Ralph O. Bloemers, OSB No. 984172
ralph@crag.org - (503) 525-2727
Christopher G. Winter, OSB No. 984355
chris@crag.org - (503) 525-2725
Crag Law Center
917 SW Oak Street, Suite 417
Portland, OR 97205
Fax: (503) 296-5454

Attorneys for Plaintiffs

**UNITED STATES DISTRICT COURT**

**DISTRICT OF OREGON**

**PORTLAND DIVISION**

**BARK,** an Oregon non-profit corporation, **FRIENDS OF MOUNT HOOD,** an Oregon non-profit corporation, **NORTHWEST ENVIRONMENTAL DEFENSE CENTER,** an Oregon non-profit corporation, **SIERRA CLUB**, a California non-profit corporation,

Plaintiffs,

v.

**LISA NORTHROP,** Acting Forest Supervisor of the Mt. Hood National Forest, **BILL WESTBROOK,** Zigzag District Ranger, **KENT CONNAUGHTON**, Regional Forester for Region 6, and the **UNITED STATES FOREST SERVICE**, a federal agency.

Defendants.

**Case No. 3:13-cv-00828-AA**

**DECLARATION OF JONATHAN J. RHODES**



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

**DECLARATION OF JONATHAN J. RHODES**

I, JONATHAN J. RHODES, pursuant to the provisions of 28 U.S.C. § 1746, do hereby state and declare as follows:

1. My name is Jonathan J. Rhodes. My qualifications to offer the opinions set forth in this declaration are discussed below and addressed in greater detail in my curriculum vitae, a copy of which is attached to this declaration as **Exhibit A**.

**Qualifications**

2. I am a hydrologist with more than 30 years of experience, with a B.S. in hydrology from University of Arizona, a M.S. in hydrology and hydrogeology from University of Nevada-Reno and I finished all required academic work toward a Ph.D. in forest hydrology at the University of Washington. Since 2001, I have worked as a consulting hydrologist for a variety of clients, including county and tribal governments in Oregon, Washington, and Idaho. Prior to that I worked for more than 12.5 years at the Columbia River Inter-Tribal Fish Commission (CRITFC), where I served as Senior Fisheries Scientist-Hydrologist. My professional experience includes work with tribal, federal, state, county, and city governments, universities, and non-profit groups in eight western states.

3. For more than 23 years, I have monitored the impacts of the public land management on watersheds and aquatic systems. I have examined, in detail, the adequacy of watershed and aquatic protection measures of more than 20 USFS Land Resource Management Plans (LRMPs) in the West, including the Northwest Forest Plan's Record of Decision (ROD, 1994) and others that I evaluated under contract with NOAA Fisheries (Rhodes, 1995). I have published numerous peer-reviewed journal papers and reports dealing with the effects of land



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

management activities on watersheds and aquatic systems on western public lands (e.g. Beschta et al., 2004; Karr et al., 2004; Beschta et al., 2012), including a detailed assessment of public land management effects on imperiled salmon (Rhodes et al., 1994) and a data-driven case history of the impacts of public land management on aquatic systems (Espinosa et al., 1997).

4. I am quite familiar with standards related to routes, soils, riparian areas, and aquatics in the MHNF Land Resource Management Plan (LRMP) and in the ROD (1994). I am also familiar with alpine and subalpine areas and aquatic conditions on the MHNF.

**Scope of Review**

5. This declaration describes some of the many substantive defects in the Timberline Ski Area Mountain Bike Trails and Skills Park Environmental Assessment (EA), Mt. Hood National Forest (MHNF), dated November 2012 with respect to its analysis of the proposal to construct about 17 miles of downhill bike routes, a skills park and associated restoration attempts. (Hereinafter, I refer the proposed actions in the EA as the "Project."). This declaration discusses the adequacy of the EA's analysis of the Project's impacts on riparian areas, soils, watersheds, streams, water quality, fish habitat and populations. This technical declaration also describes how defects in the EA undermine the determination of the Project's consistency with MHNF Plan standards and regulatory requirements.

6. In preparing this declaration, I reviewed the Environmental Assessment for the Timberline Ski Area Mountain Bike Trails and Skills Park Decision Notice and Finding of No Significant Impact, signed 11/19/12 (DN). I also reviewed my detailed comments that I submitted to the MHNF on March 31, 2011 regarding the many defects in MHNF's Preliminary Assessment (PA) for the Project. I also reviewed the PA and its appendices, the Watershed



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

Report prepared by Todd Parker ("Watershed Report"), the draft Biological Assessment prepared by Kathryn Arendt ("BA") and the Biological Evaluation prepared by Kathryn Arendt ("BE") for the proposed project.

7. I personally reviewed field conditions in the Project area on June 1, 2013. During my field review, I evaluated the existing conditions of some streams, riparian areas, and portions of the proposed trails that would be affected by the Project. I also evaluated conditions on some areas proposed for attempted re-vegetation and restoration under the Project. I also evaluated conditions in areas where past re-vegetation had been attempted within the Project area. During my field evaluation, I personally took all the photos attached to this declaration as Exhibit B. The photos are a true and accurate depiction of the conditions I evaluated during my field review on June 1, 2013.

8. I also reviewed salient scientific literature related to the impacts of the proposed construction and restoration activities described in the EA. This cited literature is listed at the end of this declaration. I also relied on my education and more than 30 years of professional experience in preparing this declaration.

**Discussion**

**The EA fails to properly describe and assess the limited effectiveness and timing of the proposed restoration measures given the best available scientific information.**

9. The EA fails to properly describe and assess the limited effectiveness of restoration in ameliorating the significant impacts of bike route construction and operation on soils, watersheds, streams, water quality, and aquatic habitat.

10. First, there is total agreement in the scientific literature that road decommissioning does *not* result in the rapid elimination of road impacts on erosion, sediment



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

delivery to streams, and runoff (Potyondy et al., 1991; Menning et al., 1996;[1] Beschta et al., 2004; Folz et al., 2007).

11. I supplied the Forest Service with scientific studies from its own scientists in my detailed comments on the PA underscoring how the EA's assumption that proposed restoration would be immediately effective was scientifically controversial and not supported by the information in the record. I have reviewed the EA and its responses to this issue, and the EA did not respond or provide any scientifically sound explanation to support its controversial positions.

12. For instance, the EA still fails to properly note and incorporate that the work of USFS researchers (Foltz et al., 2007) documented that road decommissioning via subsoiling does not rapidly or appreciably restore infiltration rates or rates of re-vegetation, even many years after subsoiling. Foltz et al. (2007) documented that there was no major improvement in infiltration rates, and hence, no major reduction in elevated road runoff for four years after subsoiling.

13. Foltz et al. (2007) documented that re-vegetation on the subsoiled roads was nominal at higher elevations: four years after treatment, the two higher elevation roads in the study only had 6% and 9% of the subsoiled surfaces covered by vegetation, showing that re-vegetation was slowed by elevation-related factors affecting vegetation growth.

14. The results from Foltz et al. (2007) related to elevation effects are applicable to the Project area where conditions related to elevation, including low soil productivity, short

---

[1] Menning et al. (1996) provides an overview of impact levels from roads, road treatments, logging landings, and logging practices from the cumulative effects methodology widely employed by the USFS for USFS lands in California. Notably, USFS and USBLM, 1997c, Chapter 3, Effects of proposed alternatives on aquatic habitats and native fishes, *in* Evaluation of EIS Alternatives by the Science Integration Team. Vol. I PNW-GTR-406, USFS and USBLM, Portland, OR, notes that the approach in Menning et al. (1996) regarding the hydrologic and sediment-related risks to watersheds from roads were consistent with those of the USFS's experts.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

growing season, and deep snowpacks will severely hamper re-vegetation on decommissioned roads. Foltz et al. (2007) also documented that the susceptibility of decommissioned roads to erosion also showed only very minor improvement over four years; in some years on some decommissioned roads, the susceptibility to erosion increased. The EA did not disclose or respond to the scientific information that I provided demonstrating that the potential benefits of decommissioning roads in reducing road runoff, erosion, and subsequent sediment delivery are very slow to accrue (Foltz et al., 2007).

