vesicles, and microcephaly. This suggests that glyphosate itself was responsible for the phenotypes observed, rather than a surfactant or other component of the commercial formulation."

Paganelli A, Ph.D., Gnazzo V, Ph.D, Acosta H, López SL, Ph.D. and Carrasco AE, Ph.D. "Glyphosate-based herbicides produce teratogenic effects on vertebrates by impairing retinoic acid signaling."

Chem Res Toxicol. 2010 Oct 18;23(10):1586-95

http://www.ncbi.nlm.nih.gov/pubmed/20695457

Glyphosate safety opposing view #77 -"There has been ongoing controversy regarding the possible adverse effects of glyphosate on the environment and on human health. Reports of neural defects and craniofacial malformations from regions where glyphosate-based herbicides (GBH) are used led us to undertake an embryological approach to explore the effects of low doses of glyphosate in development.

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"The direct effect of glyphosate on early mechanisms of morphogenesis in vertebrate embryos opens concerns about the clinical findings from human offspring in populations exposed to GBH in agricultural fields."

Paganelli A1, Gnazzo V, Ph.D., Acosta H, Ph.D., López SL, Carrasco AE

"Glyphosate-based herbicides produce teratogenic effects on vertebrates by impairing retinoic acid signaling."

Chem Res Toxicol. 2010 Oct 18;23(10):1586-95.

http://www.ncbi.nlm.nih.gov/pubmed/20695457

Glyphosate safety opposing view #78 -"Glyphosate and AMPA were detected in shallow riparian groundwater at 4 of 5 stream sites in urban catchments in Canada and each were found in approximately 1 in 10 of the samples overall."

D.R. Van Stempvoort, , Ph.D., J.W. Roy , Ph.D., S.J. Brown , G. Bickerton

"Residues of the herbicide glyphosate in riparian groundwater in urban catchments"

Chemosphere, Volume 95, January 2014, Pages 455–463

http://www.sciencedirect.com/science/article/pii/S0045653513013659

Following "Approved" Label Directions on Herbicide Containers does not Assure Safety

Following Label Directions will not Assure Safety -- Opposing View #1

"Tests done on glyphosate to meet registration requirements have been associated with fraudulent practices.

Laboratory fraud first made headlines in 1983 when EPA publicly announced that a 1976 audit had discovered "serious deficiencies and improprieties" in toxicology studies conducted by Industrial Biotest Laboratories (IBT).44 Problems included "countless deaths of rats and mice that were not reported," "fabricated data tables," and "routine falsification of data."44

IBT was one of the largest laboratories performing tests in support of pesticide registrations.44 About 30 tests on glyphosate and glyphosate-containing products were performed by IBT, including 11 of the 19 chronic toxicology studies.45 A compelling example of the poor quality of IBT data comes from an EPA toxicologist who wrote, "It is also somewhat difficult not to doubt the scientific integrity of a study when the IBT stated that it took specimens from the uteri (of male rabbits) for histopathological examination."46 (Emphasis added.)

In 1991, laboratory fraud returned to the headlines when EPA alleged that Craven Laboratories, a company that performed contract studies for 262 pesticide companies including Monsanto, had falsified test results.47 "Tricks" employed by Craven Labs included "falsifying laboratory notebook entries" and "manually manipulating scientific equipment to produce false reports."48 Roundup residue studies on plums, potatoes, grapes, and sugarbeets were among the tests in question.49

The following year, the owner/president of Craven Laboratories and three employees were indicted on 20 felony counts. A number of other employees agreed to plead guilty on a number of related charges.50 The owner was sentenced to five years in prison and fined $50,000; Craven Labs was fined 15.5 million dollars, and ordered to pay 3.7 million dollars in restitution.48

Although the tests of glyphosate identified as fraudulent have been replaced, these practices cast shadows on the entire pesticide registration process."

Cox, Caroline, "Quality of Toxicology Testing"

Journal of Pesticide Reform, Volume 15, Number 3, Fall 1995. Northwest Coalition for Alternatives to Pesticides, Eugene, OR. Glyphosate, Part 1: Toxicology

http://www.inspiringlandscapes.com/hope/glyphos8.htm

Following Label Directions will not Assure Safety -- Opposing View #2

"In 2004 the "Counterpart Regulations," strongly supported by industry, were proposed to streamline EPA's pesticide review process at the expense of the most vulnerable life forms in our country, Endangered and Threatened Species aka Listed Species (1,265 species are "Listed"). The critical change these regulations bring about is elimination of the requirement for consultations with wildlife experts at the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) by EPA reviewers evaluating adverse impacts of pesticides on Listed Species and their habitats. RCC opposed the Counterpart Regulations with comments, but, sadly, the Regulations were issued in final form on July 29, 2004, despite our objections. Over 125,000 public comments were received by the Fish and Wildlife Service, and they ran 2 to 1 against the Counterpart Regulations.

RCC Insight:

Apparently, the public's concerns did not make a difference to the people at FWS and NMFS, or did they? We wonder whether the scientists involved with protecting wildlife at both "Services" would want to be bringing their experience and knowledge to bear on decisions made by EPA with respect to pesticides, if it were up to them. Perhaps they would prefer to be part of the evaluation process and they do not concur with finalizing the Counterpart Regulations. However, the fact is that decision-makers, by finalizing these changes, support an action that will weaken Endangered Species' protection from poisoning and habitat degradation due to pesticides. This latest environmental rollback can mean increasingly hazardous conditions in rivers, lakes and wetlands. A further risk is weakening of the Endangered Species Act itself. (Text of our "Comments" is available through our website -- rachelcarsoncouncil.com)"

"Species from Pesticides – Weakened"

Rachel Carson Council Inc., Issues & Insights October, 2004

http://www.rachelcarsoncouncil.org/index.php?page=issues-insights-october-2004

Following Label Directions will not Assure Safety -- Opposing View #3

"Used in yards, farms and parks throughout the world, Roundup has long been a top-selling weed killer. But now researchers have found that one of Roundup's inert ingredients can kill human cells, particularly embryonic, placental and umbilical cord cells.

Until now, most health studies have focused on the safety of glyphosate, rather than the mixture of ingredients found in Roundup. But in the new study, scientists found that Roundup's inert ingredients amplified the toxic effect on human cells—even at concentrations much more diluted than those used on farms and lawns.

One specific inert ingredient, polyethoxylated tallowamine, or POEA, was more deadly to human embryonic, placental and umbilical cord cells than the herbicide itself – a finding the researchers call "astonishing."

"The research team suspects that Roundup might cause pregnancy problems by interfering with hormone production, possibly leading to abnormal fetal development, low birth weights or miscarriages.

Monsanto, Roundup's manufacturer, contends that the methods used in the study don't reflect realistic conditions and that their product, which has been sold since the 1970s, is safe when used as directed. Hundreds of studies over the past 35 years have addressed the safety of glyphosate.

"Roundup has one of the most extensive human health safety and environmental data packages of any pesticide that's out there," said Monsanto spokesman John Combest. "It's used in public parks, it's used to protect schools. There's been a great deal of study on Roundup, and we're very proud of its performance."

The EPA considers glyphosate to have low toxicity when used at the recommended doses.

"Risk estimates for glyphosate were well below the level of concern," said EPA spokesman Dale Kemery. The EPA classifies glyphosate as a Group E chemical, which means there is strong evidence that it does not cause cancer in humans."

Weed-Whacking Herbicide Proves Deadly to Human Cells

By Crystal Gammon and Environmental Health News June 23, 2009

http://www.scientificamerican.com/article.cfm?id=weed-whacking-herbicide-p

Following Label Directions will not Assure Safety -- Opposing View #4

"However, the U.S. government regulatory agencies seem to have given Monsanto a long rope. The clout Monsanto enjoys in the U.S. government is by no means incidental. According to the Organic Consumers Association, Clarence Thomas, before being the Supreme Court Judge who put George W. Bush in office (in his first term), was a Monsanto lawyer; Anne Veneman, the U.S. Secretary of Agriculture, was on the board of directors of Monsanto's Calgene Corporation; Donald Rumsfeld, the Secretary of Defence, was on the board of directors of Monsanto's Searle Pharmaceuticals; Secretary of Health Tommy Thompson received $50,000 in donations from Monsanto during his winning campaign for Wisconsin's governorship; and the two Congressmen who received the most donations from Monsanto during the last election were Larry Combest (Chairman of the House Agricultural Committee) and John Ashcroft (the Attorney-General)."

"A multinational Exposed"

Frontline, Volume 22 - Issue 05, Feb. 26 - Mar. 11, 2005

http://www.hinduonnet.com/fline/fl2205/stories/20050311003312500.htm

Following Label Directions will not Assure Safety -- Opposing View #5

"A recent study which shows clear links between exposure to the herbicide glyphosate and non-Hodgkin's lymphoma (NHL), a form of cancer that afflicts the lymphatic system, has caused worldwide concern over the safety of the herbicide on humans.

The study was conducted by eminent oncologists Dr Lennart Hardell and Dr Mikael Eriksson of Sweden and published in the journal Cancer by the American Cancer Society on March 15."

"Monsanto's Argument:

Previous evaluations conducted by the US Environmental Protection Agency (EPA) and the World Health Organization (WHO) suggest that glyphosate is not a mutagenic or carcinogenic.

WHO and the Food and Agriculture Organization (FAO) have approved the safety of glyphosate residues in genetically-engineered Roundup Ready soyabeans.

PAN's Counter Argument:

The EPA and WHO evaluations were done more than five years ago and based mainly on data submitted to them by Monsanto.

These evaluations did conclude that "there is no evidence of mutagenicity or carcinogenicity" based on the available data, but they do not support definitive assertions that glyphosate "is not mutagenic or carcinogenic".

Previous EPA and WHO evaluations which made similar claims for other chemicals had to be revised as new evidence came to light.

The establishment of the WHO's Acceptable Daily Intake (ADI) is based on limited studies using limited parameters which do not account for vulnerable groups such as children, the elderly, the sick and other groups that might have increased susceptibility to glyphosate exposure."

"Concerns Over Glyphosate Use"

The Sun (Malaysia), Friday August 20, 1999

http://www.poptel.org.uk/panap/archives/glywb.htm

Following Label Directions will not Assure Safety -- Opposing View #6

"To protect our health, the U.S. Environmental Protection Agency (EPA) sets maximum legal residue levels for every pesticide, for dozens of crops. But a new study in the respected journal Toxicology has shown that, at low levels that are currently legal on our food, Roundup could cause DNA damage, endocrine disruption and cell death. The study, conducted by French researchers, shows glyphosate-based herbicides are toxic to human reproductive cells."

"Solvents and surfactants, legally considered 'inert ingredients,' are mixed with glyphosate in products such as Roundup weed killer to create chemical formulations that increase mobility and more direct access to the cells. 'Those same factors that aid penetration into a plant, also aid penetration into the skin,' says Vincent Garry, professor emeritus of pathology at the University of Minnesota. 'These chemicals are designed to kill cells.' "

"Herbicide manufacturers are subject to fewer rules in the testing of inert ingredients than they are for active ingredients, explains Caroline Cox, research director at the Center for Environmental Health in Oakland, Calif. 'The tests the EPA requires for inert ingredients cover only a small range of potential health problems,' Cox says. 'Testing for birth defects, cancer and genetic damage are required only on the active ingredients. But we're exposed to both.' "

" 'Our bodies are gigantic spider webs of chemical communications that work in the parts-per-trillion range,' says Warren Porter, professor of zoology and environmental toxicology at the University of Wisconsin. 'When you put so-called 'insignificant' amounts of toxic chemicals into the mix, you have a molecular bull in a china shop. The possibilities for impact are endless.' "

Kimble-Evans, Amanda

"Roundup Kills more than Weeds"

Mother Earth News, December 2009/January 2010

http://www.motherearthnews.com/Sustainable-Farming/Roundup-Weed-Killer-Toxicity.aspx?page=2

Following Label Directions will not Assure Safety -- Opposing View #8

"The findings of Richard et al. (2005) are an important addition to our understanding that the health and environmental effects of formulated pesticide products are not fully reflected in tests conducted on the active ingredient(s) alone. It has been long known that the adjuvants (commonly and misleadingly called "inert" ingredients) may be toxic and may enhance or supplement the toxic effects of the active pesticidal ingredient.

In the case of glyphosate-containing products, this phenomenon was well demonstrated in the data submitted to the (EPA) by the registrant (Monsanto), and summarized by the U.S. EPA in the Reregistration Eligibility Document (RED) for glyphosate (U.S. EPA 1993). For example, based on the registrant's own tests of acute toxicity to freshwater fish, the U.S. EPA classified technical grade glyphosate as "slightly toxic" to "practically non-toxic" and formulated products ranged from "moderately toxic" to "practically non-toxic." Tested alone, the surfactant adjuvant (identified as "inert") was "highly toxic" to "slightly toxic." Similar differences were reported in tests of acute toxicity to freshwater invertebrates.

Based in part on the data in the glyphosate RED (U.S. EPA 1993), the New York State Attorney General's office successfully pursued an action against Monsanto in 1996 (Attorney General of the State of New York 1996). At that time, Monsanto was making advertising claims about the toxicity of the Roundup products based on data from tests on the active ingredient alone. Such claims are scientifically unfounded and inherently deceptive. The Attorney General's action was facilitated by the availability of at least some limited information about the inert ingredients and their toxicity. That same sort of information enabled Richard et al. (2005) to conduct their study.

Unfortunately, that is not always the case, and for many pesticide products, little or no information about the identity of inert ingredients is publicly available. Registrants are generally required to conduct acute toxicity tests on formulated products, but they traditionally conduct chronic toxicity tests on the active ingredient alone. Even when formulated products are tested, the identity of inert ingredients is rarely revealed in the open literature, publicly available regulatory documents, or product labels. Therefore, independent research is stymied, and the public is ill-informed in the marketplace."

Séralini, Gilles-Eric "Issue: Cumulative Impacts to Amphibians Species"

A Laboratoire de Biochimie et Biologie Moleculaire publication, Université de Caen, February 2006

http://www.signaloflove.org/clearcutting/reports/cumulativeimpactstoamphibian

Following Label Directions will not Assure Safety -- Opposing View #9

"FACT: The EPA (Environmental Protection Agency) does not test pesticides for safety. It relies on the manufacturers' test data to make judgments. Recent probes have found that the experiments

on which these data have been based, have been designed to show only what the manufacturer would like them to show. This criticism of self-serving misrepresentation can be aimed equally validly at irresponsible experimenters bent on demonstrating toxicity of a given pesticide.

It seems that however this problem is approached, the EPA needs to take more affirmative action and responsibility. This is not likely to happen, as the EPA's research program increasingly relies on corporate joint venture, according to agency documents obtained by Public Employees for Environmental Responsibility (PEER). Indeed, a study by the Government Accountability Office (the investigative arm of Congress – the same people who first told us of the $640 toilet seats and $1,000 hammers purchased with Department of Defense money), in April 2005, concluded that the EPA lacks safeguards to "evaluate or manage potential conflicts of interest" in corporate research agreements, as they are taking money from corporations that they are supposed to be regulating."

"MYTH: The Government tests pesticides for safety before they are sold"

Wild Ones Journal, Nov 17, 2006

http://www.for-wild.org/download/roundupmyth/roundupmyth.html

Following Label Directions will not Assure Safety -- Opposing View #10

"FACT: The primary focus of the Federal Insecticide, Fungicide, and Rodenticide Act, originally enacted in 1947, was to provide federal control of pesticide distribution, sale, and use. The act has been amended many times over the years. One of these amendments permitted manufacturers protection of trade secrets. It is under these provisions that manufacturers circumvent a law that originally intended all information to be known – at least by the EPA. The fact that today, with mass spectrometers, chemistry can determine the makeup of the inert ingredients, leaves only the end consumer in the dark.

