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16 February 2010

TO: fspr@contentanalysisgroup.com

[**NOTE**: some people have reported that emails to the contentanalysis.com domain have bounced, so the deadline should be extended to insure that everyone's comments are properly received.]

Subject: Oregon Wild scoping comments on NOI for the NFMA Planning Rule

Dear FS:

Please accept the following scoping comments from Oregon Wild, Environmental Protection Information Center (EPIC), Klamath Siskiyou Wildlands Center, and Klamath Forest Alliance concerning the NOI for the NFMA Planning Rule dated 18 Dec 2009, http://bit.ly/9lRyN6 http://fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5110264.pdf. Oregon Wild works to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy. EPIC works to protect and restore ancient forests, watersheds, coastal estuaries, and native species in Northern California. The Klamath-Siskiyou Wildlands Center (KS Wild) is an advocate for the forests, wildlife and waters of the Rogue and Klamath Basins, working to protect and restore the extraordinary biological diversity of the Klamath-Siskiyou region of southwest Oregon and northwest California. Klamath Forest Alliance works to support sustainable ecosystems and sustainable communities.

As explained below, a primary goal of the National Forests should be to protect areas that remain intact while striving to restore areas that have been degraded. This can be accomplished by moving over-represented ecosystem elements (such as logged and roaded and grazed areas) toward characteristics that are currently under-represented (such as roadless areas, complex old forest, and ungrazed areas).

Federal forest provide the American people with an amazing suite of public benefits including clean water, biodiversity, recreation, carbon storage, and inspiration. There is not doubt that for too long the National Forest were subjected to unbalanced management driven by economic outputs and the FS got a spanking in the courts which helped bring forest management closer to balance. Since then the FS has tried to wiggle out of it's mandates by eliminating non-discretionary language in the NFMA planning rules and in LRMPs while increasing discretion for managers. This is a big mistake. Clear legal requirements actually *help* the agency avoid conflict and controversy. Once the FS has fully internalized the need for ecosystem management and restoration, the degree of social conflict will greatly diminish. This is already happening in many places here in Oregon, such as the Siuslaw NF which has the vast majority of its land in protected status, so it has shifted to a restoration paradigm, and has seen tremendous success since then, even producing substantial amounts of timber from thinning dense young stands. This is a model that can and should be duplicated. The new planning rules can help that process.

Consider the following hierarchy of linked goals and needed actions on the National Forest as a helpful way of framing the development and implementation of the NFMA planning rules.

Hierarchy of linked goals and needed actions on the National Forests

The **prime directives for the National Forest** include: (i) complying with and harmonizing the full suite of legal requirements applicable to the National Forest System, (ii) "Sustain[ing] the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations,"[1] and (iii) making steady progress toward the "triple bottom line" of social, economic, and environmental goals such as those articulated in the Montreal Process Criteria and Indicators. Achieving these goals …

Requires … **maintenance of ecological integrity** so that the environment can supply an **optimal mix of ecosystem services**, especially mutually compatible public values such as clean water, hydrologic buffering, biodiversity, nutrient cycling, carbon storage/climate stabilization, recreation, scenic values, etc. (Recognize that economic and social values cannot be met without a healthy environment, so conservation of environmental values must be given primacy.)

Which requires … federal lands must **compensate for the degradation of ecological integrity and ecosystem services on non-federal lands**. (Recognize that non-federal lands provide wood products and livestock

[1] http://www.fs.fed.us/plan/stratplan.pdf

forage, and federal lands out-perform non-federal lands by every measure in terms of the ecosystem services listed above.)

Which requires … **restoring the damage from past practices on federal lands**. (Recognize that past management on federal lands was dominated by economic interests resulting in significant degradation that must be reversed.)

Which requires … **managing ecosystem elements that are over-represented** relative to natural or historic conditions (e.g. areas that are roaded, logged, grazed, weedy, and fire-suppressed) so as to **address deficits in ecosystem elements that are under-represented** relative to natural or historic conditions (e.g. areas that are unroaded, unlogged, ungrazed, weed-free, and burned).

Which requires … **selectively restoring structural conditions, then relying primarily on natural processes to renew and maintain ecosystem structure and function, AND not interfering with or slowing natural recovery processes.**

Which requires … allowing overabundant young forests to become old forest habitat. Areas with excessive road systems must be converted to unroaded or low-road-density areas which are currently rare. Species and habitats that have been significantly reduced due to human interference, must be conserved and restored to insure species viability. Ecosystems with depleted carbon stores must be allowed to grow and recover. Prepare ecosystems for global change.

