EARTHJUSTICE

ALASKA CALIFORNIA FLORIDA MID-PACIFIC NORTHEAST NORTHERN ROCKIES
NORTHWEST ROCKY MOUNTAIN WASHINGTON, DC INTERNATIONAL

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Submitted via http://www.govcomments.com and
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Forest Service Planning DEIS
c/o Bear West Company
132 E. 500 S.
Bountiful, UT 84010

Re: Watershed Protection Comments on National Forest System Land Management Planning Rule, 76 Fed. Reg. 8,480 (Feb. 14, 2011)

Greetings:

INTRODUCTION

Please accept these comments from Earthjustice and Pacific Rivers Council on the proposed National Forest Management Act ("NFMA") planning rule, 76 Fed. Reg. 8,480 (Feb. 14, 2011), and its accompanying draft Environmental Impact Statement ("DEIS"). Our comments focus on the proposed rule's requirements for protection and restoration of water and watersheds on national forest land. These comments unsurprisingly echo our two prior submissions to the U.S. Forest Service on this topic. Our review of the proposed planning rule, the draft environmental impact statement, and its range of alternatives all hinge on three basic principles: (1) NFMA places watershed protection over timber production, and now is the time for the Forest Service to fully recognize and fulfill this obligation through its planning requirements; (2) the proposed rule should require individual forest plans to adopt measurable, enforceable standards and guidelines to meet the goal of watershed protection; and (3) conservation biology principles must be followed to protect healthy areas, stop further degradation, and restore watershed function and connectivity, in that order.

SUMMARY

Overall, the proposed planning rule and accompanying DEIS simply fall short on the Forest Service's early promise of water and watershed protection. For priority watersheds, riparian conservation areas, roads, and measurable standards and guidelines, the proposed planning rule says some of the right words, yet backs away from concrete standards. Some of the rule's shortcomings on watershed protection are addressed by the additional requirements in Alternative D pertaining to criteria for key watershed identification, threshold metrics linking monitoring to management changes, standards and guidelines for riparian conservation areas, and standards and guidelines for key watersheds that include road density standards. We

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recommend that for watersheds at least, adoption of Alternative D should be a starting point for the agency.[1]

As discussed in more detail below, the Forest Service's proposed planning rule fails to adequately protect water and watersheds in the following ways:

1. While the proposed planning rule requires identification of priority watersheds for maintenance and restoration, it fails to supply criteria for identifying priority watersheds that are connected and well-distributed across the landscape, and to include areas important to all aquatic species. The rule further fails to mandate standards and guidelines that ensure protection of identified watersheds.

2. While the proposed planning rule requires forest plans to set riparian conservation areas, it fails to set a national default standard (to be applied until forest-specific analysis can be done), and it fails to set standards that limit activities that can occur within riparian conservation areas.

3. The proposed planning rule generally fails to require measurable, enforceable standards and guidelines for water and watershed protection. The absence of a road density standard requirement or any performance standard whatsoever related to road impacts reduction is a glaring omission, particularly given the Forest Service's long-standing acknowledgment of the harm to watersheds caused by roads.

4. The proposed planning rule fails to require the use of the best available science or to adequately ensure the involvement of the external scientific community in all aspects of planning.

5. The monitoring requirements outlined in the proposed rule are too vague to establish baseline standards for a rigorous and useful monitoring program. Specifically, there is no requirement that a feedback loop be established which connects physical and biological data to management changes.

6. The proposed planning rule fails to require that forest plans set aside certain lands as unsuitable for grazing.

7. The DEIS fails to adequately explain the Forest Service's rejection of Alternative D, or to disclose opposing scientific viewpoints.

[1] Specifically, we do not opine here on the adequacy of the species viability provisions of Alternative D to meet NFMA's species diversity obligations.

8. The DEIS fails to consider the impacts of the salvage exemption on "unsuitable" lands.

9. The DEIS fails to adequately address the impacts of livestock grazing.

10. The Forest Service must consult, under § 7(a)(2) of the Endangered Species Act, with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service on the impacts to aquatic species and habitat from the proposed rule, and the Forest Service must be prepared to amend the proposed planning rule to accommodate the biological agencies' conclusions.

LEGAL BACKGROUND

I. THE NATIONAL FOREST MANAGEMENT ACT REQUIRES THE FOREST SERVICE TO PROTECT AND RESTORE WATER AND WATERSHEDS ON OUR NATIONAL FORESTS.

The National Forest System includes 193 million acres of land (about 8% of the United States) in 42 states and Puerto Rico, including 155 national forests and 20 national grasslands. National forests are a critical reservoir of biological diversity, supporting more intact populations of rare species than any other American public land system. Over 3,000 species of birds, mammals, reptiles, amphibians, and fish, and more than 10,000 plant species, call national forests home, including over 400 endangered and threatened species. National forests encompass a wide variety of ecosystems, including large, relatively unfragmented habitat critical to such species as grizzly bears, gray wolves, and lynx; old-growth forests that harbor rare species such as the northern spotted owl; and aquatic habitat and the clean water necessary to protect dwindling populations of salmon, steelhead, and other native fish and aquatic species. National Forest watersheds produce a large share of the water that supports human recreational, scenic, municipal, and industrial use in the United States, particularly in the western states.

Public concern about excessive clearcutting and insular management led Congress in 1976 to enact the National Forest Management Act or NFMA as a "fundamental reform." Congress focused its reform efforts on (1) requiring long-range planning, (2) allowing public participation, and (3) establishing standards and guidelines for managing forests. The Chair of the Senate Subcommittee on the Environment and Land Resources noted that, in enacting NFMA, "the era of full delegation of land management decision-making authority to Federal agencies is over." Sponsor Senator Humphrey stated: "The days have ended when the forest may be viewed only as trees and trees viewed only as timber. The soil and the water, the grasses and the shrubs, the fish and the wildlife, and the beauty that is the forest must become integral parts of resource managers' thinking and actions."

NFMA imposes substantive duties on the United States Department of Agriculture Forest Service by establishing nondiscretionary standards and guidelines for protecting national forest resources and promoting public accountability and long-range planning. Inland Empire Pub. Lands Council v. U.S. Forest Serv., 88 F.3d 754, 757 (9th Cir. 1996) ("NFMA imposes substantive requirements . . . which have been promulgated as regulations"); Earth Island Inst. v. U.S. Forest Serv., 442 F.3d 1147, 1173 (9th Cir. 2006) ("[S]ubstantive requirements of the NFMA [are] designed to ensure continued diversity of plant and animal communities and the continued viability of wildlife in the forest.") (citation omitted).

NFMA establishes a three-tiered regulatory approach to forest management, with different requirements existing at the national, regional, and local levels. At the national level, NFMA requires the Forest Service to promulgate regulations that (1) set out the process for the adoption and revision of forest plans and (2) set forth the standards and guidelines for uses of the forests. Citizens for Better Forestry v. U.S. Dep't of Agriculture, 341 F.3d 961, 965 (9th Cir. 2003) ("Citizens I") (citing 16 U.S.C. § 1604(g)). The regulations "set broad guidelines (to be followed in preparing regional and site-specific plans) regarding plant and animal species conservation, timber management, and water management." Id. (citing 16 U.S.C. § 1604(g)(3)). At the regional level, NFMA requires the Forest Service to prepare forest plans, which prescribe the uses allowed in a particular national forest and must comply with the nationwide regulations. 16 U.S.C. § 1604(a). Forest plans set forest-wide standards and guidelines that control site-specific projects for 15 years or more. And at the "site-specific" level, the Forest Service prepares plans for specific actions, such as timber sales, which "must be consistent with both sets of higher-level rules." Id. at 966 (citing 16 U.S.C. § 1604(i)). The provisions of forest plans are enforceable against the Forest Service, as are the requirements of the forest planning rules under NFMA.

With respect to watershed and aquatic ecosystem protection, NFMA (16 U.S.C. § 1604(g)) provides that Forest Service regulations shall include guidelines for land management plans that:

> (A) insure consideration of the economic and environmental aspects of various systems of renewable resource management, including the related systems of silviculture and protection of forest resources, to provide for outdoor recreation (including wilderness), range, timber, watershed, wildlife, and fish;
>
> (B) provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives,…
>
> * * *

(E) insure that timber will be harvested from National Forest System lands only where—

(i) soil, slope, or other watershed conditions will not be irreversibly damaged;[2]

(iii) protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat;[3]

II. THE CURRENT RULE REVISION PROCESS

Over the last decade, a protracted and highly politicized series of amendments to prior forest planning regulations attempted to weaken both substantive and procedural protections on our national forests. A series of successful lawsuits rebuffed these weakening amendments, and once again, the Forest Service is in the process of adopting new forest planning regulations. The promulgation of new regulations presents a unique opportunity to influence the forest planning process for years to come. These national regulations control how individual forest plans are developed, which in turn directly control and affect on-the-ground activities ranging from resource extraction to restoration and protection.

Not only does the statutory language of NFMA require the Forest Service to enact regulations that protect watersheds and instream flows, but Agriculture Secretary Vilsack has specifically called for increased attention to water supplies and watershed protection on our national forests. Most importantly, the reality of climate change and the need to protect the resilience of national forest ecosystems has become a basis for good sound bites, if not any actual action. Climate change alters water quality, water quantity, and water timing. If the revised forest planning regulations were to mandate – through enforceable standards – watershed and aquatic protections based on the best available science, the Forest Service will have succeeded in raising the bar nationwide for public lands conservation.

III. THE FOREST SERVICE IS NOT NEW TO WATERSHED PROTECTION.

The Forest Service must adopt regulations that require each national forest plan to include standards and guidelines for watershed protection, and the national forest planning

[2] Note that this requirement applies to all timber activities, including road building in conjunction with timber harvesting.

[3] The Senate Agriculture Committee's discussion of this section stressed that activities affecting "significant fish and wildlife habitat must be very carefully planned and monitored to assure that habitat values are recognized and properly protected." S. Rep. No. 893, 94th Cong., 2d Sess. 39.

regulations should require each forest plan to include the following basic components: riparian reserves, key watersheds, watershed objectives and management standards, and a watershed restoration strategy.

These are not new concepts for the Forest Service. Fifteen years ago, the Forest Service and BLM adopted the Northwest Forest Plan – a "scientifically sound, ecologically credible, and legally responsible" long-term management strategy for Pacific Northwest national forests. Northwest Forest Plan Record of Decision ("ROD") at 3. The 1994 Northwest Forest Plan includes the Aquatic Conservation Strategy ("ACS"), an unprecedented planning effort developed by a team of leading scientists known as the Forest Ecosystem Management Assessment Team or FEMAT. Because of the dynamic and variable nature of aquatic environments, FEMAT eschewed one-size-fits-all standards. Instead, the ACS establishes a process to tailor prescriptions to fit the needs of each watershed. FEMAT at V-29 to-31.