In 1990 the Office of the Attorney General of New York filed a request that all inert ingredients in pesticides be made public. The request was repeated a number of times through the decade, to no avail. Sixteen years later, in August of 2006, the attorneys general of 14 states have filed a similar petition to the EPA. This time the EPA is obliged to respond within a given time period."

"MYTH: There are laws…"

Wild Ones Journal, Nov 17, 2006

http://www.for-wild.org/download/roundupmyth/roundupmyth.html

Following Label Directions will not Assure Safety -- Opposing View #11

"A recent study by eminent oncologists Dr. Lennart Hardell and Dr. Mikael Eriksson of Sweden [1], has revealed clear links between one of the world's biggest selling herbicide, glyphosate, to non-Hodgkin's lymphoma, a form of cancer [2]."

"In the study published in the 15 March 1999 Journal of American Cancer Society, the researchers also maintain that exposure to glyphosate 'yielded increased risks for NHL.' They stress that with

the rapidly increasing use of glyphosate since the time the study was carried out, 'glyphosate deserves further epidemiologic studies.' "

"O' Neill concluded: 'The EPA when authorising Monsanto's field trials for Roundup-ready sugar beet did not consider the issue of glyphosate. They considered this to be the remit of the Pesticides Control Service of the Department of Agriculture. Thus nobody has included the effects of increasing the use of glyphosate in the risk/benefit analysis carried out. It is yet another example of how regulatory authorities supposedly protecting public health have failed to implement the 'precautionary principle' with respect to GMOs.' "

O' Neill, Sadhbh "RoundUp—Lymphoma Connection"

Genetic Concern, June 22, 1999

http://www.hancock.forests.org.au/docs/herbicidesUpdate0602.htm

Following Label Directions will not Assure Safety -- Opposing View #12

"Glyphosate-containing products are acutely toxic to animals, including humans. Symptoms include eye and skin irritation, cardiac depression, gastrointestinal pain, vomiting, and accumulation of excess fluid in the lungs. The surfactant used in a common glyphosate product (Roundup) is more acutely toxic than glyphosate itself; the combination of the two is yet more toxic."

"Tests done on glyphosate to meet registration requirements have been associated with fraudulent practices."

"Laboratory fraud first made headlines in 1983 when EPA publicly announced that a 1976 audit had discovered "serious deficiencies and improprieties" in toxicology studies conducted by Industrial Biotest Laboratories (IBT).44 Problems included "countless deaths of rats and mice that were not reported," "fabricated data tables," and "routine falsification of data." "44

"IBT was one of the largest laboratories performing tests in support of pesticide registrations.44 About 30 tests on glyphosate and glyphosate-containing products were performed by IBT, including 11 of the 19 chronic toxicology studies.45 A compelling example of the poor quality of IBT data comes from an EPA toxicologist who wrote, "It is also somewhat difficult not to doubt the scientific integrity of a study when the IBT stated that it took specimens from the uteri (of male rabbits) for histopathological examination." "46 (Emphasis added.)

"In 1991, laboratory fraud returned to the headlines when EPA alleged that Craven Laboratories, a company that performed contract studies for 262 pesticide companies including Monsanto, had falsified test results.47 "Tricks" employed by Craven Labs included "falsifying laboratory notebook entries" and "manually manipulating scientific equipment to produce false reports."48 Roundup residue studies on plums, potatoes, grapes, and sugarbeets were among the tests in question." "49

"The following year, the owner/president of Craven Laboratories and three employees were indicted on 20 felony counts. A number of other employees agreed to plead guilty on a number of

related charges.50 The owner was sentenced to five years in prison and fined $50,000; Craven Labs was fined 15.5 million dollars, and ordered to pay 3.7 million dollars in restitution."48

Cox, Caroline. "Glyphosate, Part 1: Toxicology"

Journal of Pesticide Reform, Volume 15, Number 3, Fall 1995

http://terrazul.org/Archivo/Glyphosate_Fact_Sheets.pdf

Following Label Directions will not Assure Safety -- Opposing View #13

"EPA Investigates Monsanto

An internal memorandum by an official of the U.S. Environmental Protection Agency [EPA], has accused EPA of conducting a "fraudulent" criminal investigation of Monsanto, the St. Louis chemical corporation. [1]

The 30-page memo, from William Sanjour to his supervisor, David Bussard, dated July 20, 1994, describes a two-year-long criminal investigation of Monsanto by EPA's Office of Criminal Investigation (OCI).

The Sanjour memo says EPA opened its investigation on August 20, 1990 and formally closed it on August 7, 1992. "However, the investigation itself and the basis for closing the investigation were fraudulent," the Sanjour memo says.

According to the Sanjour memo:

EPA's investigation of Monsanto was precipitated by a memo dated February 23, 1990, from EPA's Dr. Cate Jenkins to Raymond Loehr, head of EPA's Science Advisory Board.

The Jenkins memo said that EPA had set dioxin standards relying on flawed Monsanto-sponsored studies of Monsanto workers exposed to dioxin, studies that had showed no cancer increases among heavily exposed workers.

Attached to the Jenkins memo was a portion of a legal brief filed by the plaintiffs as part of a trial known as Kemner v. Monsanto, in which a group of citizens in Sturgeon, Missouri had sued Monsanto for alleged injuries they had suffered during a chemical spill caused by a train derailment in 1979.

The Jenkins memo had not requested a criminal investigation; instead Jenkins had suggested the need for a scientific investigation of Monsanto's dioxin studies. But in August 1990, EPA's Office of Criminal Investigation (OCI) wrote a 7-page memo recommending that a "full field criminal investigation be initiated by OCI."

Plaintiffs in the Kemner suit made the following kinds of allegations (which we quote verbatim from the Sanjour memo):

“Monsanto failed to notify and lied to its workers about the presence and danger of dioxin in its chlorophenol plant, so that it would not have to bear the expense of changing its manufacturing process or lose customers;...

"Monsanto knowingly dumped 30 to 40 pounds of dioxin a day into the Mississippi River between 1970 and 1977 which could enter the St. Louis food chain;

"Monsanto lied to EPA that it had no knowledge that its plant effluent contained dioxin;

"Monsanto secretly tested the corpses of people killed by accident in St. Louis for the presence of dioxin and found it in every case;...

"Lysol, a product made from Monsanto's Santophen, was contaminated with dioxin with Monsanto's knowledge." [The Sanjour memo says that, at the time of the contamination, "Lysol (was) recommended for cleaning babies' toys and for other cleaning activities involving human contact."]

"The manufacturer of Lysol was not told about the dioxin by Monsanto for fear of losing his business;

"Other companies using Santophen, who specifically asked about the presence of dioxin, were lied to by Monsanto;...

"Shortly after a spill in the Monsanto chlorophenol plant, OSHA measured dioxin on the plant walls. Monsanto conducted its own measurements, which were higher than OSHA's, but they issued a press release to the public and they lied to OSHA and their workers saying they had failed to confirm OSHA's findings;

"Exposed Monsanto workers were not told of the presence of dioxin and were not given protective clothing even though the company was aware of the dangers of dioxin;

"Even though the Toxic Substances Control Act requires chemical companies to report the presence of hazardous substances in their products to EPA, Monsanto never gave notice and lied to EPA in reports;

"At one time Monsanto lied to EPA saying that it could not test its products for dioxin because dioxin was too toxic to handle in its labs."...

“EPA Investigates Monsanto”

RACHEL'S HAZARDOUS WASTE NEWS #400, July 28, 1994

http://www.ejnet.org/rachel/rhwn400.htm

Following Label Directions will not Assure Safety -- Opposing View #14

"A study by French researchers at the University of Caen of glyphosate residue discovered that the inert ingredients in the herbicide (solvents, preservatives, surfactants) increased the toxic effect on human cells. According to the researchers, glyphosate residue can cause birth defects.

"This clearly confirms that the [inert ingredients] in Roundup formulations are not inert," wrote the study authors. "Moreover, the proprietary mixtures available on the market could cause cell damage and even death [at the] residual levels" found on Roundup-treated crops."

"Another study by Argentine scientists also found that glyphosate can cause birth defects at doses considerably lower than what is commonly used on crops, in this case, soybeans. The researchers injected amphibian embryo cells with glyphosate diluted to a concentration 1,500 times less than what is used commercially. The embryos grew into tadpoles with obvious birth defects."

"A 2001 study by Swedish oncologists discovered links between non-Hodgkin's lymphoma and glyphosate. The Swedish researchers found that Swedish people with non-Hodgkin's lymphoma were 2.3 times more likely to be exposed to glyphosate.

Monsanto spokesperson John Combest defended the safety of Roundup. "Roundup has one of the most extensive human health safety and environmental data packages of any pesticide that's out there. It's used in public parks, it's used to protect schools. There's been a great deal of study on Roundup, and we're very proud of its performance." "

Cheeseman, Gina-Marie, "Can A Company That

Makes Roundup Be Sustainable?"

TriplePundit, November 20th, 2009

http://www.triplepundit.com/2009/11/can-a-company-that-makes-roundup-be-sustainable/

Following Label Directions will not Assure Safety -- Opposing View #15

"Over twenty years ago, the dangers of Monsanto's glyphosate as well as its associated GMOs were known scientifically to cause human health difficulties and Swedish researchers years ago in the Journal 'Cancer' noted glyphosate was connected to human cancer. Anyway, many scientists and public health workers researching it were fired. It's a mad empire's rush--the U.S empire and its corporate proxies--to desire (hell, the reality of) to own the world's food and dominate the whole world. It is destroying thousands of years of biodiversity security in the process. And Monsanto's empire of glyphosate is in virtually everything in the USA and worldwide. One foolish company, one corrupt federal government of the USA. Everyone should learn more about Monsanto in the film "The World According to Monsanto." (90 minutes). Monsanto's corporate contract should be revoked for endangering world health and killing off global crop biodiversity of thousands of years of work destroyed in one generation--in the mad rush to dominate the whole world's biodiversity.

Monsanto and the USA will go down in history as the organizations that caused most biological devastation and human suffering in human history."

"MONSANTO RoundUp (glyphosate) Empire causes

BIRTH DEFECTS...in amphibian embryos, humans?"

Portland independent media center, May 3, 2009

http://portland.indymedia.org/en/2009/05/391045.shtml

Following Label Directions will not Assure Safety -- Opposing View #16

"BUENOS AIRES, Apr 15 , 2009 (IPS) - Glyphosate, the herbicide used on soybeans in Argentina, causes malformations in amphibian embryos, say scientists here who revealed the findings of a study that has not yet been published."

"The observed deformations are consistent and systematic," Professor Andrés Carrasco, director of the Laboratory of Molecular Embryology at the University of Buenos Aires medical school and lead researcher on the National Council of Scientific and Technical Research (CONICET), told the Inter Press Service news agency IPS.

Reduced head size, genetic alterations in the central nervous system, an increase in the death of cells that help form the skull, and deformed cartilage were effects that were repeatedly found in the laboratory experiments, said the biologist.

The news was reported Monday by the Argentine newspaper Página 12.

Monsanto's head of communications in Argentina, Fernanda Pérez Cometto, told IPS that the company has "several studies that show that the herbicide is harmless to humans, animals and the environment."

Valente, Marcela "Scientists Reveal Effects of Glyphosate"

HEALTH-ARGENTINA, April 15 , 2009

http://www.ipsnews.net/news.asp?idnews=46516

Following Label Directions will not Assure Safety -- Opposing View #17

"It's amazing how many organics people still think it's OK to just use a bit of Roundup on those weeds in the bush or the driveway, or .... of course, not on the food, but the bush, that's OK isn't it?

Well, no, actually it isn't, and here's why: Roundup and various other formulations of the active ingredient glyphosate, have the potential to cause serious health and environmental effects, and have caused some severe poisoning problems.

Thorough PR by the developer of Roundup, Monsanto, has resulted in the widespread belief that glyphosate is 'safe'. Registration processes have generally supported this attitude, and there are no national or international bans. However, independent scientific studies and widespread poisonings in Latin America resulting from aerial application are beginning to reveal the true effects of the world's most widely used herbicide."

Watts, Meriel Ph.D. "Roundup's Not OK"

ORGANIC NZ, November/December 2009

http://www.livingorganics.co.nz/roundups-not-ok.php

Following Label Directions will not Assure Safety -- Opposing View #18

"Research on genetically modified seeds is still published, of course. But only studies that the seed companies have approved ever see the light of a peer-reviewed journal. In a number of cases, experiments that had the implicit go-ahead from the seed company were later blocked from publication because the results were not flattering. "It is important to understand that it is not always simply a matter of blanket denial of all research requests, which is bad enough," wrote Elson J. Shields, an entomologist at Cornell University, in a letter to an official at the Environmental Protection Agency (the body tasked with regulating the environmental consequences of genetically modified crops), "but selective denials and permissions based on industry perceptions of how 'friendly' or 'hostile' a particular scientist may be toward [seed-enhancement] technology."

Shields is the spokesperson for a group of 24 corn insect scientists that opposes these practices. Because the scientists rely on the cooperation of the companies for their research - they must, after all, gain access to the seeds for studies - most have chosen to remain anonymous for fear of reprisals. The group has submitted a statement to the EPA protesting that "as a result of restricted access, no truly independent research can be legally conducted on many critical questions regarding the technology."

It would be chilling enough if any other type of company were able to prevent independent researchers from testing its wares and reporting what they find - imagine car companies trying to quash head-to-head model comparisons done by Consumer Reports, for example. But when scientists are prevented from examining the raw ingredients in our nation's food supply or from testing the plant material that covers a large portion of the country's agricultural land, the restrictions on free inquiry become dangerous.

"Do Seed Companies Control GM Crop Research?"

Scientific American, Editorial, August 2009 edition, published 21 July 2009

Reprinted by Combat-Monsanto.org

http://www.combat-monsanto.co.uk/spip.php?article399

Following Label Directions will not Assure Safety -- Opposing View #19

"France's highest court has ruled that U.S. agrochemical giant Monsanto had not told the truth about the safety of its best-selling weed-killer, Roundup. The court confirmed an earlier judgment that Monsanto had falsely advertised its herbicide as "biodegradable" and claimed it "left the soil clean." Roundup is the world's best-selling herbicide.

French environmental groups had brought the case in 2001 on the basis that glyphosate, Roundup's main ingredient, is classed as "dangerous for the environment" by the European Union.

In the latest ruling, France's Supreme Court upheld two earlier convictions against Monsanto by the Lyon criminal court in 2007, and the Lyon court of appeal in 2008, the AFP news agency reports.

Monsanto already dominates America's food chain with its genetically modified seeds. Now it has targeted milk production. Just as frightening as the corporation's tactics, including ruthless legal battles against small farmers, is its decades-long history of toxic contamination."

France Finds Monsanto Guilty of Lying

Infowars Ireland, November 23, 2009

http://info-wars.org/2009/11/23/france-finds-monsanto-guilty-of-lying/

Following Label Directions will not Assure Safety -- Opposing View #20

"Monsanto created Roundup in the 1970's to kill weeds and has since catapulted this product to be the world's number one selling herbicide. Before the patent on Roundup was set to expire in 2000, Monsanto needed a surefire way to keep the profits of Roundup from bottoming out. Monsanto quickly began purchasing the majority of the world's seed companies while simultaneously creating GMOs that farmers needed to sign contractual agreements to only use Roundup. Subsequently, revenue from Roundup never dropped and in fact topped more than $4 billion in 2008, up 59% from 2007 [2].

GM-soy is estimated to be present in up to 70% of all food products found in US supermarkets, including cereals, breads, soymilk, pasta and most meat (as animals are fed GM-soy feed). Although Monsanto has consistently relied on industry-funded data to declare the safety of GM-soy and glyphosate, objective research published in peer-reviewed journals tells another story.