15. The EA repeatedly assumes, incorrectly, that decommissioning and re-vegetation will significantly reduce road runoff and erosion in a timely manner, in direct conflict with the best available scientific information, which indicates that road decommissioning will provide, at best, very slow rates of improvement in impacts on erosion and runoff within the Project area. These are serious flaws, because the EA's assessment of aquatic impacts and consistency with ACSOs are premised on the notion that restoration measures within the Project area will more than offset the immediate and significant impacts of the bike route construction and operation on runoff, erosion, and sediment delivery to streams (EA, pp. 62, 64, 68-78, 83-87, 90-94).

16. Due to the very slow rate of recovery of vegetation, runoff, and infiltration on decommissioned roads it is extremely unlikely that the decommissioning could offset bike route construction and operation impacts for many years to decades after attempted restoration. The significant delay between attempted restoration and its possible future benefits is not disclosed in the EA.

17. Second, the EA does not make known and factor into its impact analysis that road decommissioning increases erosion and sediment delivery to streams for a few years (Switalski



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

et al., 2004; GLEC, 2008; Grant et al., 2011). Road decommissioning significantly reduces vegetative cover on the decommissioned roads for at least a year, even with seeding (Grant et al., 2011), which contributes to elevated erosion and sediment delivery from such roads (Dunne and Leopold, 1978).

18. The Project's high-elevation setting only provides a very short growing season for establishment of vegetation, significantly slowing re-vegetation on decommissioned roads. Therefore, contrary to the analysis in the EA, the road decommissioning proposed under the Project is likely to elevate erosion and sediment delivery to streams for several years, exacerbating rather than offsetting the immediate, persistent, and significant effects of bike route construction and operation on erosion and sediment delivery.

19. Road decommissioning comprises about 51% of the 6 acres of proposed restoration in the Still Creek and West Fork Salmon Creek watersheds, based on the data in the EA (p. 28). Therefore, more than half of the restoration that will be attempted will cause elevated erosion and sediment delivery for several years. Because re-vegetation on decommissioned roads is generally slow, especially within the sub-alpine setting of the Project area due to low soil productivity and short growing season, elevated sediment delivery due to decommissioning may persist for many years. As a result, for several years the restoration projects will exacerbate, rather than offset, the persistent and immediate impacts of bike route construction and operation on erosion and sediment delivery.

20. Third, the EA does not disclose and incorporate into the analysis the well-established scientific findings that road decommissioning does not completely eliminate the hydrologic and erosional impacts of roads, even over the course of many decades. I provided



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

research with these findings, from the Forest Service's own scientists (Potyondy et al., 1991; Menning et al., 1996; Foltz et al., 2007) and others (GLEC, 2008).

21. USFS research, Foltz et al (2007), noted that it is unknown if infiltration rates, and, hence, runoff on decommissioned road surfaces can ever be completely restored. Potyondy et al. (1991) and the USFS cumulative effects model for USFS Region 5, as described by Menning et al. (1996), indicate that even after 50 years, obliterated roads have erosional and runoff impacts that remain significantly elevated relative to undisturbed areas. For example, after 50 years, a mile of obliterated road still has impacts equivalent to 0.1 mile of new road.

22. Topsoil and soil productivity lost due to elevated erosion and road construction impacts are irreversible and can never be fully restored (Beschta et al., 2004; Karr et al., 2004).

23. The EA's claim that road decommissioning will completely restore the treated areas is not plausible and lacks support in existing science. The EA's (e.g., pp. 86, 90) repeated assertion that the proposed restoration measures will "completely restore" treated areas is incorrect.

24. Fourth, the EA fails to properly disclose the transient and fleeting effectiveness of road resurfacing on sediment delivery. The EA proposes surfacing roads with gravel (EA, p. 28) but does not disclose that road traffic and runoff removes gravel from road surfaces fairly rapidly, by displacing it from travelways, pushing it in the native surface and/or pumping finer material below gravel to the road surface (Fu et al., 2010), all of which results in a return to a native surface, negating the effects of gravel surfacing (see Photo 1a & b).



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*


**Photo 1a & b.** Two roads in the Oregon Coast Range that had been surfaced with rock and gravel about 3 months prior to the time of photos. The travelways had primarily reverted to a native surface condition that is actively eroding, including that in concentrated runoff in ruts in the native surface of the roads, resulting in high levels of sediment delivered to nearby streams.

25. Fifth, the EA fails to properly disclose that some of the proposed restoration measures, Project Design Criteria ("PDC") and Best Management Practices ("BMPs") proposed are largely ineffective in reducing erosion and sediment delivery. For instance, there is abundant empirical evidence from past re-vegetation efforts on ski areas on Mt. Hood that seeding and other re-vegetation efforts on damaged soils proposed in the EA often fail in the high-elevation setting of the Project area. .

26. I have repeatedly examined failed re-vegetation attempts in ski areas on Mt. Hood, including those within the Project area during my June 1, 2013 field review. Consistent with my own findings, the EA (pp. 118-119) acknowledges that seeding and other re-vegetation efforts within the Project area have been unsuccessful:

> "The construction of the Jeff Flood lift resulted in approximately 77 acres of ground disturbance for new ski runs. To date, portions of those runs remain poorly vegetated and contribute sediment to intersecting road and ditch lines which transport the sediment to Still Creek."



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

This indicates that about five years after lift construction was completed in 2007, restoration efforts have not effectively re-vegetated the area or eliminated elevated sediment delivery caused by lift construction damage. During my June 1, 2013 I observed that ski runs and the area clearcut for the Jeff Flood lift near the bottom terminal remain very poorly re-vegetated since construction and clearing were completed in 2007.

27. The EA (Appendix A, p. 44) acknowledges that past re-vegetation treatments prescribed within the Project area have not been successful, even after three attempts at re-vegetation. The empirical evidence that past efforts to re-vegetate disturbed areas within the Project area have consistently failed was not reasonably factored into the EA's assessment of the effectiveness of proposed restoration measures. In direct conflict with this evidence, the EA assumed that the restoration will work. The EA provides no scientific studies or data to support this assumption which conflicts with available evidence from the Project area.

28. The EA claims it will prevent runoff and sediment delivery from newly constructed routes or as part of restoration measures by utilizing drainage diversion features near streams. In my comments on the PA, I pointed out that drainage diversion features near streams often merely route runoff and sediment over hillslopes and into streams, as noted in the USEPA's commissioned assessment of road BMPs and the water quality impacts of roads (Great Lakes Environmental Center (GLEC), 2008) and as I have repeatedly observed during the course of my work over the past 25 years. The Clearwater National Forest (CNF) in Idaho noted that routes within 300 feet of streams were likely to drain into streams (CNF, 2003). GLEC (2008) also noted that in the Pacific Northwest efforts to prevent road drainage to streams have considerable potential for failure.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

29. As the EA (pp. 52, 56-57) correctly notes, the overwhelming majority of the runoff (and hence, sediment delivery from routes) in the Project area occurs during prolonged snowmelt and rain-on-snow events. As I have observed repeatedly over the course of my career in areas similar to the Project area, during these major runoff events, soils are saturated and completely unable to infiltrate water diverted from routes via drainage features. As result, sediment-laden water diverted from the routes during major runoff events merely runs overland over saturated soils into nearby streams, thereby rendering the proposed drainage diversion features ineffective during periods of maximum runoff and sediment delivery to streams.