The ACS has four basic components: (1) a system of key watersheds or refugia comprising watersheds with the best aquatic habitat or the greatest potential for recovering at-risk fish stocks; (2) riparian reserves along streams where aquatic and riparian objectives receive primary emphasis and where certain activities are constrained; (3) watershed analysis to be used to tailor activities to specific watersheds needs; and (4) a comprehensive, long-term watershed restoration program. Northwest Forest Plan ROD at B-12; FEMAT at V-32.

The ACS imposed constraints on habitat-degrading activities in two ways. First, binding standards and guidelines restrict certain activities within riparian reserves and key watersheds. See Northwest Forest Plan ROD at C-7, C-30 to C-38. Second, FEMAT recognized the need to constrain: (1) activities in some upland areas, e.g., non-riparian, stream-associated unstable areas; and (2) the cumulative impacts of activities throughout a watershed. FEMAT at V-29. Instead of imposing explicit constraints on all such activities through specific management standards, the ACS has nine narrative objectives describing watershed functions and processes that must be maintained and restored. Northwest Forest Plan ROD at B-10 to B-11; FEMAT at V-30 to-31. The Northwest Forest Plan ROD gave the ACS objectives binding force as de facto forest-wide standards and guidelines by explicitly requiring that federal lands shall be managed to attain the ACS objectives. Courts have found that FEMAT embodies the best available scientific information pertaining to the impacts of forestry activities on salmon and their habitat. PCFFA v. NMFS, 71 F. Supp. 2d 1063, 1069 (W.D. Wash. 1999).

The significance of the ACS in comparison to past, failed approaches has been described as follows (Reeves et al. 2006):

> The ACS differs from previous conservation and management plans for aquatic ecosystems in its extent and complexity. Past attempts to recover fish populations were generally unsuccessful because they focused on good habitat in isolated

> stream reaches and not on watersheds (Williams et al. 1997). Also, previous plans focused riparian protection on relatively small portions of the aquatic ecosystem, generally within 30 m of fish-bearing streams, and over small geographic areas. In contrast, the ACS includes the entire riparian ecosystem, identifies watersheds that are meant to act as refugia for fish in the short term, and applies over a large area.

The framework provided by the ACS and its overarching objectives continues to be validated by Forest Service watershed scientists and others. For example, the aquatic conservation guidance developed recently by Region 6, (USDA Forest Service Region 6, Aquatic and Riparian Conservation Strategy, August 13, 2008) reflects major elements of Northwest Forest Plan Aquatic Conservation Strategy and the Pacfish/Infish strategies applicable to the Interior Columbia Basin by calling for five elements of an ACS: 1) riparian management areas, 2) key watersheds, 3) mid-scale watershed analysis, 4) watershed restoration, and 5) monitoring; the Region 6 Strategy also touches on "desired conditions" and sets forth model standards and guidelines. This guidance was issued after 10 years of ACS implementation, where watershed conditions had already improved for a majority of plan watersheds in large measure due to recovery of riparian vegetation, and especially in key watersheds where road impacts had been reduced. (Gallo et al. 2005). In a comprehensive analysis of several hundred research, assessment, and monitoring efforts, Forest Service investigators have found that management restrictions under the ACS were appropriate to the need, stating that there was "no scientific evidence that either the default prescriptions [riparian reserves] or the options for watershed analysis … provide more protection than necessary to meet stated riparian management goals." (Everest and Reeves 2006). Rather, "[t]he science emerging since the [Northwest Forest Plan] was developed supports the framework and components of the ACS, particularly for the ecological importance of smaller, headwater streams." (Reeves et al. 2006).

Because they are based on broadly applicable principles, key elements of the Northwest Forest Plan ACS have already been implemented in other forest plans. See, e.g., Land and Resource Management Plans for the Boise, Payette, and Sawtooth National Forests in Idaho (including an ecosystem-based Aquatic Conservation Strategy that features goals and objectives for "riparian habitat conservation areas," delineation criteria for these areas, identification of priority subwatersheds, standards and guidelines for both riparian and priority watersheds, and watershed analysis at multiple scales); (USFWS 2003) (summarizing the aquatic conservation components of these plans in the context of an ESA consultation on bull trout).

The basic elements of this Aquatic Conservation Strategy framework are valid for federal forests nationwide.

DETAILED COMMENTS

I. THE PROPOSED RULE DOES NOT ADEQUATELY ENSURE PROTECTION OF WATERSHEDS.

A. The Proposed Rule Correctly Identifies the Primary Importance of Watershed Protection (§§ 219.8(a)(2), 219.10(a)(1)).

As the Forest Service acknowledges (76 Fed. Reg. at 8,491), one of the original purposes of the agency was to protect our nation's water resources. In several places, the proposed planning rule underscores this importance of water and watersheds, explicitly stating that plans must include plan components "to maintain or restore the structure, function, composition, and connectivity of healthy and resilient terrestrial and aquatic ecosystems and watersheds in the plan area." Section 219.8. In § 219.8(a)(2)(i), the proposed rule requires that each forest plan contain plan components to "maintain, protect, or restore" aquatic elements, see § 219.8(a)(2)(i), as well as maintain, protect, or restore rare aquatic plant and animal communities and drinking water. See § 219.8(a)(2)(iii)-(iv).

The proposed rule also explicitly lists ecosystem services, fish and wildlife species, habitat connectivity, riparian areas, surface and subsurface water quality as multiple-use aspects to consider in developing plan components for integrated resource management. See § 219.10(a)(1). While we believe the Forest Service has always been obligated to protect and restore these ecological elements, we applaud this explicit incorporation of the benefits of protected and restored water and watersheds into the multiple-use mandate of the Forest Service.

B. The Proposed Rule Fails to Set Criteria for Designating Priority Watersheds and Fails to Require Standards and Guidelines for Management of Priority Watersheds (§ 219.7(e)(1)(i)).

Generally, North America can be viewed as containing islands of relatively healthy aquatic ecosystems in a sea of degradation. Consequently, areas where aquatic ecosystems are considered healthy should be recognized and treated as irreplaceable national treasures. While the proposed planning rule requires that plans identify watersheds that are a priority for maintenance or restoration, see § 219.7(e)(1)(i), the Forest Service fails to provide the next steps to make such a priority watershed identification relevant to managers.

Instead of merely stating that some watersheds must be identified, the Forest Service must spell out not only the criteria for identifying priority watersheds, but also the basic parameters for standards and guidelines that will apply to the management of priority watersheds. The end result, on each forest, should be a network of watersheds across the landscape that can serve as near-term anchor points for restoration of broad-scale processes and recovery of broadly-distributed species, as reference watersheds, as sources of high-quality

water, and as refugia for sensitive riparian and aquatic species. The protection of priority watersheds and the values they provide is likely the most important contribution the Forest Service can make to its neighbors in the all-lands approach. See Appendix A, Science Summary: Key Watersheds. The established watershed network must facilitate efforts to protect, expand, and reconnect the remaining healthier aquatic habitats, and it must ensure that all the genetic pieces of each native aquatic species are retained. The proposed rule takes a first, tentative step, but it does not advance the priority watershed concept far enough to ensure that plans require actual protection and restoration of these watersheds.

The first step in establishing a system of priority watersheds must be identification of the last best places, or refugia. The second step involves the evaluation of the initial network to ensure it encompasses the important breeding and rearing areas and migratory corridors crucial to the survival of native fish, amphibians, and aquatic- and riparian-dependent reptiles, mammals and birds. If the initial network is skewed in its geographic or taxonomic coverage, watersheds must be added to include further areas that can serve as recovery anchor points. It is crucial that the network of priority watersheds be well-distributed across the land and include areas of importance to all aquatic species.

Once the initial network of priority watersheds is identified, management standards must be applied that provide rigorous protection against new human-induced ecological harm and require appropriate restoration to allow recovery from past damage.[4] For example, upslope activities, far from riparian areas, can negatively affect water quality and quantity. Only protection of priority watersheds from further human disturbance can address this risk and assure the continued viability of many fish stocks because these areas – undisturbed – are the only existing sources of quality habitat to sustain these species. A priority watershed network can set the stage for restoration of ecosystem connectivity and allow for the recovery and conservation of imperiled native fish and other aquatic species.

C. The Proposed Rule Fails to Ensure That Riparian Areas Will Be Adequately Protected (§ 219.8(a)(3)).

Riparian areas are areas along permanent and intermittent streams, wetlands, ponds, lakes, and reservoirs. Their condition is the primary determinant of the ecological integrity of the aquatic ecosystem and largely dictates the resiliency of the aquatic environment to natural and human-induced change. Properly managed, riparian areas will be more resilient to climate change than other areas as a result of their access to water. In a natural setting, riparian areas interact constantly with stream channels through the exchange of flood waters, nutrients, and

[4] Priority watersheds should also be added to the list of required ecosystem elements that plan components must "maintain, protect, or restore," § 219.8(2), and priority watersheds should be classified as not suitable for timber production under § 219.11(a).

organic materials. Riparian vegetation is critical to the reduction of bank erosion, the provision of shade and cover for aquatic species, the filtration of nutrients, the interception of fine sediment, the provision of woody debris to the stream systems, and the maintenance of crucial elements of microclimate such as soil moisture, radiation, soil temperature, air temperature, wind speed, and relative humidity. Restoration of aquatic habitats cannot be successful unless riparian processes and communities are also restored.

The DEIS discusses riparian area management in general at 85-88, noting that "the National Research Council (2002) considers riparian restoration one of the most critical environmental challenges of our time and a national priority." DEIS at 85. The Forest Service acknowledges that "the influence of riparian areas on the quality of water and aquatic ecosystem functions is well-documented, as is the case for restoring and managing riparian areas." DEIS at 86. The DEIS continues to list benefits of riparian area protection, as well as the failure of prior land management plans to adequately protect riparian areas. See DEIS at 87 ("between 1970 and 1990, even while BMPs were in effect, the quality of riparian and aquatic habitat on forested land declined").

In keeping with these findings, section 219.8(a)(3) requires that each plan "include plan components to maintain, protect, or restore riparian areas. Plans must establish a default width for riparian areas around all lakes, perennial or[5] intermittent streams, and open water wetlands, within which these plan components will apply. The default may be a standard width for all lakes, perennial or intermittent streams, and open water wetlands, or may vary based on ecologic or geomorphic factors, or the type of waterbody. The default width will apply unless the actual riparian area for a waterbody or a site has been delineated based on best available scientific information."[6]

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[5] This "or" should be changed to "and" to lessen confusion about the fact that both perennial and intermittent streams should have defined riparian conservation areas.

[6] The draft rule implies that permanent riparian delineations will correspond to what is referred to as the "actual riparian area." This language indicates that the agency is conceiving of the final delineation in a much narrower sense than we have recommended, and we urge clarification on this point.