Toxicity of Glyphosate

A recently published study by Italian researchers [3] examined the toxicity of four popular glyphosate based herbicide formulations on human placental cells, kidney cells, embryonic cells and neonate umbilical cord cells and surprisingly found total cell death of each of these cells within 24 hours. The researchers reported several mechanisms by which the herbicides caused the cells to die including: cell membrane rupture and damage, mitochondrial damage and cell asphyxia. Following these findings, the researchers tested G, AMPA and POEA by themselves and concluded that, "It is very clear that if G, POEA, or AMPA has a small toxic effect on embryonic cells alone at low levels, the combination of two of them at the same final concentration is significantly deleterious."

Damato, Gregory Ph.D., "GM-Soy: Destroy the Earth and Humans for Profit"

Fourwinds10.com, May 27, 2009

http://www.fourwinds10.com/siterun_data/science_technology/dna_gmo/news.php?q=1243529527

Following Label Directions will not Assure Safety -- Opposing View #21

"If you're still not convinced that Roundup is a highly toxic and persistent pesticide, read on, while at the same time remembering the other contributions that Monsanto has made to society such as:

Saccharin, Astroturf, agent orange, dioxin, sulphuric acid, polychlorinated biphenyls (PCBs), plastics and synthetic fabrics, research on uranium for the Manhattan Project that led to the construction of nuclear bombs, styrene monomer, an endless line of pesticides and herbicides (Roundup), rBGH (recombinant bovine growth hormone that makes cows ill), genetically engineered crops (corn, potatoes, tomatoes, soy beans, cotton), and it's most significant product to date; Lies, Factual Distortions and Omissions. Here's one of the distortions that Monsanto had on its website a while back. 'Sustainability - the idea that the resources and people of this world are finite. That for any business decision we make, we must consider the effect it will have on us and our children. That the products we make must not use up all of a natural resource, or even worse, contaminate what is left behind.' "

"Everything you Never Wanted to Know about Monsanto's Modus Operandi (M.O.)"

Mindfully.org

http://www.mindfully.org/Pesticide/Monsanto-Roundup-Glyphosate.htm

Following Label Directions will not Assure Safety -- Opposing View #22

" "The U.S. response (to questions about biotech crop safety) has been an extremely patronizing one. They say 'We know best, trust us,'" added Gurian-Sherman, now a senior scientist at the Union of Concerned Scientists, a nonprofit environmental group."

"So far, that confidence has been lacking. Courts have cited regulators for failing to do their jobs properly and advisers and auditors have sought sweeping changes."

"The developers of these crop technologies, including Monsanto and its chief rival DuPont, tightly curtail independent scientists from conducting their own studies. Because the companies patent their genetic alterations, outsiders are barred from testing the biotech seeds without company approvals."

"The agreements disallow any research that is not first approved by the companies. "No truly independent research can be legally conducted on many critical questions regarding the technology," the scientists said in their statement."

"Outside researchers have also raised concerns over the years that glyphosate use may be linked to cancer, miscarriages and other health problems in people."

Gillam, Carey "Patents Trump Public Interest in Monsanto's

Ag Empire - Special Report: Are Regulators Dropping the Ball on Biocrops?"

Reuters, April 13, 2010

http://www.commondreams.org/headline/2010/04/13-0

Following Label Directions will not Assure Safety -- Opposing View #23

"Defining Toxic Asbestos is an extreme example, which I use here and in my book Pick Your Poison: How Our Mad Dash to Chemical Utopia is Making Lab Rats of Us All to make a point, but many other "nontoxic" products could be full of toxic chemicals. I'm hoping this essay leaves you with a general distrust of the nontoxic label, both in the past and currently. When you see "nontoxic" on a product, keep the following facts in mind:

"Nontoxic" can still legally mean that there are no immediate, acute hazards as determined by the LD50 and LC50 tests.

"Nontoxic" may mean there are little or no chronic data available on the substance. If the substance is not acutely toxic, and one can't prove it is toxic in the long term, many manufacturers feel that they have the right to call it nontoxic. Even if there are studies showing that the substance is toxic, manufacturers in the United States have traditionally waited for absolute, unequivocal proof, which in most cases is never available because we don't study our chemicals.

An art material is "nontoxic" if a toxicologist paid by the manufacturer decides it is safe. The dramatic failure in this labeling procedure was illustrated with the lead ceramic glazes and asbestos-containing materials such as talc. Asbestos-containing talcs are still found in some art and craft materials today.

Some art materials that have never been evaluated by a toxicologist may be labeled "nontoxic" illegally due to weak enforcement of the art materials labeling law. For example, in 1995, a cameraman and a reporter from Channel 9 in New York went with me to a major art materials outlet. That night on the evening news, we showed viewers about a dozen imported products that did not conform to the law, some labeled "nontoxic," which were being sold illegally. This is still true today, and a little research will lead you to many sources of noncompliant "nontoxic" products.

Labeling of ordinary consumer products is pretty much up to the manufacturer and its paid advisers. Because there is no enforcement mechanism in the regulations for the chronic hazard labeling of ordinary consumer products, there is not much incentive to provide warnings.

There is no regulatory requirement to warn consumers about damage to most of the body's organs, such as the lungs, the liver, and the kidneys. Only four types of chronic hazards are covered by the Federal Hazardous Substances Act regulations. These are cancer, and developmental, reproductive, and neurological damage."

Rossol, Monona, Ph.D. "Say What? A Chemical Can Damage Your Lungs, Liver and Kidneys and Still Be Labeled "Non-Toxic"?"

Ms. Rossol is a research chemist, author and member of the American Industrial Hygiene Association

May 9, 2011

http://www.alternet.org/story/150888/say_what_a_chemical_can_damage_your_lungs%2C_liver_and_kidneys_and_still_be_labeled_%22non-toxic%22?page=entire

Following Label Directions will not Assure Safety -- Opposing View #24

Monsanto's Claims	Independent Research Findings
Roundup has a low irritational potential for eye and skin and otherwise is not a risk to human health.	Roundup is amongst the top most reported pesticides causing poisoning incidents (mainly skin irritation) in several countries. It also causes a range of acute symptoms including, recurrent eczema, respiratory problems, elevated blood pressure, allergic reactions.
Roundup does not cause any adverse reproductive effects	In laboratory tests on rabbits glyphosate caused long lasting, harmful effects on semen quality and sperm counts.
Roundup is not mutagenic in mammals.	DNA damage has been observed in laboratory experiments in mice organs and tissue.
Roundup is environmentally safe.	In the agricultural environment, glyphosate is toxic to some beneficial soil organisms, beneficial arthropod predators, and increases crops' susceptibility to diseases. Sub-lethal doses of glyphosate from spray drift damages wildflower communities and can affect some species up to 20 metres away from the sprayer. The use of glyphosate in arable areas may cause dieback in hedgerow trees.
Roundup is rapidly inactivated in soil and water.	Glyphosate is very persistent in soils and sediments. Glyphosate inhibited the formation of nitrogen fixing nodules on clover for 120 days after treatment. Glyphosate residues were found in lettuce, carrot, and barley when planted a year after glyphosate was applied.
Roundup is immobile and does not leach from soils.	Glyphosate can readily desorb from soil particles in a range of soil types. It can be extensively mobile and leach to lower soil layers.

	Glyphosate can be carried by soil particles suspended in run off.
Roundup does not contaminate drinking water when used by local authorities on hard surfaces.	In the UK, levels of glyphosate above the EU limit have been detected by the Welsh Water Company every year since 1993. The Drinking Water Inspectorate recommends that glyphosate be monitored, particularly, in areas where it is used by local authorities on hard surfaces.
It is nearly impossible for glyphosate resistance to evolve in weeds.	In 1996, glyphosate resistant ryegrass was discovered in Australia.
Outcrossing in oilseed rape crops (and the transfer of genes from transgenic crops) occurs over a short distance and can be easily managed.	The densities of oil seed rape pollen are much higher and their dispersal patterns differ from around large fields compared to those found in experimental plots. Wind dispersal of pollen occurs over much greater distances and at higher concentrations than predicted by experimental plots. Significant levels of gene flow from transgenic oil seed crops is inevitable.
Roundup Ready crops will reduce levels of herbicide use.	Herbicide resistant crops will intensify and increase dependency on herbicide use in agriculture rather than lead to any significant reductions. A variety of herbicides will have to be reintroduced to control glyphosate resistant volunteers, feral populations of crops and resistant weeds.
Source: References cited in Health and Environmental Impacts of Glyphosate, (Details available from the Pesticides Trust [now PAN UK]).	

PAN UK "Resistance to glyphosate"

This data was first published in Pesticides News No. 41, September 1998, page 5

http://www.pan-uk.org/pestnews/Issue/pn41/PN41p5.htm

Following Label Directions will not Assure Safety -- Opposing View #25

"When Sofía lost her newborn, she soon realized that such losses were all-too-common in her small community of Ituzaingó Annex. Aerial spraying with Monsanto's herbicide RoundUp had climbed dramatically in the region as the number of acres planted with the company's "RoundUp Ready" soy crops grew.

Sofía and other concerned mothers went door to door collecting stories about health problems in each family — basically conducting the community's first-ever epidemiological study. "The Mothers of Ituzaingó" discovered the community's cancer rate to be 41 times the national average, and rates of neurological problems, respiratory diseases and infant mortality were astonishingly high. In response, the mothers launched a "Stop the Spraying!" campaign."

Schafer, Kristin, "Mother takes on Monsanto, wins global prize"

Published in GroundTruth, April 13, 2012

Pesticide Action Network North America

http://www.panna.org/blog/mother-takes-monsanto-wins-global-prize

Following Label Directions will not Assure Safety -- Opposing View #26

"But humans are much bigger than insects and the doses to humans are miniscule, right? During critical first trimester development, a human is no bigger than an insect, so there is every reason to believe that pesticides could wreak havoc with the developing brain of a human embryo. But human embryos aren't out in corn fields being sprayed with insecticides and herbicides, are they? A recent study showed that every human tested had the world's most popular pesticide, Roundup, detectable in their urine at concentrations between five and twenty times the level considered safe for drinking water.

The autism epidemic and the disappearance of bees are just two of many self-imposed disasters from allowing our world, including Utah, to be overwhelmed by environmental toxins. Environmental protection- including the smallest and most vulnerable among us - is human protection."

Moench, Brian, MD., "The Autism Epidemic and Disappearing Bees: A Common Denominator?"

Published in Truthout, April 21, 2012

http://truth-out.org/news/item/8586-the-autism-epidemic-and-disappearing-bees-a-common-denominator

Following Label Directions will not Assure Safety -- Opposing View #27

"A formula seems to have been made to not only ruin the agricultural system, but also compromise the health of millions of people worldwide. With the invent of Monsanto's Roundup Ready crops, resistant superweeds are taking over farmland and public health is being attacked. These genetically engineered crops are created to withstand large amounts of Monsanto's top-selling herbicide, Roundup. As it turns out, glyphosate, the active ingredient in Roundup, is actually leaving behind its residue on Roundup Ready crops, causing further potential concern for public health."

Barrett, Mike, "Monsanto's Roundup Ready Crops Leading to Mental Illness, Obesity"

Natural Society, December 15, 2011

Source: http://naturalsociety.com/monsanto-roundup-ready-crops-decreased-gut-flora/

Following Label Directions will not Assure Safety -- Opposing View #28

"Asked about the harmlessness of Roundup, Lovera replies, "That's the PR behind Roundup – how benign it was and you can drink it and there's nothing to worry about here. There are people who dispute that." For example there is an accusation that Roundup causes birth defects. "We don't buy the benign theory," continues Lovera, "But what's really interesting is that we aren't going to be having this conversation pretty soon because Roundup isn't working anymore."

Jill Richardson, "Monsanto controls our food, poisons our land, and influences all three branches of government."

Alternet, April 18, 2013

Source: http://www.alternet.org/food/how-monsanto-went-selling-aspirin-controlling-our-food-supply?paging=off

Following Label Directions will not Assure Safety -- Opposing View #29

"Heavy use of the world's most popular herbicide, Roundup, could be linked to a range of health problems and diseases, including Parkinson's, infertility and cancers, according to a new study.

The peer-reviewed report, published last week in the scientific journal Entropy, said evidence indicates that residues of "glyphosate," the chief ingredient in Roundup weed killer, which is sprayed over millions of acres of crops, has been found in food.

Those residues enhance the damaging effects of other food-borne chemical residues and toxins in the environment to disrupt normal body functions and induce disease, according to the report, authored by Stephanie Seneff, a research scientist at the Massachusetts Institute of Technology, and Anthony Samsel, a retired science consultant from Arthur D. Little, Inc. Samsel is a former private environmental government contractor as well as a member of the Union of Concerned Scientists."

Carey Gillam, "Heavy use of herbicide Roundup linked to health dangers-U.S. study"

Reuters, April 25, 2013

Source: http://www.reuters.com/article/2013/04/25/roundup-health-study-idUSL2N0DC22F20130425

Following Label Directions will not Assure Safety -- Opposing View #30

"These beautiful and unique creatures have long fascinated biologists and schoolchildren alike," says Sylvia Fallon, an NRDC senior scientist. "Their precipitous loss signals a warning about the unintended consequences of our industrial agricultural practices. We need to act quickly to ensure that future generations will also be able to experience the wonder of the monarch's migration." Although milkweed may sound like a pesky weed, it's actually a native plant that nature intended to be here. Monarch butterfly larvae depend on this plant species for their survival."

Zerbe, Leah, "Monarchs and Glyphosate: Will EPA Take Action to Save Butterflies?"

Rodale News, February 26, 2014

Source: http://www.rodalenews.com/monarchs-and-glyphosate

Conclusion

The results of independent, unbiased research on glyphosate-containing herbicides indicate this chemical is causing: birth defects, non-Hodgkin's lymphoma, mitochondrial damage, cell asphyxia, miscarriages, attention deficit disorder, endocrine disruption, DNA damage, skin tumors, thyroid damage, hairy cell leukemia, Parkinson disease, premature births, decrease in the sperm count, harm to the immune system in fish, death of liver cells, severe reproductive system disruptions and chromosomal damage.

Please read Dan Rather's very recent September 22, 2011 investigative report about the EPA's corrupt approval process of man-made chemicals:

http://www.panna.org/blog/dan-rather-pesticides-bees

FS Response: Glyphosate was identified by the Lolo NF as a potential herbicide for noxious weed control, specifically eradication with known off target impacts, in the 2007 Integrated Weed Management EIS. It was included in Table 4 (pgs. 11-12 of the Marshall Woods Weed Specialist's Report) based on the 2007 EIS. Appendix A of the Weed Specialist's Report (pgs. 46 – 52) identifies possible treatments that would be used to reduce the spread of weeds; including the use of herbicides. The herbicides identified are aminopyralid, chlosulfuron, clopyralid, metsulfuron, imazapic, and picloram. At this time there is no plan to use glyphosate.