Which requires … strategically reintroduce fire, both planned and unplanned. Protect recruitment pools for future old-growth AND large snags, and allow mortality processes to operate with the natural range of variability. Strategically remove roads where they interfere with ecological and hydrological structures, function, and processes. Protect large and old trees both live and dead. Protect mature and old growth forests stands. Areas that are over-grazed by livestock should be given back to native wildlife.

This hierarchy can help connect simple actions such as protecting large and old trees to the higher goals of the FS Strategic Plan and the triple bottom line. Put another way, if the Forest Service fails to do the things at the bottom of the hierarchy, it will be difficult or impossible to achieve the goals at the top of the hierarchy. The rules should be designed with this hierarchy of goals and actions in mind.

Answers to specific questions posed in the NOI:

What do you see as the biggest threats to forest and grassland health and ecosystem resiliency?

The biggest threat to ecosystems on the National Forest is probably the legacy effects of past management. Many of the forest practices that occurred, and some that are still occurring, have very long-term impacts. These include clearcutting, replanting dense uniform stands with narrow genetic bandwidth, high grade logging that removes most of the large trees, salvage logging that removes large dead and dying trees, road building, fire suppression when it leads to uncharacteristic stand replacing fire effects, livestock grazing when it leads to soil erosion, stream channel changes, and vegetation type conversions (e.g. loss of riparian hardwoods, or weed invasions). It takes more than 100 years to grow the large trees and large snags that are representative of the historic range of variability. The FS should spend the next several decades focusing on undoing the damage of the past.

Market imperfections are another significant threat that the FS should strive to correct. Market imperfections such as "externalities" and "public goods" mean that prices do not reflect the true cost of production; costs are shifted from the timber industry to the public; therefore prices are too low which results in over-production of wood products from mature & old-growth forests; and under-production of public goods such as clean water, wildlife habitat, and carbon storage. Due to these externalities, the interests of the timber industry have diverged from the public interest. Public policy must correct these market imperfections by limiting harmful logging, not increasing it.

Misguided land management also remains a continuing threat to our forests. Managers are still removing large trees that are very rare and ecologically valuable. The FS still pursues senseless salvage logging efforts after disturbances instead of conserving valuable structural legacies and letting natural processes create and renew complex forests.

Climate change is another obvious threat. The NFMA rules must recognize that the National Forest are both a victim of climate change, as well as being an important part of the global carbon cycle that can either exacerbate or mitigate climate change depending on how forests are managed. The rules should encourage actions where climate adaptation is highly compatible with climate mitigation (e.g. letting forests grow and retaining all large trees), and carefully constrain actions where adaptation and mitigation may conflict (e.g. fire suppression and logging fro fuel reduction).

The Forest Service will undoubtedly hear lots of concern expressed about fire and insects, but we feel it is very important to validate these concerns with scientific evidence. It may be appropriate to address UNcharacteristic fire and insects, but characteristic disturbances should be tolerated and encouraged. Keep in mind that decades of fire suppression have left us with a significant deficit of fire across the landscape, so even “uncharacteristic”

fire can be considered a system-level self-correction which is helping to fix the fire deficit.

To put concerns about fire in perspective please recognize a few key facts:

(i) Since commercial logging and fire suppression became dominant uses of the National Forests, a very large fraction of all the mortality that occurs in the forest is being exported, yet under natural historic conditions virtually all of the trees that grew in the forest died in the forest and stayed in the forest to serve ecological purposes such as terrestrial habitat structure (snags), stream structure, substrate (nurse logs), soil enrichment, slope stabilization, carbon storage, creating favorable microsites for seed germination, nutrient capture/storage/release, etc. Thus, it is clear that fire and beetles which kill trees are just helping to fill a significant deficit of large dead trees that exists in our National Forests. The NFMA rules should help rebalance the mortality equation by encouraging "management for decadence." The conservation of mortality process requires attention to unmanaged areas. Studies estimate that even if we apply enlightened forest management on federal lands in the Interior Columbia Basin for the next 100 years, we will still reach only 75% of the historic large snag abundance, and most of the increase in large snags will occur in roadless and wilderness areas. Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project. PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf

(ii) The FS and it's partners have suppressed fire for so long that there is still a significant *fire deficit* on our forests. If there is a little "extra" fire going on recently it is just helping to fill that deficit. Also, recognize that fire is a highly variable phenomena so few fire years match the "average." Most years are either far above or below average and that's normal. The evidence does not support the widely held view that recent fires are far more catastrophic than historic fires.