Our intent is that riparian conservation areas describe the full extent of the functional riparian ecosystem, not simply the near-stream area where vegetation that occurs only in near stream environments occurs. This is the same concept used in the ACS approach we have urged be used as a template. Again citing Reeves et al. 2006:

> Riparian reserves define the outer boundaries of the riparian ecosystem and are portions of a watershed most tightly coupled with streams and rivers. They provide the ecological functions and processes necessary to create and maintain habitat for aquatic- and riparian-dependent organisms over time, dispersal

This requirement to establish a default width for riparian areas is a necessary first step, but it is missing two key elements. First, because delineation of riparian reserves must be ecologically based, site-specific information, gathered as part of an ecological analysis of the watershed, will be necessary to finalize precise boundaries. As such analysis will necessarily take time, the default width should be established in the planning rule itself. Moreover, as admitted in the DEIS, recent forest plans "are quite variable in the guidance they provide for riparian area management." DEIS at 88 (referring to both designated riparian area widths and management proscriptions within riparian areas). Including a minimum default area will reduce the range of this variation in the short term by setting a floor for interim streamside protection.

Alternative D in the DEIS adopts a nation-wide, cautious approach, requiring that "until these riparian conservation areas are established, the minimum standard buffer for riparian conservation areas shall be no less than 100 feet on each side of the stream[7] at bank-full flow, unless the stream has an intermittently or potentially shifting channel course, in which case the default buffer must start from the edge of the 200-year channel migration zone." The Forest Service should adopt the additional language from Alternative D for default riparian conservation area widths, including the requirement that best available science be used in establishing the size of these areas. Alternative D, § 219(a)(3)(i).

Second, the proposed planning rule fails to require measurable, enforceable standards for management within riparian conservation areas to ensure the protection and restoration of riparian and aquatic functions. Again, Alternative D at (3)(ii)(A)-(B) contains protective

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corridors for terrestrial organisms, and connectivity of streams within watersheds (FEMAT 1993).

It is critical that this ecosystem definition of the riparian area be used not only to ensure adequate protection of aquatic- and riparian- resources, but to ensure that these areas are capable of fulfilling NFMA species diversity obligations for both aquatic/riparian and terrestrial species. We note that riparian protection plan components are explicitly cited in the DEIS as an important means of meeting this duty. See DEIS at 112 ("The specific requirement (§ 219.8) that plans must include plan components to maintain or restore riparian areas would provide additional emphasis and protection to these very important habitats. Riparian areas provide important corridors for species to move throughout the landscape, conditions for maintaining water quality and flows, and habitats for a wide variety of species, especially aquatic and riparian associates.").

In Alternative D, the rule uses the term "riparian conservation areas," a term that more accurately describes the intended concept.

[7] In order to be complete, the word "stream" in Alternative D should be replaced with "all lakes, open water wetlands, and perennial or intermittent streams" in order to include all riparian areas.

management requirements that the Forest Service should adopt in its final rule, establishing riparian conservation area management objectives as restorative with limited exceptions. The language in Alternative D should be strengthened by explicitly noting that activities such as logging, road-building, grazing,[8] mining, and withdrawal or diversion of surface or ground water are not allowed within riparian conservation areas, as well as specifying that riparian conservation areas are not suited for timber production under § 219.11(a)(1)(iii). Wherever possible, standards should be based on the concept of input-oriented management. See, e.g., Montgomery 1995 (while outputs approaches are suited to monitoring landscape conditions and assessing when an impact threshold has been crossed, input approaches focus on tailoring management based on landscape, site, or project level information to proactively limit adverse environmental impacts and avoid irreversible or large-scale harm).[9]

Simply put, riparian protection works. After 10 years of Northwest Forest Plan "riparian reserve" implementation, 57% of the watersheds across the planning area were in improved condition and only 3% of the watersheds, primarily in areas that experienced large-scale fires, showed declines. A primary reason that watershed conditions improved is that riparian vegetation was allowed to recover in the absence of logging. (Reeves et al. 2006; Gallo et al. 2005). The uncertainties of climate change make the case for riparian reserves where only restorative management actions are allowed more compelling than ever. Healthy riparian areas are naturally most resilient to the effects of climate change, so maximizing the extent of functioning riparian ecosystems on our national forests is a logical and likely effective adaptation strategy. (Seavy et al. 2009) (paper entitled "Why Climate Change Makes Riparian Restoration More Important than Ever: Recommendations for Practice and Research," finding that "[re]storing riparian habitat will strengthen linkages between aquatic and terrestrial systems, making both more resilient and resistant to the stresses imposed by climate change."). See Appendix B, Science Summary: Riparian Resources and Water Protection.

D. The Proposed Rule Fails to Include Other Standards and Guidelines to Ensure Watershed Protection.

Watershed health depends not only on riparian area and refuge watershed protection, but also on upslope activities and the cumulative effects of management actions in watersheds across

[8] Despite its long-recognized harmful impacts to streams and aquatic habitats, grazing is only mentioned once in the entire draft rule, in a long list of forest multiple-uses.

[9] Both federal biological agencies found that national forest grazing, logging, mining, and road construction within the range of bull trout and steelhead continued to degrade habitats for these fish despite forest plan amendment provisions that required degradation to be avoided. USFWS (1998); NMFS (1998). Land manager evaluations found that plan direction was violated partly because it was open to varying interpretations. Williams (1997).

the landscape. The aquatic and riparian benefits of intact riparian vegetation is preserved and enhanced through maintenance of natural channel geomorphology, which is also affected by runoff and sedimentation originating in the uplands.

Recommendations from several scientific assessments have produced a variety of default standards for management of upslope lands including, among others, prohibitions against timber harvest or road construction in areas prone to landslides (Lockwood et al. 2005, Rhodes et al. 1994, Spence et al. 1996), protection of late-successional old growth forests (FEMAT 1993), protection for individual mature trees (Henjum et. al. 1994), and protection of roadless areas from roadbuilding (USFS 2001 Roadless Area Conservation Rule, USFWS 1998).

To assist in determining the condition and trend of aquatic ecosystems and to guide management, measurable objectives for ecosystem integrity must be established in forest plans. These objectives should describe hydrologic characteristics, physical structure and form, vegetative characteristics, water quality, and aquatic/riparian biological community characteristics for both biological and physical ecosystem components. The proposed rule fails to specify the inclusion of such objectives.

Alternative D at (4)(i)-(vii) requires additional standards and guidelines for the following objectives to ensure watershed protection and restoration: (i) biological and biophysical connectivity of key watersheds; (ii) road densities in key watersheds; (iii) maintenance and restoration of water bodies including instream flows and thermal refugia and protection from "detrimental changes" in their quantity and quality; (iv) sediment regimes within the natural range of variability; (v) soil productivity; (vi) road removal and remediation in riparian conservation areas and key watersheds; (vii) "a minimum necessary road systems (sic)."

The Forest Service should adopt as its preferred alternative the language pertaining to watershed standards and guidelines in Alternative D with the following capitalized amendments:

(4) *Watershed standards and guidelines*. Each plan must include standards and guidelines for--

- (i) Biological and biophysical connectivity of key watersheds across the planning unit.
- (ii) Road densities in key watersheds to achieve sediment reduction, minimized alteration of surface and subsurface flows, and connectivity of aquatic and riparian habitat.
- (iii) PROTECTION, maintenance, and restoration of lakes, streams, wetlands, public water supplies, source water protection areas, groundwater, other bodies of water, instream flows, and thermal refugia, and protection of these resources from detrimental changes in quantity (subject to existing rights) and quality, including

temperature, blockages of water courses, deposits of sediments, AND ALTERATIONS OF THE HYDROLOGIC REGIME.

(iv) Protection, maintenance, and restoration of a natural rage of variability in sediment regime. Elements of the sediment regime include the timing, volume, rate, and character OF sediment input, storage, and transport.

(v) Sustaining soil productivity and preventing soil erosion and sedimentation.

(vi) Road removal and remediation, INCLUDING STREAM CROSSINGS, in riparian conservation areas and key watersheds as the top restoration priority.

(vii) A FRAMEWORK FOR HOW THE UNIT WILL PLAN AND PRIORITIZE ACHIEVEMENT OF [a] minimum necessary road system as required by 36 CFR 212.5(b)(1) and (2).

1. The proposed rule should include a requirement for a road density standard in priority watersheds.

Road density standards are an important tool for forest plans. As the Forest Service recently admitted in a separate document, "[e]xpansive road networks [ ] can impair water quality, aquatic habitats, and aquatic species in a number of ways, often to a greater degree than any other activities conducted in forested environments. … These deteriorating road conditions threaten our ability to manage forests and pose significant risks to watersheds." USDA Forest Service, Water, Climate Change, and Forests: Watershed Stewardship for a Changing Climate (June 2010) at 72. For watersheds with high road density, road removal and decommissioning should be priorities. When it comes to maintaining or restoring healthy fish populations, press disturbances, such as roads, are significantly more important to address than pulse disturbances, such as fire.

At least two scientific reviewers in the Resolve Science Review (April 2011) commented on the lack of scientific rigor in the Forest Service's treatment of roads. Dr. Robert B. Jackson, Duke University, wrote:

> One area of the draft EIS that does not reflect current scientific understanding of the peer-reviewed literature is the discussion of road building. On page 84, for instance, the EIC reads, "there is uncertainty in the literature regarding a direct cause-and-effect relationship of road density to erosion." Other statements in the paragraph and document (e.g., page 98 of the EIS) are presented in a similar vein. While it is true that one can find examples in the literature where erosion is not positively related to road density, on average there is a scientific (and intuitive) relationship between more road building and maintenance linked to more erosion, at least in habitats vulnerable to erosion. Thus this section could more strongly reflect the benefits on average for road closings, erosion, and watershed

> protection. Reducing the extent of road building and restoring some existing roads should yield both economic and environmental benefits in many cases.

Resolve Science Review at 17. Similarly, Dr. William S. Keeton, University of Vermont, noted the lack of discussion of roads and their impacts, especially impacts beyond sedimentation. Resolve Science Review at 34 ("More could be said about road impacts and the need for restoration. … Road crossings, thermal barriers (caused by loss of riparian forest cover), and other impediments to fish passage (e.g. aquatic ecosystem connectivity) would seem like [] critical watershed restoration issues for the document to evaluate, but I could find little discussion of these."), at 35 ("Other[] papers deal directly with fragmentation and connectivity. Dispersed patch clear cutting and roads have been the primary causes of fragmentation on the National Forest System, but these are not mentioned explicitly."), at 38 (addressing the effect of roads on timing and magnitude of flows and slope failures and landslides, as well as need to road decommissioning).