REVIEW OF REFERENCES CITED IN COMMENTS - DICK ARTLEY ATTACHMENT #11

Caring USFS Officials will Always Take the Most Effective Action Available to Reduce the Risk Of Homes Burning and Loss of Life should a Wildfire Start Near Neighborhoods Located in the Woods

Not Analyzing an Alternative in Detail that Applies Dr. Cohen's Fine Fuels Removal Methods Discussed below Indicates the Responsible USFS Official Believes Timber Removal resulting from Hazardous Fuels Reduction Logging is more important than Preventing Homes from Burning

1	**Comment: "Homeowners are their own first line of defense**. Saving a home from wildfire depends primarily on two factors: roofing material and the quality of the "defensible space" surrounding it.[8] Research Physical Scientist Jack Cohen noted after visiting homes that survived the Rodeo-Chediski Fire and those that were consumed, that had homeowners followed guidelines for creating defensible space—described as creating an area around a structure where fuels and vegetation are treated, cleared, or reduced to slow the spread of fire—more homes would have survived." ***Fact Sheet:*** **Understanding Fire and Fire Behavior** Ontario Aviation and Forest Fire Management **http://www.emifpa.org/PDF/FactSheetUnderstandingFire.pdf** **FS Response:** As stated on EA p. 142, "Finney et al. (2005) observed reductions in wildfire severity in portions of the Rodeo-Chediski wildfires on the lee side of areas previously treated with prescribed fire. These positive effects can be expected to be more frequent as the portion pf the landscape that has been treated increases (Reinhardt, et al., 2008)" As discussed in the Fire and Fuels Specialist's Report (pp. 2-3) and EA (pp. 126-127), "Three National goals have been identified for making a positive difference in addressing the wildland fire problems. The Cohesive Strategy builds on these goals in the three phases: • Restoring and maintaining resilient landscapes. The strategy must recognize the current lack of ecosystem health and variability of this issue from geographic area to geographic area. Because landscape conditions and needs vary dependent on local climate and fuel conditions, among other elements, the strategy will address landscapes on a regional and sub-regional scale. • Creating fire-adapted communities. The strategy will offer options and opportunities to engage communities and work with them to become more resistant to wildfire threats. • Responding to wildfires. This element considers the full spectrum of fire management activities and recognizes the differences in missions among local, state, tribal and Federal agencies. The strategy offers collaboratively developed methodologies to move forward. **Fire-adapted Communities** • Prevent unwanted human-caused fire ignitions within or in close proximity to communities. • Reduce hazardous fuels within the wildland-urban interface and nearby areas containing

	community values to be protected. • Continue to develop, support, and maintain Community Wildfire Protection Plans (CWPP) as one of the primary tools to achieve the goals of the Cohesive Strategy. • Build a culture of self-sufficiency to prepare for and protect life and property from wildland fire. • Improve effectiveness and self-sufficiency of emergency response within each community. • Improve post-fire recovery efforts that impact public health and safety, water sources, power transmission corridors, and other critical infrastructure.
2	**Dr. Cohen's opposing view #1 -** "Research results indicate that the home and its immediate surroundings within 100-200 feet (30-60 meters) principally determines the home ignition potential during severe wildland-urban fires. Research has also established that fire is an intrinsic ecological process of nearly all North American ecosystems. Together, this understanding forms the basis for a compelling argument for a different approach to addressing the wildland-urban fire problem." (Pg. 1 – abstract) **Source:** *Wildland-Urban Fire—A different approach* http://www.nps.gov/fire/download/pub_pub_wildlandurbanfire.pdf **FS Response:** "Studies have found that the loss of structures and other resource damage from wildfires can be limited by fuel treatments conducted prior to fires (Graham, 2009). In addition to modifying wildfire intensity, the severity of effects to vegetation and soils in previously treated areas can be lower than in areas not treated prior to wildfire. Studies have also found that by modifying fire behavior, lower impact suppression methods can be used. Because of the lower burn intensity in treated areas, firefighters are able to remain within the area to suppress spot fires ignited ahead of the wildfire. Therefore, fuel treatments, like those proposed in this project, can be used to create irregular forest structures and compositions that produce forests that are more resilient to wildfire" (Marshall Woods EA, page 17). "While individual home-by-home treatments can help reduce the risk of structure loss, relying solely on such treatments could forego strategic opportunities for suppressing wildfires within the wildland-urban interface. Although homes in the path of wildfire are often the most recognized value-at-risk, treatments need to go beyond the home ignition zone to protect other resource values that make up the forested setting including soil stability, wildlife habitat, water quality, timber value, and landscape aesthetics (Graham, 2004)" (Marshall Woods EA, page 17). "Studies indicate the most appropriate fuel treatment strategy for reducing hazardous fuels includes forest thinning (removing ladder fuels and decreasing tree crown density) followed by prescribed burning, piling and burning of fuels, or other mechanical treatments (Peterson, 2005). Other research shows that treating areas before fire begins can decrease the severity of fire (Strom and Fule, 2007; Peterson, et. al, 2005; Omi and Martinson, 2004; Agee and Skinner, 2005; Graham, 2004; Pollet and Omit, 202; Fuel, et. al. 2001)" (Marshall Woods EA, page 17). In supporting one of the objectives of this project, to prevent wildfires from entering the community so that home ignitability is not tested, the following statements and model results support fuels treatment management more than 30-60 meters from structures to prevent firebrand lofting and spread into the wildland urban interface. The Structure Ignition Assessment Model (SIAM) developed by Cohen (1995) and results from the International Crown Fire Modeling Experiment (Alexander et al. 1998) generally concur that a flaming front at a distance of 40 meters (approximately 120 feet) or more from structure does not deliver

	sufficient heat energy to ignite the exterior of a home. However, lofted firebrands are also a principle ignition factor. Highly ignitable homes can ignite during wildland fire without a fire spreading near the structure. This occurs when firebrands are lofted downwind from fires. The firebrands subsequently collect on and ignite flammable home materials (such as roofs) and adjacent flammables (such as woodpiles, decking, and landscaped vegetation). Firebrands that result in ignitions can originate from wildland fires that are a distance of one kilometer (0.6 miles) or more (Cohen, 2000.) As discussed in the Fire and Fuels Specialist's Report (p. 25), "Alternative B is the alternative best designed to create fire resilient stands. The best science indicates a three part objective to creating fire resilient stands with fuel treatments; reducing surface fuels, reducing ladder fuels and reducing crown density (Agee and Skinner, 2005). By meeting these objectives on a greater scale within the wildland-urban interface and the high use recreation corridor the crown fire potential is reduced and resiliency and ecosystem function increase. This occurs in a key location with a high density of high value assets that are currently at risk to negative impacts from a wildfire event."…" Under Alternative A, the potential for high intensity fire remains very probable within a landscape that has missed numerous fire return intervals and has accumulated atypical stand densities and fuel loads." (Fire and Fuels Specialist's Report (p. 24). Furthermore, as discussed on EA p. 141, " The goal of fuel treatment regimes probably should not be a target stand structure or a target fire hazard rating, but rather, to save those important ecosystem components (e.g., large, old ponderosa pine trees) and processes that might be lost if an unplanned wildfire happens to visit the landscape (Apfelbaum and Chapman, 1997). This especially applies to the WUI where fuel treatment regimes should minimize those fires that could burn homes (Reinhardt, et al., 2008). Alternative A (No Action alternative) would perpetuate surface fuel conditions that contribute to fire behavior intensities that result in flame lengths 4 feet or greater and potential mortality ranging from 80% to 100% of the stand. The No Action alternative is does not meet the purpose and need of the project on any of the 3,959 acres proposed for treatment in the other alternatives. Alternative B would apply prescribed fire treatments on all acres proposed for treatment. In critical areas (e.g., the Rattlesnake corridor) the treatment calls for thinning the overstory and understory to a greater extent than the other action alternatives. This treatment coupled with underburning is the most effective manner to address modifying fire behavior over the longest period of time. The stand densities are lower and canopy bulk densities are lessened to a greater extent prior to the application of prescribed fire. This would result in conditions that are at less likely to experience adverse fire effects. The crown fire index is the highest, the flame lengths the lowest, and the percent mortality the lowest of any of the action alternatives. Alternative C is designed to achieve these same objectives; however, would not accomplish this effectively across 539 acres along the main Rattlesnake Trail corridor (Units 70, 71, 2, 3). Alternative D would not accomplish this effectively on 1,054 acres that would be treated under Alternative B including the main Rattlesnake corridor."
3	**Dr. Cohen's opposing view #2 -** "A senior physicist at the Stanford Research Institute, C.P. Butler (1974), coined the term "urban-wildland interface" and described this fire problem as follows:

"In its simplest terms, the fire interface is any point where the fuel feeding a wildfire changes from natural (wildland) fuel to man-made (urban) fuel." (Pg. 1)

Dr. Cohen's opposing view #3 - "The results of the diverse analytical methods are congruent and consistently indicate that ignitions from flames occur over relatively short distances--tens of meters not hundreds of meters. The severe-case estimate of SIAM indicates distances of 40 meters or less. Experimental wood walls did not ignite at 10 meters when exposed to experimental crown fires. And, case studies found that vegetation clearance of at least 10 meters was associated with a high occurrence of home survival." (Pg. 4)

Dr. Cohen's opposing view #4 - "Analyses of southern California home losses done by the Stanford Research Institute for the 1961 Belair-Brentwood Fire (Howard and others 1973) and by the University of California, Berkeley, for the 1990 Painted Cave Fire (Foote and Gilless 1996) are consistent with SIAM estimates and the experimental crown fire data. Given nonflammable roofs, Stanford Research Institute (Howard and others 1973) found a 95 percent survival with a clearance of 10 to 18 meters and Foote and Gilless (1996) at Berkeley, found 86 percent home survival with a clearance of 10 meters or more." (Pgs. 3 and 4)

Dr. Cohen's opposing view #5 - "Extensive wildland vegetation management does not effectively change home ignitability." (Pg. 5)

Dr. Cohen's opposing view #6 - "Home ignitability also dictates that effective mitigating actions focus on the home and its immediate surroundings rather than on extensive wildland fuel management. Because homeowners typically assert their authority for the home and its immediate surroundings, the responsibility for effectively reducing home ignitability can only reside with the property owner rather than wildland agencies." (Pg. 5)

Dr. Cohen's opposing view #7 - "As stated, the evidence indicates that home ignitions depend on the home materials and design and only those flammables within a few tens of meters of the home (home ignitability). The wildland fuel characteristics beyond the home site have little if any significance to WUI home fire losses." (Pg. 5)

Dr. Cohen's opposing view #8 - "Home ignitability implies that homeowners have the ultimate responsibility for WUI home fire loss potential. As shown, the ignition and flammability characteristics of a structure and its immediate surroundings determine the home fire loss potential. Thus, the home should not be considered a victim of wildland fire, but rather a potential participant in the continuation of the wildland fire. Home ignitability, i.e., the potential for WUI home fire loss, is the homeowner's choice and responsibility." (Pg. 5)

Dr. Cohen's opposing view #9 - "However, public and management perceptions may impede homeowners from taking principal responsibility. For example, the Federal Wildland Fire Management, Policy and Program Review (1995) observes, 'There is a widespread misconception by elected officials, agency managers, and the public that wildland/urban interface protection is solely a fire service concern.' In a *Journal of Forestry* article, Beebe and Omi (1993) concur, stating that, 'Public reaction to wildfire suggests that many Americans want competent professionals to manage fire flawlessly, reducing the risks to life, property, and public lands to nil.' These statements agree with Bradshaw's (1988) description of the societal roles in the WUI problem. He observes that homeowners expect that fire protection will be provided by others. Contrary to these expectations for fire protection, the fire services

	have neither the resources for effectively protecting highly ignitable homes during severe WUI fires, nor the authority to reduce home ignitability." (Pg. 6) **Source for quotes #2 to #9 above:** Reducing the Wildland Fire Threat to Homes: Where and How Much? Presented as the Fire Economics Symposium in San Diego, California on April 12, 1999. http://www.fs.fed.us/rm/pubs_other/rmrs_1999_cohen_j001.pdf **FS Response:** Within the project area there are approximately 10,164 acres that are deemed wildland-urban interface (Marshall Woods EA, page 16). The LNF recognizes the intermixed urban interface as 1.5 miles from private property where man-made fuels may not be present. Conversely, wildland fuels may be present on private property where no man-made fuels are present. They both feed each other, however they can also be independent of each other. The above-cited research exclusively addresses home ignitability. Not addressed in the research are some of the other issues and problems faced by resource managers, fire professionals, and residents when considering fire in the WUI. When a fire enters the WUI, there remains the potential for loss of life, property, and other values even if homes have been made fire safe. The Missoula District works closely with the Missoula City Fire Department, Missoula Rural Fire Department, Clinton Volunteer, and the Montana Department of Resources fire personnel when responding to fire events within joint jurisdiction. Federal and State fire personnel are not trained to suppress structure fires as this duty is the responsibility of the rural fire department. While the Missoula Ranger District has had a very active prevention program, not addressed above is the uncertainty regarding the number of property owners who take the responsibility, or who have the funds available, to reduce the ignitibility of their homes and maintain that condition. Also, not addressed is the potential loss of private forests, vehicles, domestic animals, and infrastructure (e.g., roads, utility lines, water supplies, etc.). Simply reducing home ignitability ignores the cost to private and public entities when these values are damaged or destroyed in a wildfire event. "While the Rattlesnake WUI along with additional private land and developments dictate significant values-at-risk to fire management, other values-at-risk within the project area include the Rattlesnake National Recreation Area and its associated trails/developments as well as overhead powerlines. Values-at-risk adjacent to and outside the project area include Mineral Peak Lookout, Sawmill Gulch Trailhead, Macro Flats fishing access, Sha ron fishing access, the Rattlesnake Wilderness Area and the Missoula Municipal Watershed." (EA p. 17) Many homeowners would likely find it undesirable to live in an intensely or severely burned-over forest even if their home has survived the passage of fire. Not only are aesthetic values decreased for most people, but the economic consequences can be devastating, and the risks associated with the after-effects of wildfire events (e.g. mudslides such as those experienced on the Lolo and Bitterroot National Forests in 2000) can put homes, and potentially lives, at risk. Also see FS Response #2.
4	**Dr. Cohen's opposing view #10 -** "Vegetation management beyond the structure's immediate vicinity has little effect on structure ignitions. That is, vegetation management adjacent to the structure would prevent ignitions from flame exposure; but vegetation management away from the structure would not affect ignition from flame exposure and would not significantly reduce ignitions from firebrands." (Pg. 4) **Dr. Cohen's opposing view #11 -** "Past reports and recommendations as well as experimental research and modeling suggest that W-UI fire-loss mitigation should concentrate on the

	residence and its immediate surroundings. Any strategy for effectively reducing the W-UI fire problem must initially focus on residential fire resistance." (Pg. 5 – Conclusion) **Dr. Cohen's opposing view #12 -** "Instead of all fire protection responsibilities residing with fire agencies, homeowners take responsibility for assuring firewise conditions and the initial fire defense of their residences during wildland fires. The fire agencies become a community partner that provides information, coordinates and assists in meeting firewise requirements, and provides fire suppression assistance." (Pg. 5) **Source for quotes #10 to #12 above:** Structure Ignition Assessment can Help Reduce Fire Damages in the WUI Published in *Fire Management Notes*, Volume 57 No. 4, 1997 http://www.fs.fed.us/rm/pubs_other/rmrs_1997_cohen_j001.pdf **FS Response:** Refer to FS Response #3.
5	**Dr. Cohen's opposing view #13 -** "My examination suggests that the abundance and ubiquity of pine needles, dead leaves, cured vegetation, flammable shrubs, wood piles, etc. adjacent to, touching and or covering the homes principally contributed to the residential losses." (Pg. 4) **Source:** *Examination of the Home Destruction in Los Alamos Associated with the Cerro Grande Fire July 10, 2000* Source: USDA Forest Service, Rocky Mountain Research Station, Missoula, Montana, 2000. http://www.fusee.org/docs/Preparedness/Cohen_examlosalamos%20copy.pdf **FS Response:** Focusing on the home ignition's zone pine needles, dead leaves, cured vegetation, flammable shrubs, wood piles, etc. adjacent to, touching and or covering the homes is essential; however, lofted firebrands from adjacent forest fuels are also a principle ignition factor. Highly ignitable homes can ignite during wildland fire without a fire spreading near the structure. This occurs when firebrands are lofted downwind from fires. The firebrands subsequently collect on and ignite flammable home materials (such as roofs) and adjacent flammables (such as woodpiles, decking, and landscaped vegetation). Firebrands that result in ignitions can originate from wildland fires that are a distance of one kilometer (0.6 miles) or more (Cohen, 2000.) Refer to FS Response #3.
6	**Dr. Cohen's opposing view #14 -** "The wildland fire management approach for preventing WUI fire disasters largely addresses the wildfire outside the home ignition zone rather than a home's ignition potential as determined by the conditions within the home ignition zone. Since 2000, agency fire management policy initiatives have emphasized fire suppression." (Pg. 24) **Dr. Cohen's opposing view #15 -** "Preventing WUI fire disasters requires that the problem be framed in terms of home ignition potential. Because this principally involves the home ignition zone, and the home ignition zone primarily falls within private ownership, the responsibility for preventing home ignitions largely falls within the authority of the property owner. Preventing wildfire disasters thus means fire agencies helping property owners mitigate the vulnerability of their structures. The continued fire management focus on fire suppression suggests the WUI fire problem persists largely as a consequence of framing the WUI fire problem primarily in terms of the fire exclusion paradigm." (Pg. 25)