30. The ability of route runoff diversion features to capture sediment or prevent it from entering headwater stream is quite limited and quickly exhausted (GLEC, 2008). Despite drainage diversions near streams, sediment is often delivered to streams, particularly in the Pacific Northwest (GLEC, 2008). The EA does not factor in the ineffectiveness of drainage treatments near streams. As a result, the EA significantly underestimates the degree to which bike route construction extends the stream network and overestimates the degree to which proposed restoration disconnects treated roads from the drainage network.

31. The PDC involving trail inspections and removal of sediment from sediment traps during summer operations will also be ineffective at stemming the bulk of sediment delivery from trails to streams. This is because the overwhelming bulk of route runoff, erosion, and sediment delivery from the trails would occurs during the prolonged snowmelt and intense rain-on-snow events when the bike park would not be in operation. Thus, trail inspections and sediment removal from sediment traps during summer operations can only have a negligible effect on sediment delivery from the bike routes, because they would only be conducted during



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

the times when only a tiny fraction of annual sediment delivery occurs. Because sediment traps have very limited detention capacity, which is quickly exhausted during major sediment transporting events during fall rain-on-snow and spring snowmelt when the park is not in operation, it is also highly likely that the traps will have a negligible effect on the amount of sediment annually delivered from the bike routes. Despite my comments on the PA pointing out the ineffectiveness of these PDC, the EA does not make this obvious situation known or properly factor it into the analyses of the Project's impacts on sediment delivery.

32. I provided the Forest Service with a copy of a nationwide assessment of road BMP effectiveness commissioned by the United States Environmental Protection Agency (GLEC, 2008), which specifically noted that BMPs aimed at reducing road impacts are not 100% effective, and, in particular, that efforts to prevent road drainage to streams in the Pacific Northwest are especially prone to failure. GLEC (2008) also notes that in the Pacific Northwest that "…conventional BMPs for road construction may not be sufficient to prevent adverse effects on stream channels and fish habitat." However, the EA does not provide any discussion of the known limited effectiveness of road and route BMPs in the EA.

33. Sixth, some of the PDC will likely cause additional ecological problems, although this is not properly made known or assessed in the EA. For instance, attempts to disconnect surface runoff from damaged areas to nearby streams frequently exacerbate sediment delivery due to rill and gully erosion on hillslopes, as road-stream connectivity research has repeatedly documented (Wemple et al., 1996; Rhodes and Huntington, 2000).

35. As another example, a PDC proposes to use "certified weed-free certified Woodstraw or equivalent" to provide soil cover. Despite such certification, straw often has weed



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

propagules, which contribute to weed infestation (Karr et al., 2004). The EA (p. 163) notes that such mulch may have contributed to existing weed infestations within the Project area:

> "Populations of prostrate knotweed (Polygonum aviculare) and white clover (Trifolium repens ) are scattered among wood strand (wood fiber mulch) in the Timberline Express ski runs, evidently introduced in the wood strand or the seed mix that was applied to these areas in 2007."

This provides clear evidence that this PDC poses ecological harm to the area. Once established, weed infestations are extremely difficult to eliminate.

35. Seventh, the EA does not provide applicable evidence to supports its contentions regarding aggregate BMP and PDC effectiveness. There are no reliable data indicating that BMPs consistently reduce the adverse effects of roads on aquatic resources to ecologically negligible levels, especially within the context of currently pervasive watershed and aquatic degradation, as numerous scientific assessments, including those of the USFS, have repeatedly noted (Ziemer and Lisle, 1993; Espinosa et al., 1997; USFS and USBLM, 1997; Beschta et al., 2004; GLEC, 2008).

37. The research the EA (unpaginated page between pp. 81-82) cites as relevant to the effectiveness of BMPs to reduce sediment delivery in the Project area is highly questionable in terms of relevance and applicability to Project area. For instance, the EA cites Lakel et al. (2010) as relevant, but the research of Lakel et al. (2010) was conducted in the Piedmont physiographic region in Virginia at elevations ranging from about 500 feet to about 1180 feet. Therefore, it is highly unlikely that the results of Lakel et al. (2010) are applicable to the Project area's subalpine setting with deep snowpacks, prolonged snowmelt runoff, relatively sparse vegetation, and rain-on-snow events.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

38. Similarly, the EA cites Rashin et al. (2006) as being relevant to BMP effectiveness within the higher elevation sub-alpine conditions in the Project area. The research of Rashin et al. (2006) was restricted to commercial timberlands, which have far different vegetation, soil, snowpack, runoff, and growing-season characteristics than those in the Project area.

39. Eighth, the EA fails to explain that the most effective BMP is to avoid damaging and degrading activities which cause long-term damage to soils, hydrological processes, and stream systems. Scientists have repeatedly noted that the avoidance of ecological damage is far more tractable, efficient, and effective than attempts to limit, mitigate, or arrest and restore such damage (USFS et al., 1993; Rhodes et al., 1994; Kauffman et al., 1997; Beschta et al., 2004; Karr et al., 2004).

40. The avoidance of damaging impacts is particularly important in sensitive areas, such as those in riparian areas near streams. As the GLEC (2008) study noted with respect to road impacts in sensitive areas, "…in some cases, however, control of the problem may not be feasible: location 'trumps' management practice."

41. The Project does not avoid damaging impacts in sensitive areas. Instead, the Project would construct routes that have 23 new stream crossings in the Still Creek watershed, two new stream crossings in the West Fork Salmon watershed,[2] and two new stream crossings in the Glade Creek watershed, based on the data for the EA (Watershed Report, unpaginated, p. 20 of 52). Even with the proposed restoration measures, the Project would more than double stream

[2] The EA does not explicitly provide the number of new stream crossings constructed under the Project. However, the Watershed Report (unpaginated, p. 20 of 52) indicates that the proposed restoration measures would "…decrease by 1 crossing and 2 crossings in Still Creek and West Fork Salmon River Watersheds, respectively." Using this and stream crossing data in Table 8 of the Watershed Report (unpaginated, p. 20 of 52) yields the total of 27 new stream crossings under the Project, as provided here.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

crossings in the Project area, resulting in a 120% increase in stream crossings. Scientists have long recognized that BMPs cannot eliminate sediment delivery from roads to streams at stream crossings (Kattlemann et al., 1996; Beschta et al., 2004; Rhodes and Baker, 2008; Plumas National Forest, 2010).

42. Similarly, it has long been recognized that *full* protection of the area of vegetation within 200 to greater than 300 ft of the edge of *all* stream types is one of the most important and effective ways to limit the impacts from upslope disturbances, as numerous independent assessments have repeatedly concluded, including, to but not limited to, USFS et al. (1993), Henjum et al. (1994), Rhodes et al. (1994), NRC (1995), Erman et al. (1996), Moyle et al., 1996; USFS and USBLM (1997a; b), Beschta et al. (2004), and Karr et al. (2004). However, despite being provided with this information, the Project would permanently damage Riparian Reserves (RR) that are within about 200-300 of streams by constructing routes on about two acres of RR (EA, p. 86).

43. The best available science indicates that restoration attempts that treat the symptoms rather than the causes of degraded and disturbed conditions often have very limited effectiveness (e.g. USFS et al., 1993; Rhodes et al., 1994; Kaufman et al., 1997; Beschta et al., 2004; Karr et al. 2004; Beschta et al., 2012). Although the EA does not make it known, USFS et al. (1993), which provides the scientific basis for the NFP, states, regarding restoration: "Projects should address causes of degradation rather than symptoms" (USFS et al., App. V-J, 1993). Many of the restoration activities, including road surfacing, re-vegetation efforts, and road drainage activities, do not address the cause of existing problems and are highly likely to be ineffective, although this is not discussed or factored into the analyses in the EA.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

44. The foregoing major shortcomings in the EA are serious, because they cascade throughout the EA's assessment of the Project's impacts on erosion, sediment delivery, water quality, fish habitat, Riparian Reserves, and compliance with MHNF Plan standards, including ACSOs (EA, pp. 90-94), rendering all of these assessments highly flawed.