The DEIS claims that because road density is not always a reliable indicator of erosion, it should not be targeted for mandatory limitation in forest unit standards and guidelines. See DEIS at 84 ("Road density in and of itself is not always an adequate proxy for impact on aquatic resources (Verry and Dolloff 2000)[10] and when road density is associated with impacts to aquatic resources, it tends to be the result of road density being used as an easily quantifiable indicator of land use intensity (Lee et al., Ripley et al. 2005)."). While we agree that road density is not the only relevant metric that should be used to assess human impacts on watersheds, aquatic habitats or species, there is abundant scientific support for the use of road density as a reliable, easily measurable, and highly predictive indicator of watershed impairment (Quigley et al. 1996, Trombulak and Frissell 2000).

The DEIS also claims that road density limits would be "an ineffective tool" where road densities are low and/or where the Forest Service is a minority owner. DEIS at 91. Yet this reason urges us to throw the baby out with the bathwater. While it may be true that there are some places where roads are not a major aquatic stressor, in those places managers are free to develop standards that also target other problem stressors. But to the great extent that road densities exceed desirable levels on national forest lands (see, e.g., Gucinski et al. 2001, Lee et al. in Quigley and Arbelbide 1996), setting a road density objective and using road density as a monitored metric of watershed condition at appropriate scales can be an effective tool – as the DEIS notes that some forests have already determined. In cases where road densities are relatively low, density standards would likely also be effective to keep densities low and further reduce them.

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[10] We note that although the DEIS cites Verry and Dolloff 2000 to support this statement, this article does not, in fact, provide this support. Especially for important issues like this where standards differ between alternatives, incorrect/sloppy scientific citations are inexcusable.

Because roads economically and socially intersect with and support the full range of varied and sometimes competing forest and grassland management actions and human uses (Forman and Alexander 1998, Gucinski et al. 2001, Riitters and Wickham 2003), there are strong ongoing incentives for local forest and grassland managers to maintain existing or create new roads to support those uses, often regardless of their known adverse environmental impacts. Moreover, removal or remediation of roads can be costly in many cases. These factors strongly mitigate against effective reduction of road-related environmental impacts to levels necessary to maintain and restore riparian and water resources, as well as sensitive aquatic biota, on the national forests. Absent clear and specific direction for reduction of road-related impact to water, watersheds and wildlife in the Planning Rule, local forest managers will continue to struggle to define and implement adequate protective measures to safeguard water supplies and aquatic and riparian resources.

Because the proposed rule fails to set standards for road densities or require units to create specific plans for road removal and achievement of the minimum road system already required by 35 C.F.R. § 215.5, it misses an important opportunity to meaningfully address one of the largest negative impacts on watershed health. See Appendix C, Science Summary: Roads.

E. The Proposed Rule Fails to Require Forest Plans to Use the Best Available Science (§ 219.3).

On the role of science in planning, the proposed rule includes discretionary language regarding the application of science to decision making. The responsible official must "take into account" the best available scientific information and document the consideration of science. Section 219.3. Simply put, this section provides too much discretion. In the rule preamble, the Forest Service lists public input, agency policies, and the experience of land managers as other forms of information on equal footing with best available science that "must also be taken into account." 76 Fed. Reg. at 8,485. This wording effectively legitimizes management decisions that are counter to the best available science. The Committee of Scientists (1999) recommended that "planning must be based on science and other knowledge of the world, including the use of scientifically based strategies for sustainability." See Appendix D, Defining Best Available Science. The Forest Service should include a requirement that plans use the best available science.

F. The Proposed Planning Rule Fails to Require Funding and Implementation of a Complete, Fully Functioning Monitoring Program (§ 219.12).

Another serious mistake in the DEIS involves the apparent failure to require implementation of adequate monitoring. Minimum mandatory requirements and timelines are set for unit-level monitoring, and a broader-scale strategy is to be developed as soon as

practicable. Section 219.12(a)-(c). "[P]roject and activity monitoring may be used to gather information, but monitoring is not a prerequisite for carrying out a project or activity." Section 219.12(a)(7). Without a nexus between monitoring and project approval, information can be merely gathered without consequence. Absence of a comprehensive monitoring plan that will in fact be implemented calls into question the validity of the entire plan. See Seattle Audubon Soc'y v. Evans, 771 F. Supp. 1081, 1093 (W.D. Wash. 1991).

Although the proposed rule addresses monitoring, there is very little in the way of specific requirements and no minimum framework to ensure that monitoring is adequate to serve adaptive management goals. The proposed rule does require both a unit-level and a broad scale monitoring program be developed as "required content of a plan." Section 219.7(e)(iii).

The minimum requirements are that questions and indicators be based on "one or more desired conditions, objectives or other plan component, but not every plan component needs to have a corresponding monitoring question." Section 219.12(2) (emphasis added). Rather, only eight elements must be monitored via one question or indicator each: (1) the status of selected (but undefined) watershed conditions; (2) the status of certain (but unstated) ecological conditions; (3) the status of such focal species as units designate**;** (4) visitor use/recreational objectives; (5) changes related to climate change; (6) carbon storage in vegetation; (7) progress on ecological, social and economic contributions of the unit; and (8) the effects of management systems to determine whether they impair land productivity. Section 219.12(5). Forest units are required to evaluate monitoring information on a biennial basis. Section 219.12(d).[11]

Responsible officials are further required "to ensure that scientists are involved in the design and evaluation of unit and broad scale monitoring," section 219.12(4), but the involvement of the external scientific community is not specified in any detail. As Dr. John P. Hayes notes in the science review, no section of the proposed rule "specifically identifies engagement of the external (nonfederal) scientific community as a directive in the planning process." Resolve Science Review at 13. The insufficiency of the proposed action to outline a valid monitoring program is evidenced by Dr. Alan Herlihy's comment that "there were no specifics about any kind of monitoring described … so I have no scientific comments about any of the monitoring." Resolve Science Review at 14.

Alternative D requires monitoring information be linked to planning reviews and management decisions through the establishment of "critical values for ecological conditions and

[11] The required content of the § 219.6 assessments does not materially add to the monitoring requirements of § 219.12, although in developing new plans or revisions officials are directed to "[i]dentify the presence and consider the importance of various physical, biological, and cultural resources on the unit," and to "[c]onsider conditions and trends and stressors, with respect to the requirements for plan components."

focal species" that are used as triggers, and requires the monitoring program to evaluate the validity of the plan development or revision assessments in § 219.6(b).[12] We agree with science reviewer Dr. John P. Hayes that "[e]xplicit linkage to identification of triggers and thresholds such as those proposed in Alternative D would significantly strengthen the scientific integrity of Alternative A, and would facilitate appropriate selection of the response variables to be monitored and the metrics used for monitoring them." Resolve Science Review at 12.

However, we also caution that many outcomes of forest management activities – particularly watershed and stream responses to land management – simply cannot be adequately managed through response-based adaptive management. Key responses such as water quality, stream stability, and instream or riparian habitat can unfold from complex causal chains accruing over many years or decades after the initial action. Moreover, once these responses set in (e.g., stream sedimentation and or channel incision), they may take even more years or decades, even centuries, to reverse. Therefore, many key actions affecting watershed and stream response must be regulated by "input" criteria, not by "output" response criteria as envisioned by adaptive management frameworks (Montgomery 1995).

G. The Rule Should Require Certain Lands to Be Deemed Unsuitable for Livestock Grazing.

Lands deemed unsuitable for grazing should include riparian areas in systems with high water temperatures, degraded riparian vegetation, unstable banks, elevated sedimentation, with attributes rendering them susceptible to livestock damage, and/or where stream and riparian conditions are unknown (Anderson et al. 1993, Henjum et al. 1994, Rhodes et al. 1994, USFS 2000). Stream types that are highly vulnerable to grazing damage include all streams with banks comprised of non-cohesive fine-grained soils, perennially saturated banks, or lacking deep-rooted vegetation.

In our view the extent of the "scientific debate" over the "environmental impacts and sustainability of livestock grazing" even in the West, is overstated. DEIS at 144 (using examples of range of opinions regarding impacts on grassland bird habitat only). Indeed, it is hard to know what to make of the following statement in the DEIS at 144:

> The effects analysis for each alternative is focused on the contribution of sustainable uses to support communities rather than whether a specific use is indeed sustainable.

[12] In Alternative D's additions to § 219.6, there are two typographical errors: first, § 219.6(b) has only four subsections, so the numbering in Alternative D starting with (6) is off; and second, Alternative D § 219.6(b)(7) has a further subsection (b), but no subsection (a).

If the effects analysis does not look at whether specific uses are sustainable, then it is not actually analyzing effects. For grazing, and given the above statement perhaps for all other uses, the DEIS's analysis is specious.

II. THE DEIS FAILS TO UNDERTAKE THE REQUISITE ANALYSIS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT.

The fundamental purpose behind the preparation of an environmental impact statement is to ensure that the agency and the public are fully aware of the potential environmental impacts of a proposed action before the agency finalizes its decision. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989). The National Environmental Policy Act ("NEPA") mandates that federal agencies take a "hard look at a decision's environmental consequences." California v. Block, 690 F.2d 753, 761 (9th Cir. 1982). An environmental impact statement must assess the direct, indirect, and cumulative environmental impacts of the proposed action, performing a thorough analysis on the same scale as the action at issue. See, e.g., id.; 40 C.F.R. §§ 1502.2(b), 1508.8. "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided." Neighbors of Cuddy Mt. v. United States Forest Serv., 137 F.3d 1372, 1380 (9th Cir. 1998). "An EIS for a programmatic plan … must provide sufficient detail to foster informed decisionmaking." Citizens for Better Forestry v. U.S. Dep't of Agriculture, 481 F. Supp. 2d 1059, 1086 (N.D. Cal. 2007) ("Citizens II") (internal citations omitted). An agency may not merely identify differences between alternatives and why it prefers one alternative over another, but must actually discuss the environmental consequences of the alternatives. Citizens for Better Forestry v. U.S. Dep't of Agriculture, 632 F. Supp. 2d 968 (N.D. Cal. 2009) ("Citizens III") (holding programmatic EIS for 2008 NFMA planning rule was inadequate, in part, because it did "not actually discuss the environmental consequences of eliminating the specific protections that are provided in previous plan development rules").

A. The DEIS Fails to Explain Its Rejection of Alternative D.

As discussed above, Alternative D of the DEIS contains measures that would increase protection for national forest watersheds. However, Alternative D is not the preferred alternative, and the DEIS fails to explain the agency's rejection of Alternative D's measures, especially those for watershed protection. This is surprising given that, for example, on their face the same findings presented in support of Alternative A's specific attention to riparian protection (e.g. DEIS at 85-86, 91) and priority watersheds for restoration (e.g. DEIS at 91, 97) also support the additional language on these subjects in Alternative D. Furthermore, the need for increased measures to protect water, watersheds, and aquatic species has been directly raised to the Forest Service in comments by experts who are both knowledgeable and experienced in protecting watersheds, preserving aquatic biodiversity, and protecting aquatic species. As the

courts have noted many times, the environmental full disclosure purposes of NEPA cannot be met without explanation and analysis of the recommended course of action and alternatives to it.