	Dr. Cohen's opposing view #16 - "The continued focus on fire suppression largely to the exclusion of alternatives that address home ignition potential suggests a persistent inappropriate framing of the WUI fire problem in terms of the fire exclusion paradigm." (Pg. 25) **Source for quotes #14 to #16 above:** The Wildland-Urban Interface Fire Problem*: A Consequence of the Fire Exclusion Paradigm* Published in *Forest History Today*, Fall 2008 http://www.foresthistory.org/Publications/FHT/FHTFall2008/Cohen.pdf **FS Response:** Agency fire management policy has changed over the years and is now accepting of utilizing natural ignitions for multiple resource benefit. However, in Fire Management Unit 1, FMU, wildland-urban interface, there may be a greater need for suppression efforts than in other FMUs due to the urban interface concerns and values at risk. However, where applicable in FMU 2, developed accessible areas, there are greater possibilities of utilizing natural ignitions for resource benefit (Fire and Fuels Specialist's Report, pp. 6-7). The majority of the Marshall Woods project area (90%) and proposed treatments are within FMU1 (EA, p. 22). Refer to FS Response #3.
7	**Dr. Cohen's opposing view #17 -** "For the same reason, mitigating home ignition potential during extreme wildland fires must focus activities within and immediate to the residential area, i.e. the home ignition zone. But the home ignition zone largely corresponds to private property. Thus, with minor exception, the authority for effectively reducing the home ignition potential belongs to homeowners. Public land management agencies can facilitate homeowner mitigations and these agencies may be able to reduce fire intensities and the extent of burning around communities. But these agencies cannot accomplish the necessary and sufficient actions necessary to prevent residential fire disasters during extreme fire conditions by treating beyond the home ignition zone." (Pg. 2) **Source:** *Thoughts on the Wildland-Urban Interface Fire Problem*, June 2003 http://www.nps.gov/fire/download/pub_pub_wildurbaninterface.pdf **FS Response:** Refer to FS Response #6
8	**Dr. Cohen's opposing view #18 -** "A home with its immediate surroundings (about 100-150 feet from the structure) is called the Home Ignition Zone. Many factors about the HIZ determine the potential for ignition during a wildland fire, such as flammable wood roofs and materials like trees, grass, decks, or adjacent structures leading up to a home." (Pg. 1) **Source:** Saving Homes from Wildfires: Regulating the Home Ignition Zone Published in *Zoning News,* May 2001 http://www.battle-creek.net/docs/fire/Zoning.pdf **FS Response:** Refer to FS Response #6.
9	**Dr. Cohen's opposing view #19 -** "SIAM calculations indicate that large wildland flame fronts (e.g., forest crown fires) will not result in piloted wood ignitions (e.g., the typical variety of exterior wood walls) at distances greater than 40 meters (Cohen and Butler [In press])." (Pg. 4) **Dr. Cohen's opposing view #20 -** "Field studies conducted during the International Crown Fire Modeling Experiment (Alexander et al. 1998) provided measured data for comparisons with SIAM model estimates. Total heat transfer (radiation and convection) and ignition data

were obtained from heat flux sensors placed in wooden wall sections. The instrumented walls were located on flat, cleared terrain at 10, 20, and 30 meters downwind from the edge of the forested plots. The forest was variably composed of an overstory of jack pine *(Pinus banksiana)* about 13 meters high with an understory of black spruce *(Picea mariana)*. The spreading crown fire produced flames approximately 20 meters high." (Pg. 5)

Dr. Cohen's opposing view #21 - "Five burns were conducted where wall sections were exposed to a spreading crown fire. As the crown fires reached the downwind edge of the plot, turbulent flames extended into the clearing beyond the forest edge. In two of the five burns, flames extended beyond 10 meters to make contact with the wall section placed at 10 meters from the forest edge. When flame contact occurred, the walls ignited; however, without flame contact, only scorch occurred. The wooden panels at 20 and 30 meters never ignited and the panel at 30 meters never scorched." (Pg. 6)

Dr. Cohen's opposing view #22 - "Case studies of actual W-UI fires provide an independent comparison with SIAM and the crown fire experiments. The actual fires incorporate a wide range of fire exposures. The case studies chosen examine significant factors related to home survival for two fires that destroyed hundreds of homes. The Bel Air fire resulted in 484 homes destroyed (Howard et al. 1973) and the Painted Cave fire destroyed 479 homes (Foote 1994). Analyses of both fires indicate that home ignitions depend on the characteristics of a home and its immediate surroundings. Howard et al. (1973) observed 95 percent survival for homes with nonflammable roofs and a vegetation clearance of 10 to 18 meters. Foote (1994) observed 86 percent survival for homes with nonflammable roofs and a clearance of 10 meters or more." (Pg. 7)

Dr. Cohen's opposing view #23 - "The high survival rate for homes with nonflammable roofs and 10-20 meter vegetation clearances included firebrands as an ignition factor, thus indicating that firebrand ignitions also depend on the ignition characteristics of the home and the adjacent flammable materials." (Pg. 8)

Dr. Cohen's opposing view #24 - "Wildland fuel reduction beyond the home ignition zone does not necessarily change home ignitability; therefore, wildland fuel reduction does not necessarily mitigate the W-UI fire loss problem." (Pg. 9)

Dr. Cohen's opposing view #25 - "Effective landscape fuel reduction does not necessarily prevent W-UI home fire destruction." (Pg. 10)

Dr. Cohen's opposing view #26 - "Fire losses depend on home ignitions and home ignitions depend on home ignitability. Thus, home ignitability, being limited to a home and its immediate surroundings, offers us the opportunity to separate the W-UI structure fire loss problem from other landscape-scale fire management issues. This conclusion has significant implications for the actions and responsibilities of homeowners and fire agencies, such as identifying and mapping the potential for W-UI residential fire destruction, identifying appropriate and effective mitigating actions, and determining who should take responsibility for home ignitability." (Pg. 10)

Dr. Cohen's opposing view #27 - "Thus, wildland fuel reduction that is effective for reducing the wildland fire intensity might be insufficient for reducing the destruction of highly ignitable homes. In contrast, a low home ignition potential reduces the chances of fire destruction without extensive wildland fuel reduction. These findings indicate that the W-UI home fire

	loss problem is a home ignitability issue largely independent of landscape fuel reduction issues." (Pg. 10) **Dr. Cohen's opposing view #28 -** "The extent of the home ignition zone corresponds more to specific home and community ownership than to the landscapes of federal, state and local land management agencies. This suggests a corresponding responsibility for W-UI home fire loss potential residing with homeowners and communities. Thus, the home should not be considered a victim of wildland fire, but rather a potential participant in the continuation of the wildland fire. Home ignitability, i.e., the potential for W-UI home fire loss, is a homeowner and community choice and responsibility." (Pg. 11) **Source for quotes #19 to #28 above:** What is the Wildland Fire Threat to Homes? Presented as the Thompson Memorial Lecture, April 10, 2000 http://www.nps.gov/fire/download/pub_pub_wildlandfirethreat.pdf **FS Response:** The field studies mentioned in "opposing view # 20" focused in a jack pine habitat, whereas the adjacent fuels in the Marshall Woods project is Douglas-fir, ponderosa pine, and western larch. Lofted firebrands are a principle ignition factor. Highly ignitable homes can ignite during wildland fire without a fire spreading near the structure. This occurs when firebrands are lofted downwind from fires. The firebrands subsequently collect on and ignite flammable home materials (such as roofs) and adjacent flammables (such as woodpiles, decking, and landscaped vegetation). Firebrands that result in ignitions can originate from wildland fires that are a distance of one kilometer (0.6 miles) or more (Cohen, 2000.) Also see FS Response #3.
10	**Dr. Cohen's opposing view #29 -** "Model results indicate that ignitions from flame radiation are unlikely to occur from burning vegetation beyond 40 meters of a structure. Thinning vegetation within 40 meters has a significant ignition mitigation effect." (Pg. 81) **Dr. Cohen's opposing view #30 -** "Vegetation management to prevent ignitions from radiation does not require extensive vegetation removal hundreds of meters from a structure. Our analysis indicated that 40 meters was sufficient for a 20 meter flame height." (Pg. 86 – Conclusions) **Source for quotes #29 and #30 above:** Modeling Potential Structure Ignitions from Flame Radiation Exposure with Implications for Wildland/Urban Interface Fire Management Presented at the 13th Fire and Forest Meteorology Conference. Lorne, Australia, 1996 http://www.firewise.org/resources/files/WUI_HIR/Modelingpotentialignitions.pdf **FS Response:** Refer to FS Response #3.
11	**Dr. Cohen's opposing view #31 -** "Miracles aside, the characteristics of the surviving home and its immediate surroundings greatly influenced its survival." (Pg. 15) **Dr. Cohen's opposing view #32 -** "Based on severe-case assumptions of flame radiation and exposure time, SIAM calculations indicate that wild-land flame fronts comparable to crowning and torching trees (flames 20 meters high and 50 meters wide) will not ignite wood surfaces at distances greater than 40 meters (Cohen and Butler, in press). Figure 2 shows the radiant heat a wall would receive from flames depending on its distance from the fire. The incident radiant heat flux, defined as the rate of radiant energy per unit area received at an exposed surface, decreases as the distance increases." (Pg. 17)

	Dr. Cohen's opposing view #33 - "Analyses of both fires indicate that home ignitions depend on the characteristics of a structure and its immediate surroundings. Howard et al. (1973) observed 86 percent survival for homes with nonflammable roofs and a clearance of 10 meters or more." (Pg. 19) **Dr. Cohen's opposing view #34 -** "Using the model results as guidance with the concurrence of experiments and case studies, we can conclude that home ignitions are not likely unless flames and firebrand ignitions occur within 40 meters of the structure. This finding indicates that the spatial scale determining home ignitions corresponds more to specific home and community sites than to the landscape scales of wildland fire management. Thus, the W-UI fire loss problem primarily depends on the home and its immediate site." (Pg.20) **Dr. Cohen's opposing view #35 -** "Thus, the W-UI fire loss problem can be defined as a home ignitability issue largely independent of wildland fuel management issues. This conclusion has significant implications for the actions and responsibilities of homeowners and fire agencies, such as defining and locating potential W-UI fire problems (for example, hazard assessment and mapping), identifying appropriate mitigating actions, and determining who must take responsibility for home ignitability." (Pg.20) **Dr. Cohen's opposing view #36 -** "The W-UI fire case studies indicated approximately 90 percent survival with a vegetation clearance on the order of 10 to 20 meters for homes with nonflammable roofs. Thus, the case studies support the general flame-to-structure distance range of 10 to 40 meters as found through modeling and experiments." (Pg.20) **Dr. Cohen's opposing view #37 -** "A change needs to take place in the relationship between homeowners and the fire services. Instead of home-related presuppression and fire protection responsibilities residing solely with fire agencies, homeowners must take the principal responsibility for ensuring adequately low home ignitability." (Pg.21) **Source for quotes #31 to #37 above:** Preventing Disaster Home ignitability in the Wildland-Urban Interface Published in the *Journal of Forestry* 98(3): 15-21, 2000 http://www.nps.gov/fire/download/pub_pub_preventingdisaster.pdf **FS Response:** Refer to FS Response #s 3 and 9.
12	**Dr. Cohen's opposing view #38 -** "Many scientists and natural resource agencies suggest extensive fuel treatments to reduce the possibility of severe and intense wildfires that could damage ecosystems, destroy property, and take human life (USDA Forest Service, 2000; GAO, 2003a,b). However, there are a number of misconceptions and misunderstandings about fuel treatments and their use as a panacea for fire hazard reduction across the United States (Finney and Cohen, 2003; Franklin and Agee, 2003)." (Pg.1998) **Dr. Cohen's opposing view #39 -** "Given the right conditions, wildlands will inevitably burn. It is a misconception to think that treating fuels can "fire-proof" important areas. It would be virtually impossible to exclude fire from most temperate terrestrial ecosystems because ignition sources are prevalent and fuels cannot be eliminated. Ignition is rarely affected by fuel treatment." (Pg.1998) **Dr. Cohen's opposing view #40 -** "Treating fuels to facilitate suppression is an example in

circular logic. If fuel treatment makes suppression more successful in general, then less area will be burned in the short run and more acreage will tend to burn under extreme conditions, when suppression is ineffective. The inevitable result is that more area is burned in fewer, more unmanageable events with greater consequences. In addition, fire suppression leads to continued fuel accumulation and, in turn, more difficult conditions for suppression. This phenomenon has been described as ''the wildland fire paradox'' (Brown and Arno, 1991). Rather than creating conditions where fire is easier to suppress, fuel treatments should strive to create conditions where fire can occur without the need for suppression." (Pg.1998)

Dr. Cohen's opposing view #41 - "Bessie and Johnson (1995) show weather (fuel moisture and wind) is far more important than fuels in determining fire behavior; reducing fuels may have a limited impact on fire occurrence." (Pg.1999)

Dr. Cohen's opposing view #42 - "Treating fuels to reduce fire occurrence, fire size, or amount of burned area is ultimately both futile and counter-productive." (Pg.1999)

Dr. Cohen's opposing view #43 - "Since the home ignition zone largely occurs on private lands, most land management agencies do not have the authority to mitigate the WUI ignition potential directly (Cohen, 2000b). However, the opportunity exists to explicitly define responsibilities for the WUI fire potential (i.e. the home ignition zone) consistent with areas of jurisdiction and separately from ecological wildfire issues." (Pg.1999)

Dr. Cohen's opposing view #44 - "It may not be necessary or effective to treat fuels in adjacent areas in order to suppress fires before they reach homes; rather, it is the treatment of the fuels immediately proximate to the residences, and the degree to which the residential structures themselves can ignite that determine if the residences are vulnerable." (Pg.1999)

Dr. Cohen's opposing view #45 - "WUI fuel treatments can be designed such that an extreme wildfire can occur in the WUI without having a residential fire disaster. Although general wildfire control efforts may not benefit from fuel treatments during extreme fire behavior, fuel modifications can significantly change outcome of a wildfire within a treatment area. Research has shown that a home's characteristics and its immediate surroundings principally determine the WUI ignition potential during extreme wildfire behavior (Cohen, 2000a,c, 2003, 2004). The area that primarily determines WUI ignition potential is called the home ignition zone (Cohen, 2001). WUI fuel treatments can address the home ignition zone by removing flammable materials immediately adjacent to residences.")Pg. 1999)