**The EA fails to provide any explanation of how the Project's sediment impacts were estimated or provide plausible support for the accuracy of those estimates.**

45. The EA uses models to estimate the sediment delivery from the proposed new construction, the existing roads and disturbed areas and the proposed restoration. The accuracy of the EA's sediment delivery estimates is a key concern because the estimates are relied upon to assess and characterize the impacts from the Project on water quality, fish habitats, fish populations (including those that imperiled or listed under the ESA), and consistency with related standards MHNF Plan and the ACSOs of the ROD (1994) (EA, pp. 62, 64, 68-72, 73-94).

46. If the sediment delivery methodology is flawed or generally inaccurate, then much of the conclusions related to aquatics in the EA is likely incorrect. However, the EA provides none of the information needed to assess the general accuracy and limitations of the EA's sediment delivery methodology and resulting effects on the veracity of the EA's Project impact assessments.

47. The EA fails to identify and adequately explain the method(s) used to provide the estimates of sediment delivery from the construction and operation of new bike routes, the existing routes and roads, and proposed restoration measures. Without adequate disclosure, there is no way to determine the veracity of the sediment delivery estimates or whether the methodology is sound, peer reviewed, applicable to this sub-alpine environment, biased and/or accurate. These are primary considerations in assessing the potential model errors and the



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

significance of any errors in terms of assessing the impact of the new construction.

48. The EA compounds the problems associated with failure to describe the sediment yield methods, by failing to divulge these crucial aspects of estimation accuracy:

- whether the methodology has been tested for its accuracy and applicability to the Project area;
- an estimate of typical model error (no methods are perfectly accurate);
- whether model results have been tested for bias, such as a tendency to over- or under-predict sediment delivery from activities and conditions based on comparison of results with actual data;
- specific model limitations, such as an inability to factor in erosion and sediment delivery caused by large magnitude rain-on-snow events, or stream channel erosion caused by increased peak flows;
- assumptions used in method application (most methods either incorporate assumptions or require users to make them) and potential effect of such assumptions on model accuracy.

49. The EA (e.g. Appendix A, p. 20) claims that the sediment delivery methodology was reviewed by staff at the Watershed Processes Research Team at the USFS Rocky Mountain Research Station, but this statement alone is not a surrogate for an identification of the method's limitations and accuracy and the significance of those limitations with respect to assessing the Project's impacts on resources affected by sediment delivery, including water quality, fish habitat, and fish populations.

**The EA fails to adequately assess the Project's impacts on erosion and sediment delivery into the affected watersheds.**

50. Cumulatively, the new construction will permanently degrade and convert 12 acres of vegetated land into bare mineralized soil for about 17 miles of bike routes and a skills park. Under the Project, restoration projects would be attempted on 5.9 acres of land. The EA



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

claims that the benefits of the attempted restoration on the 5.9 acres of land will offset the permanent degradation of 12 acres of land. These claims are based on scientifically unsound, inconsistent, contradictory and controversial assumptions on the impacts of roads and bike trails on the drainage network and sediment delivery.

51. To make these claims, the EA ignores the best available science which has found that road decommissioning elevates sediment delivery to streams for several years, as discussed in ¶ 17 of this declaration. This a major flaw, because more than half of the proposed restoration area is comprised of decommissioning, based on the data in the EA (p. 28). Reductions in sediment delivery from road decommissioning will occur slowly, if it is effective at all. In contrast, sediment delivery increases from route construction will be rapid and particularly high during the first few years after construction. The EA acknowledges that route impacts are akin to those of roads. Beschta et al. (2004) noted:

> "Accelerated surface erosion from roads is typically greatest within the first years following construction although in most situations sediment production remains elevated over the life of a road (Furniss et al. 1991; Ketcheson & Megahan 1996)…the assumption that road obliteration or BMPs will offset the negative impacts of new road and landing construction and use is unsound since road construction has immediate negative impacts and benefits of obliteration [or decommissioning] accrue slowly."

Due to the failure to account for the timing of these sediment consequences from route construction and attempted restoration, the EA significantly underestimates the Project's total sediment delivery increases over the first several years of implementation.

52. Second, the EA's sediment delivery estimates do not reflect that re-vegetation efforts within the Project area often fail, as discussed in ¶ ¶ 25-27 of this declaration. This is a significant flaw in the EA's estimate of sediment delivery impacts, because about 44% of the



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

total area of the Project's proposed restoration involves attempted re-vegetation (EA, p. 28).

53. Third, the sediment delivery estimates do not properly incorporate that drainage features near streams will *not* effectively prevent significant delivery to streams within the Project area. A considerable fraction of the Project's drainage diversions will merely route sediment-laden water from routes to streams during the periods when most of the sediment is supplied to streams, as discussed in ¶¶ 28-30, 32 of this declaration. Based on the data in the EA (p. 28), about 51% of the proposed restoration area involves attempts to reduce sediment delivery via surface water management (which primarily involves drainage diversion features), a significant portion of which will be ineffective. Because EA did not reasonably assess the ineffectiveness of drainage diversions, the EA considerably overestimates sediment delivery reductions from proposed restoration measures.

54. The conclusion that 6 acres of restoration will work to cancel out the sediment-related impacts of the conversion of 12 acres of to a road-like state is based on the EA's (p.69) assumption that only only 1% of the total sediment generated by the bike trails is directly delivered to streams. This controversial and unsupported assumption is absurdly low for several reasons:

- Even with drainage diversion features, much of the sediment-laden water from routes within about 200-300 feet are directly delivered to streams (CNF, 2003), especially in the Pacific Northwest (GLEC, 2008);

- Studies of road drainage to streams in the Pacific Northwest have found that about 17 to 35% of the total road mileage contributes sediment to streams (GLEC, 2008), which is 17 to 35 *times* higher than the unsupported assumption in the EA regarding bike routes;

- Due to saturated soils during the periods when the majority of route runoff and erosion occur, much of the water routed from bike routes will enter streams that are within at least few hundred feet of the bike routes;



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

- Although undisclosed in the EA, available scientific literature indicates that sediment delivery at stream crossings cannot be eliminated by BMPs, including drainage features;
- The bike trails would involve construction of about 27 stream crossing, based on information in the PA, (the EA does not reveal the number of constructed stream crossings by bike routes), as discussed in ¶ 41 in this declaration;
- The assumption of 1% direct sediment delivery from the bike trails, equates to a direct delivery distance of about 33.6 feet of trail per bike route stream crossing, which is absurdly low due to Project area setting, including slope steepness, and available scientific information on route-stream connectivity at crossings which suggest it is at least several times that distance, as discussed below;
- The Project area has relatively low levels of vegetation and downed wood which, if present, helps prevent sediment delivery from drainage diversions on routes;
- The EA (p. 69) assumed that direct sediment delivery from roads was 8%, or eight times higher than from bike routes, even after restoration treatments, including drainage diversions, on roads;
- The EA provides absolutely no rationale or scientific literature to support the absurdly low assumption of 1% direct delivery to streams, rendering this assumption arbitrary and unsupported.

55. There is ample information available which runs directly counter to the EA's that only 1% of the bike routes would directly deliver sediment from bike routes into streams.

56. For instance, The Record of Decision for the Northwest Forest Plan (p. B-15, Figure B-1, 1994) indicates that on unconsolidated soils with slopes of 30-50%, more than 100 feet of protected width is needed to protect intermittent streams from upslope surface erosion. This indicates that under these conditions surface erosion is commonly delivered to streams from distances greater than 100 feet, as I noted in my comments to the MHNF on the PA. Many of the slopes flanking streams, seeps, and wetlands within the Project area are greater than 30% (EA, p. 54). Additionally, the data analysis in USFS and USBLM (1997a) found that on 40% slopes,



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

sediment traveled more than 200 feet downslope about 25% of the time.