Despite the additional coordination and watershed assessment requirements, criteria, and standards and guidelines in Alternative D, the DEIS finds that its effect on plans would be "similar" to Alternative A. DEIS at 77. There is no rational reason for rejection of Alternative D's default riparian buffer provisions, although the DEIS makes a weak attempt at providing a rationale. First, the DEIS notes that "strictly buffering riparian areas from all management activity might not always lead to healthy, functioning riparian areas," DEIS at 87, 91, and that "attempting to apply rigid management prescriptions at the watershed scale to variable conditions might not achieve desired riparian management goals," citing Everest and Reeves 2006 (finding riparian fire is beneficial) and Dwire et al. 2010 (degrading effects of fire suppression). However, given that natural disturbance and restorative activities are not being proposed to be excluded from riparian management areas under any alternative, this "reason" makes no sense.

Second, the DEIS states that road density standards are not needed or effective on all units, DEIS at 84-85, and that they will create a tendency to focus restoration work on simply reducing road density without looking at other indicators relevant to prioritization of restoration funds for the greatest ecological benefit. Id. As discussed above, requiring a road density standard does not prevent the use of other metrics if they are relevant, nor does the use of a road density standard dictate that restoration be focused on work that is not truly a priority for watershed restoration.

While it could be quite robust in effect, a road density standard will not substitute for all other standards or planning tools. A road density standard is needed because 1) roads are a universal, long-standing, and pernicious problem in all ecosystems across all national forests; 2) maintenance needs of the existing overbuilt road system far outstrip foreseeable Forest Service budgets; and 3) road system decisions implicate and can limit many other forest uses, often over large areas at the scale of national forest units, which cannot be effectively addressed through piecemeal assessments and decisions at project scales. Arguably, there is no national forest where watershed and water resource values would not be substantially and quickly improved via reduction of the road system's oversized environmental footprint and impact.

Third, the DEIS notes that establishing road remediation and removal as the highest priority in riparian areas and priority watersheds "does not take into account the high variability of conditions and stressors across NFS lands" and might cause the focus of resources on a problem that is not a high priority, in fact, on some units. DEIS at 98. Given that it is a national policy to evaluate roads on national forest units in order to minimize the road system; that there is copious science on the adverse impacts of roads to aquatic systems; and that where roads occur in riparian conservation areas, protection of riparian and aquatic resources requires that their

impacts be minimized or eliminated, places where roads impacts are not worthy of "priority" reduction will be the exception rather than the rule. If in fact the existence of some places where roads are not a priority aquatic problem is a reason for rejecting Alternative D, this concern can be addressed simply by making the presumption of road removal and remediation as a restoration priority rebuttable by a field assessment.

Finally, the DEIS intimates that having a default riparian width – although a well-supported and accepted practice – may not ultimately have any particular effect on riparian conservation areas because there is no study which examines the effect of set versus variable default widths and because it is just a temporary default that could be changed. DEIS at 99. This is a straw-man argument. The comparison is not between a set versus variable default width; it is between a variable width over time and a set width upon rule finalization. In our view, it is reasonable to make some assumptions about impacts based on the current extent of riparian protection on various forests; for example, we would assume that on forests with more protective riparian protection already in place, no change would occur, but that on those with less protective riparian direction, harmful impacts would be reduced sooner with a default width than without one.

B. The DEIS Fails to Disclose Opposing Scientific Views.

Similarly, in the absence of careful explanation of the basis for not choosing Alternative D, the Forest Service risks repeating the mistakes of the past and not disclosing/discussing opposing scientific views regarding risks of the proposed planning rule. Especially with respect to mandatory identification and protection of priority watersheds, a default national riparian buffer width, and a road density standard requirement, the Forest Service has affirmatively ignored opposing scientific views. This willful ignorance is most starkly seen on page 1 of the Resolve Science Review, where it is noted that "[t]he DEIS indicated two divergent opinions related to watershed protection. We determined that this divergence was related to policy and not substantive science." To be sure, it may be convenient to classify opposing scientific views as related only to policy, but such a classification is untenable. If the Forest Service does not address opposing scientific views, it will be acting contrary to NEPA.

C. The DEIS Fails to Consider Salvage Logging Impacts.

The statutory language of NFMA specifically allows "salvage sales or sales necessitated to protect other multiple-use values" on lands identified as not suitable for timber production. 16 U.S.C. § 1604(k). Salvage sales are a unique case of logging on unsuitable lands. While the NFMA permits salvage sales on unsuitable lands, it does not require that they be done. Given the Forest Service's focus on restoration and resilience, management of public forests must include greater accommodation of natural disturbance regimes and should ensure that all timber salvage sales on unsuitable lands must have solely non-commercial purposes. Salvage should

not be simply an opportunity to produce more timber. Even taking into account NFMA's language allowing certain salvage sales on unsuitable lands, the DEIS fails to consider the impacts of the proposed rule's broad language with respect to salvage logging.

The proposed rules at § 219.11(b)(1) establish a general prohibition on timber harvest on lands deemed unsuitable for timber production. The proposed rule requires plans to identify lands not suitable for timber production based on a number of factors, as required by NFMA, and states that on such lands "harvesting of trees for the purpose of timber production is prohibited." § 219.11(b)(1). However, "salvage sales" are specifically excluded at several points, most notably at § 219.11(c):

> (c) *Harvest for salvage, sanitation, or public health or safety*. Timber harvest may be approved for salvage, sanitation, or public health or safety, where consistent with the plan.

Salvage is also exempted from the maximum size limits on harvest openings at § 219.11(d)(3)(iii):

> (d) *Limits* on *timber harvest on suitable and non-suitable lands.* A plan for a unit on which timber harvest may occur must have plan components to:
>
> (3) Establish maximum size limits for areas to be cut…
>
> (iii) The plan maximum size openings shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm (16 U.S.C. 1604(g)(3)(F)(iv)).

There is no logical rationale for distinguishing between the opening size limitations applicable to timber harvest for the purpose of generating commercial value because "salvage" is also for the purpose of recovering or "salvaging" commercial value. That is, "salvage" is not categorically an ecological restoration activity and should be subject to the same presumption against timber harvest on unsuitable lands as other types of logging.

The underlying assumption of the salvage exemption language is that after large natural disturbances, human interventions that would not have been necessary or advisable prior to the disturbance become urgently necessary according to a different set of rules. In areas where timber harvest is a management objective, time may be of the essence in planning harvest. But we are unaware of circumstances where fire, insects, or disease render a forest previously deemed unsuitable for timber production suddenly suitable via salvage harvest merely on the basis that more dead or dying trees exist. Salvage logging on the same sensitive lands that the unsuitability determination is designed to protect, in locations that have become <u>even more</u>

sensitive to logging-associated management impacts than they were before the disturbance, is unsound policy and science.[13]

The key consideration in post-fire management must be to allow and enable natural recovery. See Beschta et al. 2004. In rare cases where human intervention is ecologically warranted, it is unlikely to be in the form of salvage logging. In unroaded and otherwise unmanaged areas of the landscape, for example, wildfires present no threat to watersheds and in fact contribute to beneficial ecological processes. In these areas, natural recovery occurs on its own, and human intervention serves to delay natural recovery. Intervention or so-called "restoration" practices such as grass seeding, salvage logging, and tree planting do not promote natural recovery, do not address watershed stressors, and can actually be harmful to the ecosystem they are purporting to restore. There are legitimate and treatable problems that, if left untreated after a fire, will lead to acute and pervasive adverse biological and physical effects — specifically, problems arising from roads. But these problems are inconsistently addressed in current post-fire management (Karr et al. 2004).

Fire has played an important role in the development of most North American aquatic-riparian systems. There is plentiful evidence of resilience of native fishes in the face of fire impacts, even intense burns. (Beschta et al. 1995). Additionally, comparisons of certain known harmful effects of logging against effects of wildfire (which can be neutral or even beneficial to aquatic systems) suggest that tactical logging intended to reduce fire risk (i.e., mechanical thinning) poses more risk to aquatic and riparian ecosystems than the fire itself (Beschta et al. 1995, Erman 1996, Rieman and Clayton 1997). Studies have shown that while fire often has an immediate, measurable effect on stream ecology and aquatic species, the intermediate and long-term effects are beneficial and can be crucial to ecosystem and habitat developments (Albin et al. 1979, Novak and White 1990, Minshall and Brock 1991, Minshall et al. 1997, Minshall 2003, Rieman et al. 1997, Roby and Azuma 1995, Mihuc et al. 1996, Gresswell 1999). Wildfire tends to burn less frequently and/or intensely in riparian areas (Skinner 1997, Fisk et al. 2004) and results in standing dead vegetation which helps minimize temperature increases (Amaranthus et

[13] The proposed rule at § 219.11(b)(2) is also too liberal in exempting non-salvage harvest from timber suitability restrictions, stating simply that "[t]he identification in a plan of lands as not suitable for timber production does not preclude the harvest of trees on those lands for other purposes (16 U.S.C. 1604(k)); in particular, timber harvest may be authorized as a tool to assist in achieving or maintaining one or more applicable desired conditions or objectives of the plan. Examples of using timber harvest on lands not suited for timber production may include improving wildlife or fish habitat, thinning to reduce extreme fire risk, or restoring meadow or savanna ecosystems where trees have invaded." This language is too broad. Such exceptions should be limited to circumstances where timber harvest is determined to be affirmatively necessary to achieve desired conditions and objectives of unit plans, based on best available scientific information.

al. 1989). Fire also is less harmful to fish populations than management efforts designed to mitigate fires and restore forest production and aquatic habitats (i.e., fuels reduction) (Rieman and Clayton 1997).

These environmental impacts were not analyzed in the DEIS. Moreover, if this rule chooses to establish presumptions about post-fire management, those presumptions should be that the priorities on a post-fire landscape are to:

- Preserve natural recovery pathways by not reducing larger woody material or not disturbing structure of the soil litter layer and surface horizon, and not reducing hardwood and native grass regrowth via grazing or annual grass seeding. While patches of hydrophobic soils may form during intense fires, their cumulative effect is insignificant at the watershed level, and they should be left untreated.
- Protect riparian areas, mass failure-prone slopes, and highly erosion-prone soils from salvage logging, grazing, and other additional human disturbance.
- Remove unneeded roads, disconnect needed roads from hydrologic system, and otherwise stormproof or relocate needed roads. Biologically critical and restoration priority watersheds should be given the highest priority for this treatment.

See Beschta et al. 2004 and Karr et al. 2004.