Dr. Cohen's opposing view #46 - "Treating fuels may not reduce suppression expenditures. It is a natural mistake to assume that a successful fuel treatment program will result in reduced suppression expenditures. Suppression expenditures rarely depend directly on fuel conditions, but rather on fire location and on what resources are allocated to suppression. The only certain way to reduce suppression expenditures is to make a decision to spend less money suppressing fires." (Pg. 2000)

Dr. Cohen's opposing view #47 - "Thinning to reduce crown fire potential requires careful evaluation of the tradeoffs in treatment effects on potential surface fire behavior and crown fire behavior (Scott and Reinhardt, 2001). Thinning will often result in increased potential surface fire behavior, for several reasons. First, thinning reduces the moderating effects of the canopy on windspeed, so surface windspeed will increase (Graham et al., 2004). It also results in increased solar radiation on the forest floor, causing drier surface fuels. It may also cause an

increase in flammable grassy and shrub fuels over time, due to the reduced tree competition." (Pg.2000)

Dr. Cohen's opposing view #48 - "Some viable fuel treatments may actually result in an increased rate of spread under many conditions (Lertzman et al., 1998; Agee et al., 2000). For example, thinning to reduce crown fire potential can result in surface litter becoming drier and more exposed to wind. It can also result in increased growth of grasses and understory shrubs which can foster a rapidly moving surface fire." (Pg.2000)

Dr. Cohen's opposing view #49 - "Treating fuels may not improve ecosystem health. Ecosystem restoration treatment and fuel treatment are not synonymous. Some ecosystem restoration treatments reduce fuel hazard, but not all fuel treatments restore ecosystems. Ecosystem restoration treatments are often designed to recreate presettlement fire regimes, stand structures and species compositions while fuel treatment objectives are primarily to reduce fuels to lessen fire behavior or severity—this is known as ''hazard Reduction.'' Achieving fuel hazard reduction goals in the absence of ecosystem restoration is insufficient (Dombeck et al., 2004; Kauffman, 2004)." (Pg.2000)

Dr. Cohen's opposing view #50 - "Conversely, some fuel treatments can reduce fuels but create stands that are quite dissimilar from their historical analogs. Examples include mastication treatments that break, chip, or grind canopy and surface woody material into a compressed fuelbed and thinning treatments that remove the fire adapted species and leave shade-tolerant, late successional species." (Pg.2000)

Source for quotes #38 to #50 above: Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States
Published in *Forest Ecology and Management* 256, 2008
http://www.firewise.org/Information/Research-and-Guidance/WUI-Home-Ignition-Research/~/media/Firewise/Files/Pdfs/Research/CohenFuelTreatment.pdf

FS Response: As discussed above, agency fire management policy has changed over the years and is now accepting of utilizing natural ignitions for multiple resource benefit. However, in Fire Management Unit 1 (FMU1- wildland-urban interface) there is a greater need for suppression efforts than in other FMUs due to the urban interface concerns and values at risk. MA 28 Wildfires will be confined, contained, or controlled as provided for by criteria and guidelines for each management unit in the Fire Management Plan, described in Appendix X (The Lolo National Forest Plan pg. III-145).

During the onset of a fire event the Wildland Fire Decision Support System (WFDSS) process is completed which drives the course of action costs for a fire event whether it is full suppression or multiple resource objectives is analyzed and documented for future economic review. The location of values at risk often dictates whether suppression is the course of action to take. The wildland-urban interface is continually expanding requiring fire protection either from federal, state, or rural fire departments. Policy across these agencies varies and often does not allow for multiple resource fire events.

The removal of trees focuses on removing smaller diameter trees and retaining the largest healthiest ponderosa pine and western larch in all age classes as well as thinning and prescribed fire applications to modify crown fire potential and fire behavior characteristics that influence tree mortality and stand resilience. (Marshall Woods EA p.140)

	The above comment in "opposing view # 46" that the only way to reduce suppression expenditures is to make a decision to spend less money on suppressing fires is not implementable in all situations based upon values at risk and fire jurisdictions. Also see FS Response #3.
13	**Attachment #11 concludes,** Nearly all Forest Service projects that claim to lessen the risks to homeowners living in the WUI propose to reduce hazardous fuels. The NEPA documents that analyze these fuels reduction treatments conveniently do not mention Dr. Cohen's methods because the Purpose & Need is to reduce fuels … **<u>not</u>** (emphasis added) to protect homeowners as it should be. Reducing hazardous fuels is an alternative way to lessen the risks to homeowners living in the WUI. It is definitely not a goal or objective unto itself and should never appear in the Purpose & Need. However there is a reason most USFS line-officers deal with WUI risks this way. They know hazardous fuels reduction treatments include the logging of merchantable trees which produces volume and helps them meet their supervisor's volume expectations and spends the allocated "timer" money each FY. Line-Officers who propose hazardous fuels reduction projects are clearly more interested in accumulating volume than they are protecting the public in the WUI. There are laws that prohibit such actions by a public servant whose salary is partially paid by the families living in the WUI. **FS Response:** An alternative that included removing fine fuels within 300 feet of homes (a "Cohen" alternative) was not requested or suggested by the public during scoping. Furthermore, the commenter did not put the agency on notice that an alternative should be considered which focuses on removing fine fuels within 300 feet of homes. Even if that had been suggested at the appropriate planning phase (during scoping for alternative development, rather than during the EA comment period), the agency is responsible for land management activities on National Forest System lands, not on private property. Furthermore, an alternative should as the commenter suggested would not achieve the purpose and need of the Marshall Woods Restoration project which is designed to restore functioning ecosystems and fire's natural role on the landscape which aligns with multiple initiatives including the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). The Marshall Woods project area includes numerous residences mainly within the southwest portion. Within the project area there are approximately 10,164 acres under multiple ownerships that are deemed WUI. Fuels treatments are needed to reduce the potential for crown fire initiation and fire intensities. Many of these private lands are adjacent to or near NFS lands proposed for treatment in the Marshall Woods project. (Marshall Woods EA p. 16). These objectives could not be accomplished by solely focusing on effects within the home ignition zone. The above comments are cited opinions towards line-officers and hazardous fuels reduction.

REVIEW OF REFERENCES CITED IN COMMENTS – MIKE BADER

Literature Cited	Review and Response
Alexander, Martin E. and Bret W. Butler. 2008. Proceedings of the Wildland Fire Safety Summits. Fire Management Today 68(1):40.	FS Response: The commenter provided this document without any indication as to the relevance of it to the Marshall Woods project.
Bader, M. 1998. Yellowstone Fires. Out of the ashes: planning, humility. Guest Opinion, The Missoulian, August 28, 1998. Missoula, Montana.	This is an "opinion" and does not require review and response.
Bader, M. 2000. Wilderness-based ecosystem protection in the Northern Rocky Mountains of the United States. Pages 99-110 in: McCool, S.F, D.N. Cole, W.T. Borrie and J. O'Loughlin, comps. Wilderness science in a time of change conference Proceedings RMRS-P-15-VOL-2. U.S. Department of Agriculture, Rocky Mountain Research Station. Ogden, UT.	This is a portion of the conference proceedings from a wilderness-based conference. The author is promoting the idea of protecting "wilderness refugia" or a "wilderness reserve network," to protect areas outside of congressionally designated wilderness with low road densities. The commenter used the conference proceedings with other literature citations to address the relationship between road density and bull trout. FS Response: The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general information or opinion.
Bader, M. 2004. A report prepared by Mike Bader Consulting in Missoula, Montana under contract with the Alliance for the Wild Rockies for use by Alliance for the Wild Rockies and Friends of the Wild Swan, regarding public comment to the US Fish and Wildlife Service's announcement to conduct a five-year status review of bull trout.	This report is a compilation of information and opinion by the author, as interpreted from a variety of sources. FS Response: The commenter did not make a specific connection to the Marshall Woods project and the report is based on the author's opinion, so does not require further comment or review.
Baxter, C.V. and F.R. Hauer. 2000. Geomorphology, hyporheic exchange, and selection of spawning habitat by bull trout (Salvelinus confluentus). Canadian Journal of Fisheries and Aquatic Science (57):1470-1481.	The literature provides information on the ecology and selection of spawning habitat by bull trout. The research is based on streams in the Swan River Basin in northwestern MT. FS Response: The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general biological information about bull trout.
Brown, R.T., Agee, J.K., Franklin, J.F. 2004. Forest restoration and fire: principles in the context of place. Conservation Biology 18, 903-912.	FS Response: See response to comment #93
Committee on Interior and Insular Affairs, U.S. House of Representatives	FS Response: We are familiar with this document. It is located in the Project File.

1980. Report on the Rattlesnake National Recreation Area and Wilderness Act. September 17, 1980.	
Covington, W., Fule, P., Moore, M/, Hart, S., Kolb, T., Mast, J., Sackett, S. and Wagner. (1997). Restoring ecosystem health in ponderosa pine forests of the southwest. Journal of Forestry, 95 (4): 23-29.	FS Response: See response to comment #62
Ecological Restoration Institute, Northern Arizona University (undated). Effects of forest thinning treatments on fire behavior. nau.edu	FS Response: This is a Systematic Literature Review that does not appear to be completed at this time. An introduction of the review was found online at: http://nau.edu/ERI/Research/Evidence-Based-Conservation/EBC-Projects/Forest-Thinning-and-Burning-Effects-on-Fire/
Endangered Species Act. 16 U.S.C. § 1531 et seq.	FS Response: We are familiar with this document.
Espinosa, F.A. 1996. Review and evaluation of Governor Philip E. Batt's Idaho bull trout conservation plan. Report prepared for Alliance for the Wild Rockies and Friends of the Wild Swan. Moscow, ID. 19p.	The commenter cites this document with regard to bull trout biological requirements for clean water and spawning areas with low levels of fine sediments. FS Response: The commenter did not provide this literature. We made a reasonable attempt to locate this literature, but could not. A Google search led to a different document (Bader 2004) that cited the Espinosa document. The Bader 2004 document was included in the commenter's literature package, but the Espinosa (1996) document was not. However, the commenter did not make a specific connection as to how the document would be relevant to the Marshall Woods project, so the citation is not considered.
Fox, J.W. and Ingalsbee, T. 1998. Fuel reduction for firefighter safety. Proceedings of the International Wildland Fire Safety Summit, Winthrop, WA	FS Response: We are familiar with this document and agree with the statement that "treatment of surface and ladder fuels through prescribed fire combined with manual pre-treatments (for example, non-commercial thinning, pruning, and hand-piling) can effectively reduce the risk of crownfires, increase firefighter safety, and improve ecosystem health." Based on the purpose and need of the Marshall Woods project, "Emulating fire's natural role on the landscape…" Vegetative treatment proposals were designed to accomplish the same objectives Fox and Ingalsbee speak of. Based on current fuel loading conditions within the project area, mechanical removal of material is required to meet these objectives in several units based on desired basal area coupled with non-mechanical DBH limitations.
Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (Salvelinus	The literature title adequately describes the content of the document. The commenter referred to this literature as best available science on bull trout and to establish

confluentus) in the Flathead Lake river system, Montana. Northwest Science 63(4):133-143.	basic bull trout biological needs. FS Response: We are familiar with this document. It is a well-known and frequently cited document on basic bull trout biology. The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general biological information about bull trout.
Friends of the Rattlesnake Statement of Purpose	This document describes the purposes and goals of the Friends of the Rattlesnake, Inc. FS Response: We are familiar with this document. It is located in the Project File.
Frissell, C. A. 2014. Comments on the Revised Draft Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus). 50p.	This is a comment letter based on the author's professional opinions on the revised draft recovery plan for bull trout. It was prepared at the request of Friends of the Wild Swan. The commenter references this document as an outline and review of the best available science on bull trout. FS Response: This citation is comprised of the author's opinions related to a separate issue – the draft recovery plan for bull trout. The commenter did not make a specific connection as to how these comments are relevant to the Marshall Woods project, so the citation is not considered.
Goetz, F. 1989. Biology of the bull trout, Salvelinus confluentus, a literature review. Willamette National Forest. Eugene, OR.	The literature title adequately describes the content of the document. The commenter referred to this literature as best available science on bull trout and to establish basic bull trout biological needs, specifically optimal spawning and rearing temperatures. FS Response: We are familiar with this document. It is a well-known and frequently cited document on basic bull trout biology. The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general biological information about bull trout. See responses to comments #132 and #135 for information regarding stream temperature.
Healthy Forests Restoration Act of 2003. Public Law 108-148).	FS Response: We are familiar with this document.
Huntington, C.W. 1995. Fish habitat and salmonid abundance within managed and unroaded landscapes on the Clearwater National Forest. USDA Forest Service.	The literature title adequately describes the content of the document. The commenter referenced this literature as support that "bull trout strong populations, presence and biomass are inversely related to road densities." FS Response: We have reviewed the document and agree that the data collected support that statement. However,

	the commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project.
Ingalsbee, T. 2005. Fuelbreaks for wildland fire management: A moat or a drawbridge for ecosystem fire restoration? Fire Ecology 1(1):85-99. Association for Fire Ecology.	FS Response: We are familiar with this document however the focus of this document is fuelbreaks which are not included in the proposed treatments for the Marshall Woods project. Refer to response to comment #91. "This paper will briefly discuss some of the critiques and controversies that have been raised against fuelbreak proposals on public lands managed by the Forest Service, and draw attention to the needs and opportunities for more fire ecology research. Ingalsbee, T. 2005" The purpose and need of the Marshall Woods project includes: "Emulate fire's natural role on the landscape through vegetative treatments including prescribed fire. EA p.16" As stated on page 17 of the EA "Studies indicate the most appropriate fuel treatment strategy for reducing hazardous fuels includes forest thinning (removing ladder fuels and decreasing tree crown density) followed by prescribed burning, piling and burning of fuels, or other mechanical treatments (e.g., Peterson, 2005)."
Inland Native Fish Conservation Strategy. U.S. Forest Service. Lolo National Forest. 1986. Forest Plan.	FS Response: We are familiar with this document, and it is referenced in the Fisheries Specialist Report and the EA. The Lolo NF Plan was amended on August 30, 1995, by the Inland Native Fish Strategy (INFISH).
Krelick, Jake. 4/27/2015. Statement Regarding History of Marshall Woods Project	This document is a statement by Jake Krelick, LRC Chair, describing his interpretation of the history of the LRC's involvement in the development and planning for the project. FS Response: We are familiar with the history of the LRC's involvement in the Marshall Woods project. The collaboration and correspondence that occurred between the Lolo NF and the LRC is documented in the Project File, Section K.
Lolo National Forest. May, 1987. Management Area Quick Guide Summary Sheet.	FS Response: We are familiar with this document. This was not part of the LNF Forest Plan. See response to comment #10.
Lolo National Forest. 2004. Press Release on Sawmill Gulch Fuels Reduction Project.	FS Response: We are familiar with this document (Project File, Item N-14)
McPhail, J.D. and C.B. Murray. 1979. The early life history and ecology of Dolly Varden in the Upper Arrow lakes. Report to B.C. Hydro and Power Authority and Kootenay Region Fish and Wildlife. Nelson, BC. 113p.	The literature title adequately describes the content of the document. The commenter referred to this literature as best available science on bull trout and to establish basic bull trout biological needs, specifically with regard to temperatures in spawning habitat. FS Response: We are familiar with this document. It is a well-known and frequently cited document on basic bull

	trout biology. The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general biological information about bull trout.
Montana Bull Trout Scientific Group. 1998. The relationship between land management activities and habitat requirements of bull trout. Report prepared for the Montana Bull Trout Restoration Team, Montana Department of Fish, Wildlife & Parks, Helena. 78p.	The literature title adequately describes the content of the document. The commenter cites this document for its suggested ways to protect core and nodal bull trout habitat. FS Response: We are familiar with this document, and it is cited in the Fisheries Specialist Report and the EA. Resource Protection Measures were prescribed to protect riparian areas and aquatic resources (Fisheries Specialist Report, Table 2, pgs. 22-23, and EA, pgs. 67-72), and each of the action alternatives is in compliance with the applicable regulatory framework. See response to comment #129.
Myrick, Christopher. 2002. Bull trout temperature thresholds peer review summary.	FS Response: We were unable to locate where the commenter cited this in the comments. While the commenter did provide an electronic fie with this title, we were unable to open it.
National Environmental Policy Act of 1970. Public Law 91-190.	FS Response: We are familiar with this document.
Odion, D.C, Hanson, C.T., Arsenault, A., Baker, W.L., DellaSala, D.A., Hutto, R.L., Klenner, W., Moritz, M.A., Sherriff, R.L., Veblen, T.T. and Williams, M.A. 2014. Examining historical and current mixed-severity fire regimes in Ponderosa pine and mixed-conifer forests of western North America. PLos ONE 9(2).	FS Response: See response to comment #s 61 and 53 and in Hutto Literature Review.
Oliver, M. 2014. Reality check: shedding new light on the restoration needs of mixed-conifer forests. Science Findings (168), Pacific Northwest Research Station, USDA Forest Service.	FS Response: This agency brief is specific to more mesic forests in the Pacific NW, yet the concepts and restoration points are consistent with the Marshall Woods proposed action.
Quigley, T.M., R.W. Haynes, and R.T. Graham, technical editors. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia Basin and portions of the Klamath and Great Basins: Volume III. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR.	FS Response: We are familiar with this document. We cited this document.
Rattlesnake National Recreation Area and Wilderness Act of 1980.	FS Response: We are familiar with this document. It is located in the Project File (Item N-1)