57. The PA (p. 61) noted that existing anthropogenic sediment sources in the Project area that are more than 80 feet from streams are delivering sediment to streams. This strongly indicates that trails constructed more than 80 feet from streams will also deliver sediment to streams. This, together with the foregoing information from ROD (1994) and USFS and USBLM (1997a) strongly contradict the EA's assumption that only 1% of the sediment generated by the routes will be directly contributed to streams.

58. Many assessments, including those by the USFS, have repeatedly acknowledged that stream crossings deliver sediment from a significant distance of the routes directly to streams, even with BMP application (Eaglin and Hubert, 1993; Kattlemann, 1996; Gucinski et al., 2001; Rieman et al., 2003; Ouren et al., 2007; Rhodes and Baker, 2008; GLEC, 2008; Plumas National Forest, 2010, Fu et al., 2010). Fu et al. (2010) noted "The most efficient form of sediment delivery occurs at road-stream crossings where virtually all generated sediment is delivered to a stream…"

59. A rational approach to estimating the percentage of the direct delivery of sediment provides a helpful point of reference to understand the magnitude of the EA's underestimation of sediment delivery that will come from the construction of 17.2 miles of new bike routes. Using the very conservative assumption that 150 feet of bike routes[3] are directly connected to streams at stream crossings during runoff periods when the vast majority of sediment delivery occurs, coupled with 27 crossings, results in a very conservative direct sediment delivery estimate of about 4.5% for the bike routes, or 4.5 times higher than assumed in the EA.

---

[3] As previously discussed, available data indicates that it is likely that at least 200-300 feet of routes are directly connected to streams at stream crossings, and, hence, directly deliver sediment to streams.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

60. The EA vastly underestimates sediment delivery from the Project, due to the use of the absurdly low assumption that only 1% of sediment from bike routes is directly delivered to streams. At the very least, the bike routes will deliver more than *four times the amount of sediment* estimated in the EA.

61. The EA significantly underestimates the Project's increases in sediment delivery from road decommissioning, bike route construction and operation, while vastly overestimating reductions in sediment delivery from proposed restoration measures. Therefore, it is highly likely that the Project's total effect will result in a significant increase in sediment delivery to streams for at least several years.

62. There are several other flaws in the EA that further contribute to an underestimation of the Project's net impacts on sediment delivery to streams. As discussed in ¶ 24, the EA fails to account for the transience of gravel surfacing and its effects on sediment delivery.

63. The EA fails to assess the increase in downstream sediment delivery due to the increased peak flows under the Project. The best available science indicates increased peak flows inexorably increase channel erosion and sediment transport to downstream reaches (Richards, 1982; King, 1989; Rhodes et al., 1994; Dunne et al., 2001), although this is not properly made known or analyzed in the EA. Dunne et al. (2001) noted that even minor changes in peak flow magnitude and frequency can have major effects on salmonids by triggering significant changes in channel erosion and sediment transport to downstream reaches (Dunne et al., 2001).

64. The EA (p. 68) acknowledges that the erosive power of water increases at the



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

sixth power of its velocity, which corroborates that sediment transport greatly increases with relatively small increases in peakflow discharge, because water velocity increases with peak flow discharge (Dunne and Leopold, 1978; Richards, 1982; Rosgen, 1994).

65. The EA (p. 66) acknowledges that Project will elevate peak flows have a recurrence interval of about two years. This will significantly elevate channel erosion and downstream channel transport, because it has long been recognized that peak flows with a recurrence interval of about two years transport the majority of sediment in stream systems (Dunne and Leopold, 1978). This is also corroborated by the USFS "state-of-science" assessment of peak flow impacts on stream channels (Grant et al. (2008)) which notes that channels that are primarily gravel bedded are significantly affected by increases in peak flows that have a recurrence interval of about two years or less.

66. The streams in the area are susceptible to elevated erosion triggered by increased peak flow. The EA (p. 79) notes: "The streams in this area are composed of a gravel substrate." Some of the Project area streams are Rosgen "A4" type channels (EA, pp. 54-56), which are gravel-bedded (Rosgen, 1994). Although is it not addressed in the EA, these A4-type streams have very high streambank erosion potential and are extremely sensitive to disturbances (Rosgen, 1994), such as increased peak flow.

67. As the EA (pp. 65, 75, 79) acknowledges, Grant et al. (2008) noted that gravel bedded channels warrant more detailed hydrologic and geomorphic analysis with respect to peak flows, due to their susceptibility to elevated erosion triggered by increased peak flows. Despite the EA's repeated acknowledgement that the effects of peak flows on gravel bed streams, such as those in the Project area, warrant detailed analysis, the EA includes no such detailed analysis.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

68. Therefore, the failure of the EA to account for the increased channel erosion and sediment transport due to the Project's peak flow increases is yet another way in which sediment delivery to downstream channels and fish habitats is underestimated. As a result, the Project's aggregate sediment-related impacts are underestimated, including the downstream impacts on water quality, aquatic habitats and sediment-sensitive aquatic biota.

69. The best available science indicates that fine sediments delivered to, or mobilized from the Project area's perennial and non-perennial streams will be readily transported to downstream reaches, affecting downstream water quality, fish habitat and stream conditions in a cumulative fashion (USFS et al., 1993; Rhodes et al., 1994; Moyle et al., 1996; Erman et al., 1996; USFS and USBLM, 1997a). In fact, most of the sediment and water in fish habitats come from upstream sources, including non-perennial tributaries (Moyle et al., 1996; Erman et al., 1996; USFS and USBLM, 1997a).

**The EA makes unsupported and controversial assumptions regarding the impacts from new construction on stream-route connectivity, peak flows and stream network extension.**

70. As the EA (p. 65) acknowledges, studies have consistently documented that roads elevate peak flows by routing elevated runoff to streams at locations where streams and roads are hydrologically connected. Roads greatly elevate runoff due to extremely low infiltration rates and the interception of subsurface flows which are converted to surface runoff (Wemple et al., 1996; Rhodes and Huntington, 2000; La Marche and Lettenmaier, 2001; Gucinski et al., 2001; Grant et al., 2008), although the EA fails to divulge and analyze the latter's effects on peak flows. These findings are germane to the impacts of bike routes on peak flows, because the EA (p. 65) acknowledges that bike routes "…are similar to roads in the way that they impact



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

hydrologic process associated with streamflow…"

71. The EA's assessment stream network extension by bike routes is severely flawed because it is based on two unsound assumptions: 1) that the stream network is expanded by the bike routes only at stream crossings and 2) only expanded for a distance of 50 feet at these crossings (EA, App. A, p. 21). The EA provides no sound scientific basis or rationale for these two assumptions, but both are incorrect and underestimate the Project's effects on the extension of the stream network by bike routes and, hence, peak flows.

72. Routes are connected to streams at points other than stream crossings, as field assessments of stream-road connectivity have consistently documented (Wemple et al., 1996; Rhodes and Huntington, 2000; La Marche and Lettenmaier, 2001; GLEC, 2008). Other common points of route-stream connectivity include gullies and channels formed by route runoff drainage features (Wemple et al., 1996; Rhodes and Huntington, 2000; La Marche and Lettenmaier, 2001). Notably, such channels are most likely to form under conditions that exist within the sub-alpine area here: high levels of runoff and relatively steep slopes. Such channels can deliver runoff to streams over hundreds of feet of hillslope (USFS and USBLM, 1997a; Rhodes and Huntington, 2000).