D. The DEIS Fails to Adequately Address the Impacts of Livestock Grazing.

The systematic and widespread adverse impacts of grazing on watersheds, water quality, riparian communities, and fish and other aquatic biota have long been recognized (e.g., Anderson et al. 1976, Kauffman and Krueger 1984, Platts 1991, Elmore and Beschta 1987, Fleischner 1994), and many of these studies have focused on national forest lands. Also well-documented is the checkered success of site-specific grazing management prescriptions and actions to prevent and reverse long-term impacts from grazing (e.g., Kauffman et al. 1997, NRC 1996).

The DEIS fails to adequately address the direct, indirect, and cumulative impacts of livestock grazing in riparian areas. Given the prevalence of livestock grazing on national forests, especially in the West, and the documented harm livestock grazing causes to riparian areas, this analysis gap is particularly troubling. The altered channel morphology, increased sedimentation, and elevated stream temperatures commonly associated with heavily grazed and trampled riparian areas have contributed significantly to the long-term decline in abundance and distribution of resident and anadromous fishes in the western United States (Platts 1991; Rhodes et al. 1994; NRC 1996; Behnke 2002).

Riparian areas are disproportionally utilized by livestock (Kauffman and Krueger 1984), reducing the abundance and vigor of riparian vegetation, preventing its recovery, and

contributing to invasions of exotic species and a host of negative impacts on aquatic dependent species (Belsky et al. 1999; Fleischner 2010). Many wildlife species use riparian areas for nesting, food, and cover. Livestock-driven changes in plant communities and aquatic ecosystems can have profound effects on wildlife habitat and appreciably contribute to the imperiled status of riparian-dependent birds, mammals, and other vertebrates, including fish (Ohmart 1996; Kauffman et al. 2001).

Livestock use of riparian areas also inevitably damages soils. Grazing reduces the stability of streambanks through the combination of trampling and loss of bank-stabilizing vegetation. Accelerated streambank erosion and channel widening/incision are common features of contemporary stream systems across much of the West where grazing has occurred. Degraded, incised channels contribute to the drying of former floodplains and loss of wet meadows, loss of floodwater detention storage, impoverished riparian plant communities, decreased availability of food/construction materials for keystone species such as beaver (*Castor canadensis*), and reductions in stream baseflows (Ponce and Lindquist 1990, Trimble and Mendel 1995, Belsky et al. 1999). Furthermore, livestock can significantly elevate fecal bacteria levels in streams, posing a health risk in drinking water supplies (Derlet et al., 2010).

Because the DEIS fails to adequately analyze the impacts of livestock grazing on riparian areas, the proposed planning rule also fails to protect national forest watersheds from the harmful impacts of grazing.

III. THE FOREST SERVICE MUST BE PREPARED TO CHANGE ITS PROPOSED PLANNING RULE IN RESPONSE TO ENDANGERED SPECIES ACT CONSULTATION.

Under section 7 of the Endangered Species Act ("ESA"), every federal agency "shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency … is not likely to jeopardize the continued existence of any endangered species or threatened species." 16 U.S.C. § 1536(a)(2). The obligation to "insure" against a likelihood of jeopardy or adverse modification requires the agencies to give the benefit of the doubt to endangered species and to place the burden of risk and uncertainty on the proposed action. See Sierra Club v. Marsh, 816 F.2d 1376, 1386 (9th Cir. 1987).

Section 7 establishes an interagency consultation process to assist federal agencies in complying with their duty to ensure against jeopardy to listed species or destruction or adverse modification of critical habitat. An agency must initiate consultation with NMFS or FWS under Section 7 whenever it takes an action that "may affect" a listed species. See 50 C.F.R. § 402.14(a). Regulations implementing section 7 broadly define the scope of agency actions subject to consultation. See 50 C.F.R. § 402.02 (definition of action). The Ninth Circuit Court of Appeals has construed the term "action" broadly. See Pacific Rivers Council v. Thomas, 30

F.3d 1050, 1054-55 (9th Cir. 1994); Connor v. Burford, 868 F.2d 1441, 1453 (9th Cir. 1988); see also National Wildlife Fed'n v. FEMA, 345 F. Supp. 2d 1151, 1169 (W.D. Wash. 2004).

As a result of consultation, the federal agency will obtain either a written concurrence letter from NMFS or FWS that the proposed action is "not likely to adversely affect" listed species or their habitat, 50 C.F.R. §§ 402.13, 402.14(b)(1), or a biological opinion evaluating the effects of the federal action on listed species and their critical habitat. 50 C.F.R. § 402.14(a); see generally Thomas v. Peterson, 753 F.2d 754, 763 (9th Cir. 1985). If NMFS or FWS concludes that a proposed action is likely to jeopardize a listed species or result in adverse modification of its critical habitat, NMFS or FWS must propose a reasonable and prudent alternative, if available, that will mitigate the proposed action so as to avoid jeopardy and/or adverse modification of critical habitat. 16 U.S.C. § 1536(b)(3).

The threshold for a "may affect" determination and required ESA § 7 consultation is low. See 51 Fed. Reg. 19,926, 19,949 (June 3, 1986) ("Any possible effect, whether beneficial, benign, adverse or of an undetermined character, triggers the formal consultation requirement."). Forest management plans, and significant amendments to them, are actions that "may affect" threatened and endangered species and their designated critical habitat. See Pacific Rivers Council, 30 F.3d at 1055 (Forest Service must reinitiate consultation on forest plans upon listing of salmon); Lane County Audubon Soc'y v. Jamison, 958 F.2d 290, 294 (9th Cir. 1992) (BLM must consult on multi-year logging plan). See also National Wildlife Fed'n v. FEMA, 345 F. Supp. 2d at 1176 (responding to FEMA argument that the flood insurance program itself did not affect salmon by noting "[t]he regulations implementing Section 7(a)(2) of the ESA require an action agency to consider 'the effects of the action as a whole.'").

The proposed planning rule "may affect" threatened and endangered species and their designated critical habitat. In Citizens for Better Forestry v. U.S. Dep't of Agriculture, 632 F. Supp. 2d 968, 982 (N.D. Cal. 2009), the district court held that the Forest Service violated the ESA when it did not consult on its 2008 revision to the NFMA planning regulations. See also California ex rel. Lockyer v. U.S. Dept. of Agriculture, 575 F.3d 999, 1019 (9th Cir. 2009) (holding that Forest Service's repeal of nationwide rule protecting roadless areas may affect federally-listed species and their critical habitats and subject to ESA §7(a)(2) requirements).

Not only must the Forest Service consult with the FWS and NMFS on its proposed planning rule, but it must be prepared to amend its proposed rule to respond to any concerns raised by the federal biological agencies.

CONCLUSION

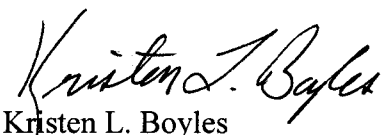
As the human footprint on the operation of the Earth's natural systems increases, and as our scientific knowledge grows, the ecological limits on our national forest management options

to achieve NFMA's watershed protection goals have become clearer. We can no longer afford to take risks with our aquatic resources purely for the sake of preserving manager discretion.

We have urged the Forest Service to set additional minimum requirements for riparian area and priority watershed identification, management, and restoration with clear, objective, easily implementable and enforceable management standards adequate to protect and restore aquatic ecosystems and the many benefits they provide. The national direction we urge be adopted has a compelling rational basis in empirical science. It is also consistent with policies already adopted on many forests where managers have been motivated to reduce the risk of management-induced harm to aquatic resources for a variety of reasons, including but not limited to a desire to avoid non-compliance with baseline natural resource protection duties under the Endangered Species Act and the Clean Water Act.

What we propose are reasonable minimum requirements for forest plans that will maximize planning efficiency and reduce legal controversy over the adequacy of aquatic protection. It is sound public policy to set baseline standards for forest plans that will prevent managers from wasting time and resources planning management actions that science and experience tells us are too risky for aquatic resources. We must stop managing for the "lowest common denominator" – we need to be proactive now more than ever.

Sincerely,



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APPENDIX A. SCIENCE SUMMARY: KEY WATERSHEDS

Scientists have long been keenly aware of and concerned about the long-term and cumulative consequences of human alteration of ecosystems through natural resource management (Warren 1979, Regier and Baskerville 1980, Schindler 1987). Cumulative effects of human management propagate both across time with multiple actions and events within ecosystems, and across space as more and more watersheds are subject to similar management and stressors. While managers and management-oriented institutions tend to prefer maximum flexibility and localized discretion in decision-making (this aspiration often takes the form of uniform resistance to prescriptive or quantitative performance or protection standards), the outcome of unregulated application of conventionally accepted practices across the landscape can be, and often has been, fatal for fish and wildlife and harmful for water quality (Regier and Baskerville 1980, Doppelt et al. 1993, Frissell and Bayles 1996, Meyer et al. 2007, Langford and Frissell 2009). Management practices and policies causing unrecognized or delayed environmental and ecological harm can end up affecting all ecosystems before their long-term and cumulative environmental consequences are observed (Warren 1979, Schindler 1987, Sedell et al. 1990, Montgomery 1995).

Warren (1979) and Sedell et al. (1990) were among the first to point out that certain watersheds with relatively limited human disturbance and certain other geohydrological features often provide regional refuge to sensitive species that are otherwise in regional decline. For example, inventoried roadless areas provide or affect habitat for over 55% of the Threatened, Endangered, or Proposed-for-listing species found on or affected by National Forest lands, representing approximately 25% of all animal species and 13% of all plant species listed under the Endangered Species Act within the United States, and for over 65% of Forest Service-designated sensitive species (Brown & Archuleta 2000). While watersheds *per se* were not the spatial units of analysis in this research, it also strongly supports the importance of relatively intact areas within landscapes serving as refugia and anchors of potential future restoration. Noss e al. (1995) reported close associations of numerous imperiled species with particular endangered ecosystem types, most examples of which are today widely degraded from their historical condition. Other empirical examples abound (Trombulak and Frissell 2000, Gucinski at al. 2001). For example, Frissell and Carnefix (2007) reported significant association of higher redd densities of Threatened bull trout *(Salvelinus confluentus)* in Rock Creek (Montana) subwatersheds with high proportions of Wilderness and/or Inventoried Roadless Area.