Rheinhardt, E.D., Keane, R.E., Calkin, D.E. and Cohen, J.D. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. Forest Ecology and Management 256:1997-2006.	We cited this document.
Rieman B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of Bull Trout. Gen. Tech. Rep. INT-302. Ogden, UT. U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 38 p.	The literature title adequately describes the content of the document. The commenter cites this document for best available science on bull trout, and general information on bull trout habitat needs with emphasis on temperature and the role of metapopulations. FS Response: We are familiar with this document, and it is cited in the Fisheries Specialist Report and the EA. It is a well-known and frequently cited document on basic bull trout biology. The commenter did not make a specific connection to the Marshall Woods project, so the citation is considered as general biological information about bull trout.
Rieman, B.E., D.C. Lee, and R.F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath basins. North American Journal of Fisheries Management 17:1111-1125.	The literature title adequately describes the content of the document. The commenter referenced this literature as support that "bull trout strong populations, presence and biomass are inversely related to road densities." FS Response: We are familiar with this document, as it is well-known and frequently cited document on bull trout. The commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project, so the citation is considered as general information on bull trout.
Rieman, B.E. and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21: 756-764.	The literature title adequately describes the content of the document. The commenter referenced this literature with regard to bull trout minimum viable population sizes, genetic isolation and thermal barriers, and fragmentation. FS Response: We are familiar with this document, as it is well-known and frequently cited document on bull trout. The commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project, so the citation is considered as general information on bull trout.
Rieman, B.E., Isaak, D., Adams, M., Horan, D., Nagel, D., Luce, C. and Myers, D. 2007. Anticipated climate warming effects on bull trout habitat and populations across the interior Columbia River Basin. Transactions of the American Fisheries Society	The literature title adequately describes the content of the document. The commenter referenced this literature with regard to rising air temperatures being a prominent threat to bull trout. FS Response: We are familiar with this document, as it is well-known and frequently cited document on bull trout.

136:1552-1565.	Temperature is a very important element in the suitability of fish habitat, and is therefore discussed throughout the Fisheries Specialist's Report, including an analysis of the anticipated effects to stream temperature associated with each of the alternatives. See responses to comments #132 and #135.
Shugart, H.H. and West, D.C. 1981. Long-term dynamics of forest ecosystems. American Scientist 69:647-652.	FS Response: This literature is dated and does not represent the best- available, current science, it does; however, as disclosed in the Marshall Woods Forested Vegetation report and analysis discuss the ever-changing and dynamic nature of forests.
US Census Bureau. Block Level Housing Densities in the Wildland Urban Intermix.	FS Response: Specific documentation regarding "Block Level Housing Densities in the Wildland Urban Intermix" pertaining to the Marshall Woods project could not be located. Refer to response to comment #86 for additional information on defining Wildland Urban Interface.
USDA Forest Service. 1978. RARE II Montana. Supplement to Draft Environmental Statement Roadless Area Review and Evaluation.	FS Response: We are familiar with this document (PF Item xx). As discussed in the response to comment #167, none of the 7,281 acres of NFS land in the Marshall Woods project area is in an IRA. The nearest IRA is Rattlesnake #1204 lies seven plus miles north-northeast of the Marshall Woods project area.
USDA Forest Service. 2009. Focus: Bull Trout and Climate in Air, Water and Aquatic Environments Science Program.	This literature gives an overview of what the Rocky Mountain Research Station's Air, Water and Aquatic Environments Science Team was working on with respect to bull trout and climate. The commenter provides this literature but does not reference it in the comments. FS Response: We are familiar with this document and the current research being conducted by the Forest Service's Rocky Mountain Research Station. The commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project, so the citation is considered as general information.
USDA Forest Service. 2014. Reality Check: Shedding New Light on the Restoration Needs of mixed-Conifer Forests in Science Findings (spies, Thomas and Merschel, Andrew).	FS Response: This agency brief is specific to more mesic forests in the Pacific NW, yet the concepts and restoration points are consistent with the Marshall Woods proposed action.
US District Court – District of Oregon. 2004. Notice of Publication of Final Rule critical habitat designation for Columbia/Klamath River bull trout.	FS Response: We were unable to locate where the commenter cited this in the comments. While the commenter cited this document, the explanation of why this is relevant to the Marshall Woods project was not clearly spelled out.
US District Court – District of Oregon. 2004. Compliant: AWR v. USDI FWS	This is a complaint filed in court regarding the US Fish and Wildlife Service's designation of critical habitat for bull trout. This literature provided by the commenter was not specifically referenced in the comment.

	FS Response: The commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project, so the citation is not considered.
USDOJ. 2003. Confidential settlement document: final critical habitat designation for Columbia/Klamath River bull trout.	FS Response: We were unable to locate where the commenter cited this in the comments. While the commenter cited this document, the explanation of why this is relevant to the Marshall Woods project was not clearly spelled out.
U.S. Fish & Wildlife Service. 1998. Bull trout interim conservation guidance. Lacey, WA. 47p.	The literature title adequately describes the content of the document. The commenter referenced this literature to highlight a recommendation made by the US Fish and Wildlife Service that remaining roadless areas within bull trout range be maintained in roadless condition. FS Response: The commenter did not make a specific connection as to the literature's relevance to the Marshall Woods project, so the citation is not considered.
Weaver, T. and J.J. Fraley. 1991. Fisheries habitat and fish populations. Pages 53-68 in: Flathead Basin Cooperative Program Final Report. Flathead Basin Commission. Kalispell, MT.	The literature reviews fish habitat conditions and fish populations in tributaries within the Flathead Basin. The commenter cited this document with regard to bull trout biological requirements for clean water and spawning areas with low levels of fine sediments. FS Response: The commenter did not provide this literature. We made a reasonable attempt to locate it, and found the document with the same title but it does not have the page numbers specified by the commenter. The document we found did discuss a variety of data collected on fine sediments associated with bull trout and westslope cutthroat trout in the Flathead Basin. However, the commenter did not make a specific connection as to the document's relevance to the Marshall Woods project, so the citation is considered as general information on bull trout.
Williams, M.A. and Baker, W.L. 2012. Spatially extensive reconstructions show variable- severity fire and heterogeneous structure in historical western United States dry forests. Global Ecology and Biogeography, 21:1042-1052.	FS Response: We are familiar with this document. Refer to EA p. 131 "The impacts of "no-action" in dry forest ecosystems must incorporate the probability of stand-replacing, intense fire where stand density has increased and dead fuel accumulated in excess of historical levels (Agee and Skinner, 2005)."
Wuerthner, G. 2014. Why thinning forests is a poor wildfire strategy. The Wildlife News, wildlifenews.com	This is an "opinion" and does not require review and response.
Zachmann, L., Shaw, D. and Dickson, B. 2014. The long-view of fuel reduction treatments in mixed-conifer forests of the western United States: a 15-year	FS Response: This document is not available and its relevance, or lack thereof, to the Marshall Woods project and analysis cannot be ascertained given that.

case study in the northern Sierra Nevada. Abstract in: Society of Conservation Biology Conference:480.	
Author and date unknown. Scientific Literature Review.	FS Response: This document appears to review literature about a variety of topics. Because no author or date is provided for this document, its credibility is in question. Also, the commenter provided this document without specifically indicating the relevance of it to the Marshall Woods project.

REVIEW OF REFERENCES CITED IN COMMENTS - DICK HUTTO

Literature Cited	Review and Response
Amoroso, M. M., L. D. Daniels, M. Bataineh, and D. W. Andison. 2011. Evidence of mixed- severity fires in the foothills of the Rocky Mountains of west-central Alberta, Canada. Forest Ecology and Management 262:2240-2249.	FS Response: The authors found evidence of historically low to moderate and high severity fires in lodgepole pine forests in Alberta, Canada. Lodgepole pine is not a primary tree species within the MW analysis area hence, the referenced article is not directly applicable to this project.
Baker, W. L., T. T. Veblen, and R. L. Sherriff. 2007. Fire, fuels and restoration of ponderosa pine-Douglas fir forests in the Rocky Mountains, USA. Journal of Biogeography 34:251- 269.	FS Response: See response to comment #53. "The aim of this article is to elaborate a….variable-severity fire model and evaluate the applicability of this model, along with the low-severity model, for the ponderosa pine-Douglas-fir forests of the Rocky Mountains." As disclosed in the FV, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Calkin, D. E., J. D. Cohen, M. A. Finney, and M. P. Thompson. 2014. How risk management can prevent future wildfire disasters in the wildland-urban interface. Proceedings of the National Academy of Sciences 111:746-751.	FS Response: We are familiar with this document. "Reframing the objectives of the fire management to how we best live with wildfire in a fire adapted environment is critical to untangling the wildland fire paradox. Calkin et al." Please refer to EA page 16, "The Cohesive Strategy recognizes that fire is a natural process, necessary for the survival of many landscapes and people. The Cohesive Strategy takes a holistic approach by simultaneously looking at the role of fire in the landscape, the ability of humans to actively manage these landscapes, plan for and adapt to living with fire, and the need to be prepared to respond to fire when it occurs." The purpose and need for the Marshall Woods project contains "Emulate fire's natural role on the landscape through vegetative treatments including prescribed fire."
Cohen, J. 2003. Home ignition zone. MS.	FS Response: We are familiar with this document. Please refer to page 17 of the EA, "While individual home-by-home treatments can help reduce the risk of structure loss, relying solely on such treatments could forego strategic opportunities for suppressing wildfires within the WUI. Although homes in the path of wildfire are often the most recognized value-at-risk, treatments need to go beyond the areas immediately surrounding individual homes to protect other resource values that make up the forested setting including soil stability, wildlife habitat, water quality, timber value, and landscape aesthetics (Graham, 2004)".
Cohen, J. D. 2000. Preventing disaster: home ingnitability in the wildland-urban interface. Journal of Forestry	FS Response: We are familiar with this document. Please refer to the last paragraph in the "Conclusions" section of Cohen's paper where it states: "Consequently if the

98:15-21.	community or borne site is not considered in reducing W-UI fire losses, extensive wildland fuel reduction will be required. For highly ignitable homes, effective wildland fire actions must not only prevent fires from burning to home sites, but also eliminate firebrands that would ignite the home and adjacent flammable materials. To eliminate firebrands, wildland fuel reductions would have to prevent firebrand production from wildland fires for a distance of several kilometers away from homes." Decreasing high intensity wildfire potential is included in the purpose and need of the Marshall Woods project (EA page 16).
Cohen, J. D., and R. D. Stratton. 2008. Home destruction examination: Grass Valley fire. USDA Forest Service R5-TP-026b:1-26.	FS Response: We are familiar with this document. Please see response above to Cohen, J.D. 2000. Preventing disaster… Also, please refer to paragraph 3 of the Summary and Conclusion of Cohen's Home destruction examination of the Grass Valley fire where it states: Home ignitions due to the wildfire were primarily from firebrands igniting homes directly and producing spot fires across roads in vegetation that could subsequently spread to homes." As stated on page 140 of the EA: "Thinning stands to reduce crown fire potential is a primary means of reducing fire hazard (Graham et al., 1999, 2004; Brown and Aplet, 2000)."
Graham, R., M. Finney, C. McHugh, J. Cohen, R. Stratton, L. Bradshaw, N. Nikolov, and D. Calkin. 2011. Fourmile Canyon Fire: preliminary findings. USDA For.Serv.Sta.Pap. RMRS:1-99.	FS Response: We are familiar with this document. Please refer to response above to Cohen's 2003 document on the "Home Ignition Zone". Page 90 of Fourmile Canyon Fire: preliminary findings states: "We have the opportunity to significantly reduce the potential for WUI fire disasters during extreme burning conditions such as the Fourmile Canyon Fire, but this opportunity depends on homeowners creating and maintaining low home ignition potential within the HIZ." The Marshall Woods project aims to "Decrease high intensity wildfire potential; enhance firefighter efficiency and safety within the WUI. EA, page 16)". At the time this response was written, the Federal Government does not have control over privately owned lands and therefore cannot control homeowner's activities with regards to hazardous fuels reduction activities on private lands.
Harvey, B. J., D. C. Donato, W. H. Romme, and M. G. Turner. 2013. Influence of recent bark beetle outbreak on fire severity and postfire tree regeneration in montane Douglas-fir forests. Ecology 94:2475-2486.	FS Response: See response to comment # 56. Cited article discusses that, "Although (bark) beetle outbreaks and subsequent fire were not linked disturbances, they produced compound effects that contribute to heterogeneity characteristic of mid/lower montane forests." This is consistent with the concept of disturbance disclosed in the MW project, FV p.8, "Natural disturbances are not disruptions in forests rather they are the norm, and warm, dry low elevation forests, like those that occupy