73. Within the Project area, there will be many other points of stream network extension by routes besides stream crossings. Because soils on hillslopes are completely saturated and unable to infiltrate water diverted from bike routes during major runoff events in the Project area, water diverted from routes flowing will simply flow over saturated soils into streams during the major runoff events that generate peak flows. USFS assessments have repeatedly conceded that there is a high degree of stream-route connectivity when routes are



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

within 300 feet of streams (e.g., Clearwater National Forest, 2003; Gila National Forest, 2010), even in the absence of stream crossings. Notably, the Project area generates far greater runoff than either the Clearwater or Gila National Forests, which tends to increase the distance over which routes are hydrologically connected to streams (Gucinski et al., 2001). Therefore, the EA's failure to reasonably assess other likely points of stream network extension by the bike routes besides stream crossings causes the EA to significantly underestimated stream network extension and effects on peak flows.

74. The EA's assumption that only 50 feet of bike routes at crossings contribute to stream channel extension is not credible, because attempts to prevent runoff from routes to the streams through the use of diversion features often fail in the Pacific Northwest when the routes themselves are relatively close to streams (e.g. less than 300 feet). The use of diversion features near streams merely changes the path by which water from routes enters streams (GLEC, 2008).

75. Although it is not disclosed in the EA, the USFS synthesis of the impacts of roads (Gucinski et al., 2001) clearly noted that the magnitude of runoff and soil saturation affects the amount of routes that are connected to streams: "As storms become larger or soil becomes wetter, more of the road system contributes water directly to streams." This certainly holds for prolonged snowmelt runoff and the extension of stream networks by the bike routes in the Project area.

76. A reasonable and conservative assumption for purposes of the analysis is that about 150 feet of a particular bike route is connected to streams at the point of the stream crossing. Using this assumption, it is likely that the actual level of drainage network extension that will be caused by the Project will be at least *three times higher* than estimated in the EA.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

77. Notably, the PA assumed that native surface roads expand the stream network by 750 feet at stream crossings, which is *15 times* greater than the distance the EA assumes for the bike routes. The EA (p. 64) notes that the bike routes function similar to roads with respect to hydrologic impacts. Therefore, it is not sound to assume that only 50 feet of bike routes are connected to streams at stream crossings, as is done in the EA. This scientifically controversial and unsound assumption results in significant underestimation of the Project's effect on stream network extension, and, hence, peak flows.

78. The bike trails will also elevate peak flows by intercepting subsurface water during periods of high runoff when soils are saturated, converting the subsurface flow into surface flow that is rapidly routed to streams. This mechanism of interception will occur at locations where the bike routes are excavated into soils. This mechanism of interception is unavoidable during periods when soil moisture levels are high (Kirkby, 1978; Rhodes et al, 1994). Studies have consistently documented that the interception of subsurface water by routes is a significant source of peak flow elevation (La Marche and Lettenmaier, 2001; Luce, 2002).

79. The EA fails to adequately analyze and make known the Project's effects on peak flows and instead incorrectly asserts that groundwater in the Project area is 50-150 below the soil surface. During the period of primary runoff, the soils are completely saturated, as is the case in all mountainous areas with deep snow packs during prolonged snowmelt. When soils are saturated, any soil incision converts subsurface flow to surface runoff.

80. The failure to properly assess and make known the foregoing is a major flaw, because subsurface water interception is often the most substantial mechanism for peak flow elevation by routes (La Marche and Lettenmaier, 2001; Luce, 2002). For these reasons, the EA



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

does not reasonably assess the Project's effects on stream networks, peak flows and related effects on streams, fish habitats, and ACSO compliance.

**The EA does not properly divulge that the construction of the 17.2 miles of bike routes will permanently degrade Riparian Reserves.**

81. The Project's bike routes will have impacts akin to those of roads on about 2 acres of Riparian Reserves (EA, p. 86). Although it is not disclosed in the EA, it is well documented that route construction, as proposed in this Project, effectively eliminates soil productivity and permanently degrades soil hydrology.

82. These losses of critical ecosystem functions in Riparian Reserves, along with topsoil loss from elevated erosion, are irretrievable and irreparable (USFS and USBLM, 1997a; Beschta et al., 2004; Karr et al., 2004).

83. The EA does not make known that these enduring soil impacts and associated vegetation removal on bike routes permanently degrade the functionality of these Riparian Reserves. Soil conditions and vegetation are key to numerous critical Riparian Reserve functions, including bank stability, stream shading, sediment prophylaxis, large woody debris (LWD) recruitment, and microclimate maintenance (USFS et al., 1993; Rhodes et al., 1994).

84. Due to de-vegetation and soil damage, the areas occupied by bike routes will not contribute to any of these important Riparian Reserve functions. The areas occupied by bike routes in the Riparian Reserves will no longer be able help arrest sediment transport from upland sources, but will instead act as near-stream sources of persistent and significantly elevated levels of fine sediment.

85. Sediment detention will be reduced on trails due not only to the removal of vegetation, but due to severe reductions in infiltration and major increases in the magnitude,



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

frequency, and duration of surface runoff from trails. The vast reduction of infiltration on routes greatly increases the magnitude, frequency, and duration of surface runoff. In contrast to undisturbed areas, surface runoff occurs on routes in response to even short-duration low-intensity rates of rain and snowmelt.

86. Even if the bike routes are ultimately abandoned and/or decommissioned, the bike routes will continue to degrade Riparian Reserve functions and retard re-vegetation due to soil compaction and irreversible loss of soil productivity from the bike routes' combined soil impacts. As the USFS has admitted for other projects, degraded soil productivity and soil hydrology from such impacts can never be fully restored, even with remediation (Bitterroot National Forest, 2001; Rogue River-Siskiyou National Forest, 2003).

87. The EA (pp. 86, 90) compounds the foregoing flaws by incorrectly asserting that "The planned restoration activities would completely restore 1.54 acres…within the riparian reserves." As previously discussed, this is incorrect because restoration measures cannot fully restore conditions and processes caused by ground disturbing impacts, as the USFS has acknowledged. This is a significant defect, because Riparian Reserves are one of the cornerstones of the ACS (ROD, 1994).

**The EA's assessment of the Project's cumulative effects on aquatic resources, including compliance with ACSOs and other standards, is highly defective.**

88. Many of the defects in the EA are due to the flawed assessment of Project's impacts in terms of sediment delivery. The available science from the Forest Service's own research establishes that the Project will significantly elevate sediment delivery for at least several years.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

89. Increased sediment delivery degrades fish habitats in several ways that reduce salmonid survival and conflict with the attainment of the Aquatic Conservation Strategy Objectives.

90. Field and laboratory studies have consistently demonstrated that increased sediment delivery increases fine sediment levels in stream substrate (Lisle et al., 1993; USFS et al., 1993; Rhodes et al., 1994; Buffington and Montgomery, 1999; Hassan and Church, 2000; Kappesser, 2002; Cover et al., 2008). The failure to divulge how much the Project will elevate fine sediment levels in relation to the applicable Mt. Hood National Forest Plan standards is significant because increased fine sediment levels sharply reduce the survival and production of steelhead, coho salmon, spring chinook salmon, coastal cutthroat trout and degrade their habitats in several ways (Meehan, 1991; Weaver and Fraley, 1991; Rhodes et al., 1994; Waters, 1995; Hall et al., 1997; USFS and USBLM, 1997a; c).

91. *Any* increase in fine sediment levels significantly impairs steelhead trout production (Suttle et al., 2004). The additional increases in fine sediment in streams caused by the Project will be particularly harmful to affected salmonid populations, because fine sediment levels in affected streams are already at high levels (EA, p. 58-59) that impair salmonid survival and production. The EA fails to account for increased fine sediment levels on fish habitat, fish survival, and impacts on salmonids.

92. The increases in fine sediment caused by the Project will serve to further increase the severity and extent of the existing chronic condition and violations of fine sediment standards contained in the Mt. Hood National Forest Plan. Currently, several reaches in Still Creek and the West Fork Salmon have fine sediment levels well in excess of the MHNF Plan standard for fine



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

sediment (EA. pp. 58-59). During my field review of the Project area on June 1, 2013, I observed that fine sediment levels Still Creek were extremely high in all the stream reaches that I examined from the base of the Jeff Flood lift downstream to the crossing of Still Creek by the East Leg Connector. In all of these reaches, fine sediment occupied 65 to 100% of the surface of the stream bed, which is extraordinarily high and far higher than the MHNF standard which requires that surface fine sediment not exceed 20% (EA, p. 58).