These examples lend strong empirical support for the protection of remaining relatively intact and unaltered watersheds as refugia, or Key Watersheds, to protect high-quality habitat for imperiled species and allow them to serve as anchor points, or sources of sensitive species to recolonize surrounding areas as they are restored or recover from past disturbances (Yount and Niemi 1990, Li et al. 1995, Schlosser and Angermeier 1995, Frissell 1997). However, very few of these high value, high-priority watersheds are pristine; they have been subject to past disturbance, often including some roads. To maintain their high value, these watersheds should be protected and restored (see also FEMAT 1993, Moyle and Yoshiyama 1994, Frissell and

Bayles 1996; Menning et al. 1996.) Watershed-Scale Landscape Refugia can and should be designed and managed so as to perform several key functions in the context of larger landscape conservation design and freshwater resource protection, such as:

1) *Ensuring some watersheds in every region remain resilient to and able to benefit from natural disturbances* such as wildfire (Brown and Archuleta 2000, Minshall 2003, Karr et al. 2004), and remain resilient to longer-term stressors such as *climate change* (Rieman et al. 2007, Seavey et al. 2009).
2) *Ensuring patches of habitat with existing highest value—and the populations of sensitive and declining species inhabiting them—are maximally protected* (FEMAT 1993, Li et al. 1995, Frissell and Bayles 1996, Frissell 1997, Trombulak and Frissell 2000).
3) To provide a *demographic source* of locally adapted, genetically appropriate colonizers to populate surrounding habitats as they become suitable through restoration and natural recovery processes (Sedell et al. 1990, Yount and Niemi 1990, Schlosser 1991, Doppelt et al. 1993, Li et al. 1995, Frissell 1997).

As a crucial element of monitoring and adaptive management, to provide relatively natural, unaltered examples of land-aquatic ecosystems remain intact to serve as a *benchmark and quasi-controls to evaluate the success of active and passive restoration and management treatments and programs* on other parts of the landscape (Schindler 1987, Frissell and Bayles 1996, Rheinhardt et al. 1999). A serious commitment to monitoring and adaptive management on the national forests will require incorporating "reference" or "benchmark" watersheds into a broader, quasi-experimental monitoring design (Wissmar 1993, Frissell and Bayles 1996). Currently the Forest Service nationally lacks any rigorous comparative framework to allow inferences to be made and reliably extrapolated from field data. Key Watersheds have been a crucial component of both aquatic habitat conservation and of a regional monitoring program in national forests of the Pacific Northwest (Reeves et al. 2006). Moreover, where Key Watersheds under the Northwest Forest Plan received a significant and early investment in watershed restoration (in particular, removal or remediation of road infrastructure), monitoring has demonstrated clear improvement over time in instream habitat conditions (Gallo et al. 2005).

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APPENDIX B. SCIENCE SUMMARY: RIPARIAN RESOURCES AND WATER PROTECTION

Riparian areas "are among the biosphere's most complex ecological systems and also among the most important for maintaining the vitality of the landscape and its rivers (Naiman and Décamps 1990, 1997)" (as cited in Naiman and coauthors 2000). Besides their dominant influence on conditions in immediately adjacent water bodies, stream riparian zones also serve critical functions as habitat (including old-growth forest) for numerous aquatic-riparian-old-growth-associated or -dependent terrestrial/amphibian species and as corridors providing connectivity from headwaters to ocean when undisturbed, with large implications for maintenance of regional biodiversity (Naiman and coauthors 1993, Meyer et al. 2005, Viers et al. 2011).

Scientific syntheses converge on the view that for protection of water, aquatic life, and riparian resources, the management of riparian areas must integrate two goals and their perspectives (FEMAT 1993, Spence et al. 1996, Erman et al. 1996, Everest and Reeves 2007). The first is *protection and restoration of natural vegetation structures, habitats, biological and physical processes and dynamics* within riparian areas, floodplains, and associated wetland complexes. The second is *protection of natural vegetation and soil structure of land areas buffering riparian areas* to ensure that both natural and man-caused disturbances in uplands are routed and mediated the way they are in fully functional natural landscapes. As in the past, stream and riparian protection paradigms that do not explicitly integrate both the riparian resource viewpoint and the buffer function viewpoint are bound to fail to satisfy either set of goals.

While no two stream and riparian settings are identical, and variation occurs across the nation, these ecosystems in comparison to the rest of the landscape are defined by some core functional and structural features that are in fact universal. The common underlying physics and basic physiological and edaphic factors governing riparian influence on stream conditions (e.g., the suite of factors mentioned below) are fixed enough that generalized conservative minimum recommendations can be made that apply in a wide range of stream and watershed settings and this has been the conclusion of nearly every science-based assessment of stream and riparian protection needs for many years. It is likely true that the greatest source of variation in riparian ecosystem structure and function across North America is caused not by natural circumstances, but by their direct and indirect human alteration by humans. Roughly, a proposed 100-foot minimum default buffer (with provision for local exceptions where specific conditions and best available scientific information justifies them) can be considered a fairly robust protection rule that can apply across forest, grassland/meadow (see, e.g., "The Energy Area," Erman and coauthors 1996), and even urban stream settings. In other words, it is reasonably predictable that mechanical or large-animal disturbance of ground or vegetation within 100 feet of virtually any stream or water body carries appreciable risk of negative impact (e.g., see recent review by Dwire et al. 2010). As the incidence in space and time of such disturbances increases, the probability and level of adverse effect is likely to cumulatively produce measurable and

unremitting impairment of water quality, habitat, and biotic condition (FEMAT 1993, Everest and Reeves 2007).

Studies around the globe and across the U.S., from a wide variety of environmental settings, support the general need to maintain buffer zones of natural vegetation and undisturbed soils on the order of 100-feet (ca. 30 meters) horizontal distance around surface waters and to protect vegetative conditions and microclimate in riparian areas (far more than we can summarize here, but for one example, see Olson et al. 2007). For example, in the U.S. Southeast region, Meyer et al. (2005) developed empirical models based on data describing the relationships between: 1) young trout populations and stream habitat (stream temperature and sediment conditions); and 2) stream habitat and riparian buffer widths in northern Georgia trout streams. Calculations using these models suggest that "on average, in a stream where the forested riparian buffers were reduced from 100 ft to 50 ft along the length of the stream, the biomass of young trout would be reduced by over 80% due to associated stream warming and increased amounts of fine sediments." In another example, based on thorough review of the best available science (King County 2004a), King County (Seattle and environs), Washington, established minimum urban stream buffer widths of 115 or 165 feet (depending on "basin condition" designation) on all streams with flows >20 cubic feet per second, or >2 feet wide and downstream of gradient or other natural barriers to fish passage (King County 2004b). The study's authors determined those protective buffers to be justified across all of the diverse landscape and stream conditions in the Puget Sound region in order to protect in-stream water quality and fish habitat conditions. There are many other such examples from agricultural and forested ecosystems.

From the standpoint of surface water protection, it is important to recognize that by far the most linear miles of streams are small headwaters (Benda et al. 2005), not the larger, permanently-flowing, fish-bearing streams that in the past have been afforded greatest protection. Failure to protect headwaters inexorably causes degradation of downstream resources (Menning and coauthors 1996, Moyle et al. 1996, Erman and others 1996, Lowe and Likens 2005, Olson et al. 2006, Meyer et al. 2007). Widespread recognition of headwater-to-downstream connectivity to larger streams, rivers, and lakes by scientists and field managers informed by monitoring studies is one primary reason why headwater streams have been given increasingly extensive riparian buffers in recent science-based planning efforts, despite the fact that their putative zone of strictly riparian habitat may be very narrow in montane landscapes. Moreover, many smaller streams with seasonal flow do support fish during key life stages, even though they have not been so identified and protected in the past (e.g., Fausch and Bramblett 1991, Wigington et al. 2006).

In view of these and similar findings, some scientific syntheses have articulated compelling arguments for buffer zones substantially greater than 100 feet horizontal distance along smaller, headwater streams in specific circumstances. In an extensive study of sediment transfer from upland slopes to stream networks via headwater channels, Rashin et al. (2006) pointed out that very wide buffers may be necessary to protect streams from logging-related sediment delivery

where side slopes assume the steep "inner gorge" form (a very common geomorphic feature on headwaters in national forests across the continent, in dissected uplands, alluvial, piedmont and uplifted coastal marine terrace terrain). Biological studies have documented adverse modification of habitat and declines in freshwater species from headwater logging with narrower stream buffers. For example, "[d]ramatic changes in riparian conditions by logging forests near headwater streams have greatly reduced populations of riparian-dependent and terrestrial salamanders in the Appalachians (Petranka, et al. 1994)" (as cited by Erman and coauthors 1996). For several reasons, including small streams having "lower volume to influence-area ratio[s that] dilute effects less readily than do larger water bodies (see Moyle, et al. 1996; Kattelmann and Embury 1996)," "less developed aquatic fauna/flora and [so tending] to be . . . depend[ent] on biological inputs from *outside* the system," and being more sensitive to activities on their often steeper hillslopes, "stream buffers should get larger as streams get smaller" (Menning and coauthors 1996, p. 35). In this rationale recommended after substantial scientific synthesis in the Sierra Nevada Ecosystem Project (SNEP), buffer sizes increase with adjacent slope steepness, and so are largest in steep headwaters areas (Menning and coauthors 1996, p. 33). Minimum default buffer widths are set to 150 feet for both an inner "green" zone in which any permitted management disturbance is most restricted and an outer "grey" zone with less restriction of management activities, i.e., a total riparian buffer of 300 feet, minimum, on each side of the stream (Menning and coauthors 1996, p. 44). Olson et al. (2006) suggested including expanded, coextensive patches of protected area that include a mosaic of upland and riparian habitats could favor the persistence of sensitive amphibians and other headwater-oriented species.

To our knowledge, no truly comprehensive synthesis of scientific knowledge to inform specific conservation design for federal lands management has been attempted since FEMAT, either for the Pacific Northwest region covered by the Northwest Forest Plan or elsewhere. FEMAT (1993) remains the default "state of the science" for protection of riparian function in the Pacific Northwest, as recently reaffirmed by Reeves et al. (2006) and Everest and Reeves (2007; p. 87):

> The curves of ecological functions also provide a margin for error allowing for incomplete science, unknown cumulative effects, or strategic uncertainty in defining interim riparian zones prior to watershed analysis. **We are unaware at this time of any evidence in the scientific literature that supports modifying or retracting the original curves. The science produced since then (i.e., 1993) has supported the original assumptions and judgments used in developing the FEMAT curves** (e.g., Brosofske et al. 1997, Gomi et al. 2002, Reeves et al. 2003).

Everest and Reeves (2007) also chronicle the history of riparian management standards from early days when impacts of land management to aquatic systems were for all practical purposes ignored. The pattern has been: 1) recognition of the resulting damage being done; 2) modest strengthening of riparian management standards, constraints, or prohibitions (e.g., requirement of

initially narrow stream buffer retention), designed to constrain management options as little as possible; 3) documentation of ongoing declines of aquatic species/habitat; 4) further modest strengthening of riparian management constraints (e.g., somewhat wider buffers); repeat "3" and "4" – until the FEMAT (1993) process finally took the first integrated, comprehensive, conservative (i.e., precautionary) approach to assessing what was necessary to comprehensively define, and fully protect, riparian functions and values.