	Marshall Woods area, are disturbance mediated. The species that occupy these forests evolved with and are morphologically adapted to very frequent disturbance, namely fire. These forests are ever-changing and dynamic; forest development typically follows an initial floristic pattern whereby species invade at approximately the same time following a major disturbance, but assert dominance at different times (Oliver and Larsen, 1996). The type, size, scale, arrangement, duration, species affected, etc. in a disturbance event dictate how forest development patterns emerge after its occurrence."
Harvey, B. J., D. C. Donato, W. H. Romme, and M. G. Turner. 2014a. Fire severity and tree regeneration following bark beetle outbreaks: the role of outbreak stage and burning conditions. Ecological Applications 24:1608-1625.	FS Response: The authors concluded that, "The severity of recent wildfires to be moderately linked to prefire bark beetle outbreaks in lodgepole pine forests of Greater Yellowstone….(and) that serotinous lodgepole pine forests were resilient to compound disturbance effects if beetle outbreaks were followed by fire within ;10 years." These findings are not directly applicable to the forests or conditions in the MW project.
Harvey, B. J., D. C. Donato, and M. G. Turner. 2014b. Recent mountain pine beetle outbreaks, wildfire severity, and postfire tree regeneration in the US Northern Rockies. Proceedings of the National Academy of Sciences.	FS Response: The authors found that "recent prefire mountain pine beetle outbreak severity affected few measures of wildfire severity and was not directly related to postfire tree seedling establishment". These findings are not directly applicable to the forests or conditions in the MW project.
Hessburg, P. F., R. B. Salter, and K. M. James. 2007. Re-examining fire severity relations in pre- management era mixed conifer forests: inferences from landscape patterns of forest structure. Landscape Ecology 22:5-24.	FS Response: See response to comment #53. The authors concluded that variable severity fire, fire ranging from low to mixed to severity, was the most prevalent fire type that shaped dry and moist Eastern Washington forests. These findings are consistent with the information disclosed in the MW Forested Vegetation p. 10: "Historically fires were mixed with variable intensities ranging from frequent, low intensity, non-lethal, understory fires to infrequent, high intensity, stand-replacement fires."
Heyerdahl, E. K., K. Lertzman, and C. M. Wong. 2012. Mixed-severity fire regimes in dry forests of southern interior British Columbia, Canada. Canadian Journal of Forest Research 42:88-98.	FS Response: See response to comment #53. The authors "suggest that mixed-severity fire regimes that are dominated by low-severity fires were likely to be historically widespread in the Interior Douglas-fir and Ponderosa Pine zones elsewhere in the southern interior of British Columbia." "This hypothesis is generally consistent with the conclusions of Klenner et al. (2008), although our data support a more significant role for low-severity fires than their analyses suggest." Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events. Heyerdahl et al. (2012) illuminated that the portion of low and high severity fires historically is variable based on region and other influencing factors. In their study area their findings indicate that low severity fire was the most

	dominant type in the mixed severity regime.
Klenner, W., R. Walton, A. Arsenault, and L. Kremsater. 2008. Dry forests in the Southern Interior of British Columbia: historic disturbances and implications for restoration and management. Forest Ecology and Management 256:1711-1722.	FS Response: See response to comment #53. The authors concluded "that a mixed-severity disturbance regime (including fire, insects and other disturbances) likely maintained diverse stand and landscape conditions in our study area…(And that) ….Forest managers should: (1) focus on clearly defining desired stand conditions and the mosaic of habitats necessary to maintain multiple values across landscapes (e.g. Fischer et al., 2006), (2) identify the commodity, social and ecological objectives that will be met or compromised with these conditions, (3) identify the most effective interventions for achieving these objectives, and (4) implement a program to monitor, assess and revise activities to ensure objectives are met." These recommendations are consistent with the MW project and analysis.
Marcoux, H. M., L. D. Daniels, S. E. Gergel, E. Da Silva, Z. e. Gedalof, and P. F. Hessburg. 2015. Differentiating mixed- and high-severity fire regimes in mixed-conifer forests of the Canadian Cordillera. Forest Ecology and Management 341:45-58.	FS Response: See response to comment #53. Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Marcoux, H. M., S. E. Gergel, and L. D. Daniels. 2013. Mixed-severity fire regimes: How well are they represented by existing fire-regime classification systems? Canadian Journal of Forest Research 43:658-668.	FS Response: See response to comment #53. Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Moritz, M. A., E. Batllori, R. A. Bradstock, A. M. Gill, J. Handmer, P. F. Hessburg, J. Leonard, S. McCaffrey, D. C. Odion, T. Schoennagel, and A. D. Syphard. 2014. Learning to coexist with wildfire. Nature 515:58-66.	Located document online but could not find access to view content.
Odion, D. C., C. T. Hanson, A. Arsenault, W. L. Baker, D. A. DellaSala, R. L. Hutto, W. Klenner, M. A. Moritz, R. L. Sherriff, T. T. Veblen, and M. A. Williams. 2014. Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. PLoS ONE 9:e87852 (87851-87814).	FS Response: See response to comment #53. Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Perry, D. A., P. F. Hessburg, C. N. Skinner, T. A. Spies, S. L. Stephens, A. H. Taylor, J. F. Franklin, B. McComb,	FS Response: See response to comment #53. The authors concluded that, "Like low-severity forests in the western United States, many dry mixed-severity types experienced

and G. Riegel. 2011. The ecology of mixed severity fire regimes in Washington, Oregon, and Northern California. Forest Ecology and Management 262:703-717.	significant increases in stand density during the 20th century, threatening forest health and biodiversity, however not all understory development in mixed-severity forests increases the threat of severe wild fires. In general, current landscapes have been homogenized, reducing beta diversity and increasing the probability of large fires and insect outbreaks. Further loss of old, fire tolerant trees is of particular concern, but understory diversity has been reduced as well. High stand densities on relatively dry sites increase water use and therefore susceptibility to drought and insect outbreaks, exacerbating a trend of increasing regional drying." These general conclusions are consistent with the conditions in the MW project.
Schoennagel, T., R. L. Sherriff, and T. T. Veblen. 2011. Fire history and tree recruitment in the Colorado Front Range upper montane zone: implications for forest restoration. Ecological Applications 21:2210-2222.	FS Response: See response to comment #53. The authors studied the resilience of forest in the Colorado Front Range and concluded that "these forests are resilient to prolonged periods of severe drought and associated severe fires."….The authors recommended that "management focus on fuels reduction directly adjacent to residential communities." The conditions in the MW area are not analogous to the Front Range of Colorado where the study occurred. Additionally, the MW project is immediately adjacent to the community of Missoula, MT.
Sherriff, R. L., and T. T. Veblen. 2006. Ecological effects of changes in fire regimes in Pinus ponderosa ecosystems in the Colorado Front Range. Journal of Vegetation Science 17:705-718.	FS Response: See response to comment #53. Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Sherriff, R. L., and T. T. Veblen. 2007. A spatially-explicit reconstruction of historical fire occurrence in the ponderosa pine zone of the Colorado Front Range. Ecosystems 10:311- 323.	FS Response: See response to comment #53. Again, as disclosed in Forested Vegetation report, variable severity fire regimes likely dominated moderately warm and dry forests with both low and high severity fire events.
Six, D. L., E. Biber, and E. Long. 2014. Management for mountain pine beetle outbreak suppression: Does relevant science support current policy? Forests 5:103-133.	FS Response: see response to comment #51.
Syphard, A. D., T. J. Brennan, and J. E. Keeley. 2014. The role of defensible space for residential structure protection during wildfires. International Journal of Wildland Fire 23:1165-1175.	FS Response: We are familiar with this document. Please refer to the response to Fourmile Canyon Fire: preliminary findings, Graham et al.
Syphard, A. D., and J. E. Keeley. 2015. Location, timing and extent of wildfire vary by cause of ignition.	FS Response: We are familiar with this document. Although the importance of wildfire prevention strategies is significant to fire management within the WUI, it is not

International Journal of Wildland Fire 24:37-47.	significant in regards to the purpose and need of the Marshall Woods project. Furthermore, in contrast to the California sub-regions in which 95% of ignitions were human caused, only 36% of fires occurring on the Lolo National Forest between 1980 and 2008 were human caused (EA page 135), leaving the vast majority lightning caused, which is an ignition source that cannot be prevented.
Williams, M. A., and W. L. Baker. 2012. Spatially extensive reconstructions show variable- severity fire and heterogeneous structure in historical western United States dry forests. Global Ecology and Biogeography 21:1042-1052.	FS Response: The methodology and conclusions of Williams and Baker (2012) have been questioned and refuted by Fule and others (2013) who state, "Contrary to the conclusions of Williams and Baker, the preponderance of scientific evidence indicates that conservation of dry forest ecosystems in the western United States and their ecological, social and economic value is not consistent with a present-day disturbance regime of large, high-severity fires, especially under a changing climate"(Project File Item M5-50). We concur with the eighteen scientists listed in Fule et al. (2013).

REVIEW OF REFERENCES CITED IN COMMENTS – JEFF JUEL

Literature Cited	Review and Response
Baker, William L.; Thomas T. Veblen, and Rosemary L. Sherriff; 2006. Fire, fuels and restoration of ponderosa pine–Douglas fir forests in the Rocky Mountains, USA. Journal of Biogeography (J. Biogeogr.) (2006)	Paper states, "(T)he variable-severity model, in which forest structures were shaped mainly by infrequent severe fires, is consistent with the evidence of fire history and tree age structures in these forests. Only limited areas of ponderosa pine–Douglas fir forests in the Rocky Mountains, primarily at low elevations and on xeric sites, appear to have been shaped primarily by low-severity fires. To assess which model may best fit a potential management area, site- specific information on fire history and forest conditions is required." FS Response: This is comment #101.
Finney and Cohen, 2003. Expectation and Evaluation of Fuel Management Objectives. USDA Forest Service Proceedings RMRS-P-29.	Paper discusses the concept of a "fireshed involving a wide area around the community (for many miles that include areas that fires can come from). Questions effectiveness of any given entity that is claimed to have its risk of fire reduced by the proposed project. FS Response: As stated in the EA page 16, The Marshall Woods Restoration project is designed to promote ecosystem health and decrease high intensity wildfire potential which aligns with multiple initiatives including the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). Purpose and Need 2.) "Emulate fire's natural role on the landscape through vegetative treatments including prescribed fire. a. Promote ecosystem health with prescribed fire to distribute beneficial fire effects to areas within the wildland-urban interface (WUI). b. Integrate project objectives with the Missoula County Wildfire Protection Plan (CWPP). and c. Decrease high intensity wildfire potential; enhance firefighter efficiency and safety within the WUI." "The fundamental goal of fuel treatment should not be to reduce burn spread rate but to reduce burn severity (Reinhardt, et all, 2008). Burn severity for the desired future condition is represented by flame length. The objective is that with reduced flame lengths, stands will experience lower levels of tree mortality during wildland fire events whether they are large or small events in scale. The lessened fire intensity allows for a greater margin for firefighter and public safety. Resilient stand conditions contribute to resilient community conditions." (Fire and Fuels Specialist Report, page 24)
Graham, Russell T., Sarah McCaffrey, Theresa B. Jain, 2004. Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. U.S. Department of Agriculture Forest	We also cited this document. It states that "(T)reatments need to go beyond the areas immediately surrounding individual homes to protect other resource values that make up the forested setting including soil stability, wildlife habitat, water quality, timber value, and landscape aesthetics." FS Response: This document was cited in the EA on page 17 and 140. The commenter cites Graham et al., 2004 stating "fuel modifications do little to influence overall fire behavior and severity of fire", however, this statement is describing an extreme fire behavior event in which

Service Rocky Mountain Research Station, General Technical Report RMRS-GTR-120. April 2004.	the Hayman fire ran "16-19 miles lasting an entire day, burning 60,000 acres. Graham et al., 2004". Measurement indicators used for the Effects Analysis (EA page 129) include High intensity wildfire potential, and Crown Fire Index. As stated on page 140 of the EA, "Thinning stands to reduce crown fire potential is a primary means of reducing fire hazard (Graham et al., 1999, 2004; Brown and Aplet, 2000)".
Lesica, Peter, 1996. Using Fire History Models to Estimate Proportions of Old Growth Forest In Northwest Montana, USA. Biological Conservation 77, p. 33-39.	Paper states that even 10% as minimum old-growth Standard may result in extirpation of some species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old- growth condition prior to European settlement. FS Response: See response to comment #123.
McRae D.J., L.C. Duchesne, B. Freedman, T.J. Lynham, and S. Woodley 2001. Comparisons between wildfire and forest harvesting and their implications in forest management. Environ. Rev. 9: 223–260 (2001) DOI: 10.1139/er-9-4-223 © 2001 NRC Canada	Paper discusses the use and effectiveness of silvicultural techniques to imitate natural disturbances such as wildfire. FS Response: The paper is not directly applicable or relevant to the MW project, as the forest types, practices, and objectives are entirely different. A correlation does not exist.
Riggers, Brian; Rob Brassfield; Jim Brammer; John Carlson; Jo Christensen; Steve Phillips; Len Walch; Kate Walker; 2001. Reducing Fire Risks to Save Fish – A Question of Identifying Risk. A Position Paper by the Western Montana Level I Bull Trout Team, 2001.	Paper states that the real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. FS Response: The commenter did not provide a copy of this paper, and Forest Service Biologists confirmed that it was never finalized and was only a draft position paper. The draft version we were able to locate had no date, but did have the information cited by the commenter. In addition, the commenter omitted portions of the position paper that are relevant to the Marshall Woods project: "Although mechanical fuel removal and salvage is more likely than wildfire to adversely affect fishes and their habitat, the Team understands that in some areas (such as urban interface zones), mechanical fuel management may be the most practical option. In these cases, we recommend that fishery and fuels specialists work closely together to achieve project goals while minimizing impacts to fishes." With regard to the position quoted by the commenter, the authors of the draft position paper also stated: "There are undoubtedly exceptions to this position. Examples might include direct urban interface environments where natural fire

	processes are clearly not an option and road systems cannot be removed, or areas where native fish populations are nearly extinct and isolated to an extremely small watershed and reconnection to other populations is not an option. Another exception might be where funds generated from thinning would be directly used to obliterate roads or remove barriers." The Marshall Woods project would fit within the exceptions to the authors' position.
Samson, Fred 2006a. Habitat estimates for maintaining viable populations of the northern goshawk, black-backed woodpecker, flammulated owl, pileated woodpecker, American marten, and fisher. Unpublished paper by Fred Samson, Regional Wildlife Ecologist, USDA Forest Service Northern Region. 25pp. May 2006	Commenter challenges the report findings re: goshawk viability in Region 1, and refers to Woodbridge and Hargis goshawk monitoring protocol, which is published as a USFS a Forest Service technical report who's 2005 detection map says there were 40 detections in 2005 in Region 1 whereas Samson says 50 pairs are needed. Concluding that the results of this survey essentially show that the population in Region 1 is not viable according to the agency's own science (only 40 instead of 55). The map referenced in this comment shows detections from a Regional goshawk survey effort conducted in 2005, the methods and results of which are detailed in Kowalski 2006 (included in the Project File), and cited in the Wildlife Specialist's Report on page 113. The survey effort sub-sampled the Region, as it would be infeasible to survey every acre of land in the Region for goshawks. Thus Kowalski used a sub-set of Primary Survey Units (PSUs) placed throughout the Region for the survey, surveying 114 of the 12,350 PSUs that contained NFS lands in the Region. Goshawks were detected in 40 of the 114 PSUs surveyed, leading to a detection rate of 0.39 for PSUs in the Region (all described in Kowalski). Extrapolating this detection probability across all lands in the Region would result in many more than 40, or even 55, goshawk detections. As stated in Kowalski: If we use the above confidence limits to extrapolate to the entire set of PSUs within the accessible portion of the Northern region, we obtain a maximum likelihood estimate of 4,816 PSUs with goshawk presence and, based on a 95% confidence interval, having a range of 3,581 to 6,175 PSUs with goshawks present…since goshawk researchers have found no evidence that goshawks are declining in the western United States (Kennedy 1997, Squires and Kennedy 2006) and Samson (2005) demonstrated that goshawk habitat was well-distributed and abundant in the Region, our estimate of goshawk presence suggests that goshawks are abundant and well-distributed throughout the accessible portions of Region One National Forest System lands within Montana and Idaho during the breeding season." Kowalski also found reproduction at 0.175 of the goshawk detections (7 of the 40). Again, if this is extrapolated out, calculating 0.175 of the 3,581 to 6,175 PSUs would assume that there could be 626-1,080 goshawk pairs nesting in the Region. The goshawk analysis in the wildlife specialist's report (page 112-113) considers this information in the existing condition for goshawks, and in the analysis of effects to goshawks (pages 119-120).

USDA Forest Service, 2008a. Young Dodge Draft Environmental Impact Statement, Rexford Ranger District, USDA Forest Service, Kootenai National Forest, February 2008	This DEIS was not cited in the commenter's letter; only listed in Literature Cited.