93. The increases in sediment delivery and consequent fine sediment elevation in stream substrate caused by the Project will also conflict with the attainment of several ACSOs. NMFS (1996) notes that substrate conditions affect ACSO's #3, #5, #8, #9. The increases in fine sediment in streams caused by the Project will conflict with the attainment ACSO #3 by degrading stream bottom configurations via elevated fine sediments, ACSO #5 by altering the sediment regime, and ACSO #9 by degrading fish habitats.

94. Increased sediment delivery from the Project will also contribute to reductions in the pool volume and quality (Lisle and Hilton, 1992; McIntosh et al., 2000; Buffington et al., 2002), which conflicts with ACSO #3, which requires maintenance and restoration of the "physical integrity of the aquatic system including shorelines, banks and bottom configurations" (ROD, B-11, 1994). This effect on pool volume and quality from elevated sediment delivery also degrades fish habitat, which also conflicts with ACSO #9.

95. Coastal cutthroat trout and coho salmon, which inhabit streams affected by the Project, are particularly sensitive to the loss of pool volume and quality (Meehan, 1991; Hall et al., 1997; USFS and USBLM, 1997a; c). However, pool degradation has a significant negative effect on all salmonids affected by the Project (Meehan, 1991; Hall et al., 1997; USFS and



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

USBLM, 1997a; c). Therefore, the failure to adequately assess the Project's cumulative effects on pool conditions renders the EA's analysis of impacts on salmonids defective.

96. Elevated sediment delivery also increases turbidity which degrades water quality and can adversely affect salmonids. This turbidity effect is inconsistent with ACSO #4, which requires the maintenance and restoration of "water quality necessary to support healthy riparian, aquatic, and wetland ecosystems." (ROD, B-11, 1994).

97. The increased sediment delivery and peak flows from the Project also contribute to stream widening and elevated width/depth ratio in affected streams (Richards, 1982; Rhodes et al., 1994; Dose and Roper, 1994; Bartholow, 2000). These changes conflict with ACSO #3 which requires protection of stream channel integrity. The EA is completely devoid of any assessment of the Project's effect on stream width and depth. This is also significant because stream widening elevates summer water temperatures, even in the absence of shade loss (Bartholow, 2000), which conflicts with ACSO # 4.

98. The Project's increases in peak flow magnitudes conflict with ACSO #6, which requires protection of the timing, magnitude, duration, and spatial distribution of peak flows, although this is not properly disclosed.

99. Although it is not made known in the EA, peak flow elevation is likely to degrade conditions in the steep, gravel bed A4 channels within the Project. These stream channels have very high streambank erosion potential, are extremely sensitive to disturbance, and have very poor recovery potential after degradation (Rosgen, 1994). The degradation of these channels by the Project's peak flow impacts is in conflict with ACSO #3, which requires the maintenance and



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

restoration of the "…aquatic system including shorelines, banks and bottom configurations" (ROD, B-11, 1994).

**The Project irreversibly and irretrievably commits resources to a degraded condition.**

100. The 17.2 miles of bike route construction, operation and maintenance would result in the loss of topsoil via erosion and delivery to streams on at least 12 acres of ground. The best available science indicates that topsoil loss causes serious reductions in soil productivity (Beschta et al., 2004), which the USFS has acknowledged (USFS and USBLM, 1997a). The loss of topsoil is irreversible and associated reductions in soil productivity are essentially permanent (Beschta et al., 2004; Karr et al., 2004). Loss of organic matter would also occur on trails in Riparian Reserves, which reduces soil productivity (USFS and USBLM, 1997a) in an irretrievable manner. The loss of salmonid productivity in affected fish habitats is also irretrievable. The EA does not disclose these irretrievable and irreversible impacts.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 2nd day of June 2013 at Portland, Oregon.

JONATHAN J. RHODES



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

**Literature Cited**

Allen, D.M. and Dietrich, W.E., 2005. Application of a process-based, basin-scale stream temperature model to cumulative watershed effects issues: limitations of Forest Practice Rules. Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H13B-1333, http://www.agu.org/meetings/fm05/fm05-sessions/fm05_H13B.html

Bartholow, J.M., 2000. Estimating cumulative effects of clearcutting on stream temperatures, Rivers, 7: 284-297.

Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E., Minshall, G.W., Karr, J.R., Perry, D.A., Hauer, FR, Frissell, C.A., 2004. Postfire management on forested public lands of the Western USA. Conservation Biology, 18: 957-967.

BNF (Bitterroot National Forest), 2001. FEIS for the Burned Area Recovery Project. BNF, Hamilton, MT.

Buffington, J.M., Lisle, T.E., Woodsmith, R.D., and Hilton, S., 2002. Controls on the size and occurrence of pools in coarse-grained forest rivers. River Res. Applic. 18: 507-531.

Buffington, J.M. and Montgomery, D.R., 1999. Effects of sediment supply on surface textures of gravel-bed rivers. Water Resour. Res., 35: 3523–3530.

Clearwater National Forest (CNF), 2003. Roads analysis report. Clearwater National Forest, Orofino, ID.

Cover, M.R., C.L. May, W.E. Dietrich, and V.H. Resh. 2008. Quantitative linkages among sediment supply, streambed fine sediment, and benthic macroinvertebrates in northern California streams. J. N. Amer. Benthological Soc., 27:135-149.

Dose, J.J. and Roper, B.E., 1994. Long-term changes in low-flow channel widths within the South Umpqua watershed, Oregon. Water Resour. Bull., 30: 993-1000.

Dunne, T. and Leopold, L., 1978. Water in Environmental Planning. W.H. Freeman and Co., NY.

Dunne, T., Agee, J., Beissinger, S., Dietrich, W., Gray, D., Power, M., Resh, V., Rodrigues, K., 2001. A scientific basis for the prediction of cumulative watershed effects. University of California Wildland Resource Center Report No. 46.

Eaglin, G.S. and Hubert, W.A., 1993. Effects of logging and roads on substrate and trout in streams of the Medicine Bow National Forest, Wyoming. N. Am. J. Fish. Manage., 13: 844-46.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

Erman, D.C., Erman, N.A., Costick, L., and Beckwitt, S. 1996. Appendix 3. Management and land use buffers. Sierra Nevada Ecosystem Project Final Report to Congress, Vol. III, pp. 270-273.

Espinosa, F.A., Rhodes, J.J., and McCullough, D.A.. 1997. The failure of existing plans to protect salmon habitat on the Clearwater National Forest in Idaho. J. Env. Manage. 49: 205-230.

Foltz, R.B., Rhee, H., Yanosek, K.A., 2007. Inltration, erosion, and vegetation recovery following road obliteration. Trans. ASABE 50: 1937-1943.

Fu, B., Newham, L.T., and Ramos-Sharrón, C.E., 2010. A review of surface erosion and sediment delivery models for unsealed roads. Environ.Modelling & Software, 25: 1-14.

Gila National Forest, 2010. Draft Environmental Impact Statement for Travel Management on the Gila National Forest. USFS, Southwestern Region, Santa Fe, NM.

Grant, G.E., S.L. Lewis, F.J. Swanson, J.H. Cissel, and J.J. McDonnell. 2008. Effects of forest practices on peak flows and consequent channel response: a state-of-science report for western Oregon and Washington. General Technical Report PNW-GTR-760. Pacific Northwest Research Station, Forest Service, USDA, Portland, OR.