Even though short-term, local assessments might find reason to delineate buffers narrower than 100 feet, it is vital that such determinations not be made without full consideration of both the manmade and natural factors that may be significantly affected by riparian buffer-zone vegetation over a time frame of decades to centuries. This necessitates recognition of the critically important role of riparian buffer zones in mediating catchment and surface water response to natural or uncontrolled disturbances, such as wildfire, drought, wind storms and hurricanes, and climate change (Everest and Reeves 2007, Seavey at al. 2009). Both wildfire and regional windstorms are known to be associated with general atmospheric circulation processes (such as El Nino-Southern Oscillation in the Pacific Basin and similar phenomena operating on a multi-year and multi-decadal scales) and climate change in forest and rangeland watersheds. Gresswell's (1999) comprehensive review and Minshall et al.'s research (1997, 2003) on wildfire effects on streams and fish underscored that natural wildfire brings a mix of short-term impacts and longer-term benefits to fish and wildlife. In all fire-prone regions native species including fishes are necessarily highly adapted to surviving or thriving after fire. Wildfire triggers a cascade of natural watershed recovery processes that are necessary for the maintenance or restoration of stream complexity, geomorphic processes, habitat diversity and biological productivity (Gresswell 1999, Meyer et al. 2001, Minshall et al. 2003). In fact, recent work has shown that conditions after severe wildfire in the Rocky Mountain West can favor native fishes over competing nonnative species (Sestrich 2005).

Management of riparian areas and buffer zones after wildfire, windthrow, insect kill, and other disturbances critically determines the natural succession and self-healing capacity of streams and riparian ecosystems. Riparian areas are often – but not always – subject to less intense or extensive disturbance in fires and other disturbances (Karr et al. 2004 Reeves et al. 2006). Because of vigorous sprouting of hardwoods and reduced moisture stress in riparian areas, they usually show robust and rapid natural recovery after fire and other disturbance. In their review of fire and effects in riparian zones Reeves et al. (2006) reported that both pre-and post-fire logging and other human disturbances often aggravate the effects of natural disturbances such as wildfire. While natural wildfire across catchments and inside riparian areas in particular may be essential for the long-term sustenance of woody debris, habitat complexity, and maintenance of alluvial land- and bed-forms in North American streams, logging, livestock grazing, and other human alterations of pre-fire condition and post-fire process can directly or indirectly truncate natural processes of recovery and habitat regeneration (Minshall et al. 1997, Minshall 2003, Beschta et al. 2004, Karr et al. 2004). Because riparian zones even in grasslands are commonly dominated by woody species, these generalizations apply across most ecosystem and channel

types, including prairie and savannah ecosystems. Malison and Baxter's (2010) research further reveals the broader importance of naturally recovering riparian areas across the landscape: after wildfire, a flush of invertebrate production from small streams enriches and diversifies food resources for recovering upland food and nutrient webs.

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APPENDIX C. SCIENCE SUMMARY: ROADS

Roads are endemic to managed forest landscapes, on national forests as elsewhere. Outside of Wilderness, global, national, regional, and local assessments consistently identify existing roads as among the foremost and lasting threats to watershed condition, water quality, and aquatic diversity, and fisheries (FEMAT 1993, Quigley et al. 1996, Forman and Alexander 1998, Trombulak and Frissell 2000, Jones et al. 2000, Guscinski et al. 2001, Riitters and Wickham 2003). In roadless areas outside of Wilderness, the building of new roads is a primary threat to their water resources and aquatic life (USDA Forest Service 2000, Frissell and Trombulak 2000). Roads alter chemical, biological, microclimate, biological, and human use aspects of ecosystems within at least several hundred meters of the road's location, and by altering hydrology and generating sediment and nutrients, roads alter aquatic ecosystems and their impact can threaten aquatic species and water quality for domestic or commercial users many kilometers downstream (Frissell and Trombulak 2000, Jones et al. 2000).

Unlike some other forms of disturbance, roads create major alterations of soil, landforms, and hydrologic and erosion processes that are not self-healing on time scales of less than thousands of years. In other words, the impacts of roads – especially on water, erosion, and nutrient loading processes, are permanent, unless they are effectively reversed through active, site-specific treatment (Trombulak and Frissell 2000, Madej 2001, Switalski et al. 2004). Fortunately, effective remediation and restoration measures for roads are well-understood and widely tested, so impact reduction is feasible and restoration can be achieved (Madej 2001, Switalski et al. 2004). But effectively addressing watershed threats from roads on the ground requires three elements: 1) clear policy direction to ensure watershed outcomes are an overarching priority, 2) focused planning to define clear targets for restored watershed condition and establish stepwise priorities for treatment areas and actions, and 3) adequate resources to implement the necessary projects. The first two elements could be achieved – and the third substantially fostered – nationally through a specific NFMA planning rule requiring them as a primary outcome of forest plans.

Scientific research to date does not identify any clear, nonzero "safe" threshold of road influence on the landscape. Persistent adverse biological impact to sensitive species can be detected at road densities on the order of 1 mile per square mile or even lower density (reviewed in Carnefix and Frissell 2009, including USFWS 1999, assessments by Forest Service in the Interior Columbia Basin Ecosystem Management Plan, e.g., Quigley et al. 1996, Lee et al. 1997, and others, e.g. Ripley et al. 2005). Moreover, roads have effects that interact with and may aggravate other threats (Frissell and Trombulak 2000, Gucinski et al. 2001). For example, roads increase access and hence both legal and illegal harvest pressure on sensitive fish populations, and Hitt et al. (2003) found increasing incidence of hybridization of native cutthroat trout by nonnative rainbow trout with increased road density in Montana.

Because roads have common physical and biological effects across a broad range of forest and rangeland ecosystems, and because the remediation measures are well-established and common across ecosystem types, planning direction, including establishing targets to reduce road densities to sustainable levels in priority watersheds, need not wait to be derived in site specific assessments. Methods and tactical planning to implement projects should be informed on a site-specific basis, but the need for such projects is a pervasive national and regional reality and its solution can and should be driven by national policy. As one example – in one of the only successfully implemented regional monitoring programs of its kind – monitoring of the first decade or so of the Aquatic Conservation Strategy ("ACS") implementation under the Northwest Forest Plan documented the success of the measurable improvement for multiple condition indicators (Gallo et al. 2005, Reeves et al. 2006). Recorded improvements of instream habitat condition were most pronounced in watersheds where road densities had been dramatically reduced through active restoration early in the interval.

Harm to watersheds and aquatic resources from roads is expected to increase under nearly all projected climate change scenarios (Battin et al. 2007, Furniss et al. 2010). Increased storm intensity, transition from snowmelt to rainfall-dominated hydrology, and increased extent and frequency of rain-on-snow-driven floods all tend to increase the role of roads in diverting surface flow and the vulnerability of roads to erosion, both chronic and failure-driven. Hydrologically effective decommissioning and stormproofing upgrades of roads that remain is the primary active means through which managers can increase the resilience of forest watersheds in the face of future climate change (Furniss et al. 2010).

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APPENDIX D. DEFINING BEST AVAILABLE SCIENCE

Many U.S. laws and implementing regulations governing conservation and natural resource management require that policies and decisions be based on "best available science" or some closely equivalent wording. (Sullivan and coauthors 2006). Ample evidence demonstrates that in practice this requirement is not met for a range of reasons, including, but not limited to: corrupt influence on or collusion with regulators by regulated parties (including outright criminality) (e.g., Devaney 2008a); improper political or other intrusion into and/or distortion, manipulation, or revision of scientific analyses and conclusions (e.g., OIG 2007, Devaney 2008b); failure to consider all relevant, reasonably current data and reasonably foreseeable or likely impacts (Lubchenco 2009); and violation of laws, regulations, or required procedures (Perry 2009).

It is important to recognize what "best available science" is *not*: it is not limited only to published and peer-reviewed scientific work, though these elements of scientific process can add credibility, other things equal. Nor, in cases of competing models, theory, hypotheses, conclusions, or differing expert opinion, does it mean one of these "winning out" over the others. Most especially, it is not selective consideration of scientific information that is interpreted to support a policy outcome that is preferred for non-scientific reasons while selectively excluding that which does not, though such is too common in practice.

Rather, determining "best available science" is a synthetic process which gathers and considers all credible scientific information relevant to an issue or decision – including non-rigorous sources such as local or anecdotal knowledge, historical archives, etc. – and weighing the quality of data, analyses, and conclusions to reach a comprehensive picture of what science says on the matter at hand. Critically, it is a task for scientists, not non-scientists (Sullivan and coauthors 2006). As Sullivan and coauthors (2006) conclude [**bold** emphasis added]:

> **High-quality** science adheres to the well-established scientific process. This process includes (1) a clear statement of objectives; (2) a conceptual model, which is a framework for characterizing systems, making predictions, and testing hypotheses; (3) a good experimental design and a standardized method for collecting data; (4) statistical rigor and sound logic for analysis and interpretation; (5) clear documentation of methods, results, and conclusions; and (6) peer review. **The best *available* science** will not always meet all these criteria but it can still be valuable in informing management decisions. The soundness of any science is enhanced if associated values, assumptions, and uncertainties are clearly explained.
>
> Even with clearly defined and applied scientific processes, science is still a human endeavor, and as such it can be limited by human understanding of the systems we interact with and implicitly or explicitly influenced by underlying human

> principles, values, and beliefs. Maintaining transparency and openness in the process through the means available for communicating methods, assumptions, and findings may be difficult, but it should promote better science. Scientific debate is another important mechanism by which scientists can explore the effects of uncertainty on the scientific process and how it may influence decision making; such debate also helps to define the risks associated with management actions.
>
> Unfortunately, even science that has been developed through an open, transparent, and well-communicated process may not be fully adequate for addressing management issues. Scientists must often rely on incomplete information in offering their best expert advice. That is why scientists are obligated to articulate the limits of science and develop means for overcoming problems in communicating scientific information, assessing uncertainty in predictions, and evaluating risk in decision making.

Sullivan and coauthors' (2006) concrete structural/procedural recommendations for implementing "best available science" include:

- [S]cientific evidence must be assessed for its quality and content by scientists following the scientific process. Peer review panels selected to review the quality of science need to be selected by and composed of qualified scientists.

- Scientific peer review must be distinguished from policy peer review.

- Scientific societies should play a larger role in developing or at least reviewing policies and in assessing and documenting whether the science under their purview is properly applied to policy and management decisions.

- The development of a peer review structure for science as it bears on environmental policy should be considered.

- Consideration should be given to instituting a peer "pre-review" of sampling and experimental designs related to environmental issues that are likely to generate controversy. This may help promote stake holder buy-in, but it may also ensure against missing important data sources relative to sensitive issues.

- The responsibilities for science and regulatory decisions should be formally separated within agencies.

- There should be formally appointed advocates and/or watchdogs of best available science within the management and policy processes.

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