Grant, A.S., Nelson, C.R., Switalski, T.A., and Rinehart, S.M., 2011. Restoration of native plant communities after road decommissioning in the Rocky Mountains: Effect of seed-mix composition on vegetative establishment. Restoration Ecology, 19: 160-169.

(GLEC) Great Lakes Environmental Center, 2008. National Level Assessment of Water Quality Impairments Related to Forest Roads and Their Prevention by Best Management Practices. Final Report. Report prepared for US Environmental Protection Agency, Office of Water, Contract No. EP-C-05-066, Task Order 002, 250 p.

Gucinski, H., Furniss, M.J., Ziemer, R. R., and Brookes, M.H., 2001. Forest roads: a synthesis of scientific information. Gen. Tech. Rep. PNW GTR-509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Hall, J.D., P.A. Bisson and R.E. Gresswell (eds.). 1997. Sea-run cutthroat trout: biology, management, and future conservation, Am. Fish. Soc., Corvallis.

Hassan, M.A. and Church, M., 2000. Experiments on surface structure and partial sediment transport on a gravel bed. Water Resour. Res., 36: 1885-1895.

Kappesser, G.B., 2002. A riffle stability index to evaluate sediment loading to streams. J. Amer. Water Resour. Assoc., 38: 1069-1080.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

Karr, J.R., Rhodes, J.J., Minshall, G.W., Hauer, F.R., Beschta, R.L., Frissell,C.A., and Perry, D.A, 2004. Postfire salvage logging's effects on aquatic ecosystems in the American West. BioScience, 54: 1029-1033.

Kattlemann, R., 1996. Hydrology and Water Resources. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options, pp. 855-920 Wildland Resources Center Report No. 39, Centers for Water and Wildland Resources, University of California, Davis.

Kauffman, J.B., R.L. Beschta, N. Otting, and D. Lytjen, 1997. An ecological perspective of riparian and stream restoration in the western United States. Fisheries 22:12-24.

King, J.G., 1989. Streamflow Responses to Road Building and Harvesting: A Comparison With the Equivalent Clearcut Area Procedure, USFS Res. INT-RP-401, USFS Intermountain Research Station, Ogden, UT.

Kirkby, M.J. (ed.), 1978. Hillslope Hydrology. John Wiley & Sons, Inc., New York

Lakel, W.A., Aust, W.M., Bolding, M.C., Dolloff, C.A., Keyser, P. and Feldt, R., 2010. Sediment trapping by streamside management zones of various widths after forest harvest and site preparation. Forest Science 56: 541-551.

La Marche, J.L. and Lettenmaier, D.P., 2001. Effects of forest roads on flood flows in the Deschutes River, Washington. Earth Surf. Process. Landforms, 26: 115-134.

Lisle, T. and Hilton, S., 1992. The volume of fine sediment in pools: An index of sediment supply in gravel-bed streams. Water Resour. Bull., 28: 371-383.

Lisle, T.E., Iseya, F. and Ikeda, H., 1993. Response of a channel with alternate bars to a decrease in supply of mixed size bed load: A flume experiment. Water Resour. Res., 29: 3623-3629.

Luce, C.H., 2002. Hydrological processes and pathways affected by forest roads: What do we still need to learn? Hydrol. Process. 16: 2901–2904

McIntosh, B.A, Sedell, J.R., Thurow, R.F., Clarke, S.E. and Chandler, G.L., 2000. Historical changes in pool habitats in the Columbia River Basin. Ecological Applications, 10: 1478-1496.

Meehan, W.R. (ed.). 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. Am. Fish. Soc. Special Publication 19.

Menning, K. M., D. C. Erman, K. N. Johnson, and J. Sessions, 1996. Aquatic and riparian systems, cumulative watershed effects, and limitations to watershed disturbance. Sierra



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

Nevada Ecosystem Project: Final Report to Congress, Addendum, pp. 33-52. Wildland Resources Center Report No. 39, Centers for Water and Wildland Resources, University of California, Davis.

Moyle, P. B., Zomer, R., Kattelmann, R., & Randall, P., 1996. Management of riparian areas in the Sierra Nevada. Sierra Nevada Ecosystem Project: Final Report to Congress, vol. III, report 1. Davis: University of California, Centers for Water and Wildland Resources.

NMFS (National Marine Fisheries Service), 1996. Making ESA determinations of the effect of individual or grouped actions at the watershed scale. NOAA Fisheries ETS Division, Portland, OR.

National Research Council (NRC), 1995. Upstream -- Salmon and Society in the Pacific Northwest. National Academy of Sciences Press, Wash. D.C.

Ouren, D.S., Haas, C, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, T., and Bowen, Z.H., 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353.

Plumas National Forest, 2010. Final Environmental Impact Statement Plumas National Forest Public Motorized Travel Management. Pacific Southwest Region R5-MB-166, Plumas National Forest, Quincy, CA.

Rashin, E. B., Clishe, C. J., Loch, A.T., Bell, J.M., 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal American Water Resources Association, 42: 1307-1328.

Rhodes, J.J. and Baker, W.L., 2008. Fire probability, fuel treatment effectiveness and ecological tradeoffs in western U.S. public forests. Open Forest Science Journal, 1: 1-7. http://www.bentham.org/open/tofscij/openaccess2.htm

Rhodes, J.J. and Huntington, C., 2000. Watershed and Aquatic Habitat Response to the 95-96 Storm and Flood in the Tucannon Basin, Washington and the Lochsa Basin, Idaho. Annual Report to Bonneville Power Administration, Portland, Or.

Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, Or. http://www.critfc.org/text/tech_rep.htm

Richards, K., 1982. Rivers: Form and Process in Alluvial Channels. Methuen and Co., New York.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*

Rieman, B.E., Lee, D., Burns, D., Gresswell, R., Young, M., Stowell, R., Rinne, J. and Howell, P., 2003. Status of native fishes in the western United States and issues for fire and fuels management. Forest Ecol. and Manage., 178: 197–211.

RSNF (Rogue River-Siskiyou National Forest), 2003. Biscuit Fire Recovery Project DEIS, RSNF, Medford, OR.

Rosgen, D.L., 1994. A classification of natural rivers. Catena, 22: 169-199.

Suttle, K.B., Power, M.E., Levine, J.M, and McNeely, C., 2004. How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. Ecological Applications, 14: 969–974.

Switalski, T.A., Bissonette, J.A., DeLuca, T.H., Luce, C.H., and Madej, M.A., 2004. Benefits and impacts of road removal. Frontiers in Ecology and the Environment 2: 21-28.

USFS and USBLM, 1997a. An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great Basins, Volumes 1-4. General Technical Report PNW-GTR-405. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.

USFS and USBLM, 1997c, Chapter 3, Effects of proposed alternatives on aquatic habitats and native fishes, in Evaluation of EIS Alternatives by the Science Integration Team. Vol. I PNW-GTR-406, USFS and USBLM, Portland, OR

USFS, National Marine Fisheries Service (NMFS), U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), U.S. National Park Service (NPS), U.S. Environmental Protection Agency (EPA), 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. USFS PNW Region, Portland, OR.

Waters, T.F., 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society, Monograph 7, Bethesda, MD

Weaver, T., and Fraley, J., 1991. Fisheries habitat and fish populations, Flathead Basin Forest Practices Water Quality and Fisheries Cooperative Program Final Report, pp. 51-68. Flathead Basin Comm., Kalispell, MT.

Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, Western Cascades, Oregon. Water Resour. Bull. 32: 1195-1679.

Ziemer, R.R., and Lisle, T.E., 1993. Evaluating sediment production by activities related to forest uses--A Northwest Perspective. Proceedings: Technical Workshop on Sediments, Feb., 1992, Corvallis, Oregon. pp. 71-74. Terrene Inst., Washington, D.C.



*Crag Law Center*
*917 SW Oak St., Suite 417*
*Portland, OR 97205*
*Tel. (503) 525-2727*