The US Forest Service program on Forest Inventory and Analysis (FIA) recently analyzed forest fire hazard across the state of Oregon and found ...

> These [forest inventory and analysis] data paint a different picture of fire hazard and fuel treatment opportunity than do certain commonly used maps of fire regime condition class (Hardy et al. 1999; Schmidt et al. 2002). … Under the fire weather assumed for this analysis, less than half the forested lands are predicted to develop crown fires, and an even smaller fraction, 5 to 15 percent, can be expected to develop active crown fire. … From the standpoint of implementing fuel treatments, these results suggest that only a fraction of the forested landscape is likely to benefit from fuel treatment if the objective is to reduce crown fire hazard. Given that spatial analyses of fuel treatments has demonstrated that treating a small percentage of the landscape can reduce landscape-

> scale fire hazard significantly and sometimes cost-effectively (Finney 2001), these results suggest that the fuels management challenge may be more tractable than has been assumed.[2]

The ICBEMP investigations show that fire hazard in northwest forests is not as bad as some are claiming.

> About 6 percent of the FS/BLM administered lands in the [Interior Columbia Basin] ICBEMP management region experience at least moderate levels of uncharacteristic wildfire probability. These are broadly scattered across the landscape. Much of this occurs in dry forest where the interaction of fire suppression, insects and disease, and succession has produced uncharacteristically high fuel levels. … The great majority (80 percent or more) of lands administered by the FS/BLM in the ICBEMP management region currently experience low probabilities of uncharacteristic wildfire. … Fire disturbances are about equally split between low, moderate and high classes at present.[3]

Hanson et al (*in press*) reviewed 2 decades of fire records in conifer forests in dry provinces of the Northwest Forest Plan and found that the proportion of area burned and the severity of fire has not changed significantly.[4] These findings, along with the evidence that logging has unavoidable adverse impacts, indicates that caution is warranted. We should not encourage excessive and unwarranted logging in mature forests to address a threat that may be minor or non-existent. PNW Research Station recently reported that profit-driven fuel reduction logging can conflict with both habitat objectives and fire risk reduction objectives.[5]

How do you define restoration? What is your concept of restoration? How can the planning rule foster restoration of NFS lands?

Define restoration with reference to the natural or historic range of variation, so restoration is the management of over-represented ecosystem elements toward under-represented ecosystem elements. Over-represented elements include: areas with excessive road density, excessive young forests, depleted snag habitat, impaired water quality, areas

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[2] Donnegan, Joseph; Campbell, Sally; Azuma, Dave, tech. eds. 2008. Oregon's forest resources, 2001–2005: five-year Forest Inventory and Analysis report. Gen. Tech. Rep. PNW-GTR-765. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station. 186 p. http://www.fs.fed.us/pnw/publications/gtr765/pnw-gtr765b.pdf (emphasis added).

[3] Miles A. Hemstrom, Wendel J. Hann, Rebecca A. Gravenmier, Jerome J. Korol. 2000. [SAG] Landscape Effects Analysis of the [ICBEMP] SDEIS Alternatives. USDA/USDI, *draft* March 2000.

[4] Hanson, C.T., Odion, D.C., DellaSala, D.A., and W.L. Baker. *in press.* Overestimation of fire risk in Northern Spotted Owl Recovery Plan. Conservation Biology.

[5] PNW Research Station. 2006. Seeing The Bigger Picture: Landscape Silviculture May Offer Compatible Solutions To Conflicting Objectives. Science Findings. July 2006. http://www.fs.fed.us/pnw/sciencef/scifi85.pdf

with weeds, areas with depleted carbon stores, etc. Under-represented elements include: unroaded areas, mature & old-growth forests, large snags, areas with high carbon storage, candidate/threatened/endangered species, weed free areas, etc.

Many restoration objectives are being met through natural processes like forest growth, natural mortality, and natural disturbance processes. Part of restoration is getting out of the way and letting these things operate with as little interference as possible. Management should not retard natural recovery toward the natural range of variability.

Comment [DH1]: "[N]atural restorative processes should be used wherever possible; in fact, natural processes may be sufficient once the degrading influences have been removed. Because the process of restoration is progressive, the criteria of success are not easy to define. The most important point is that ecosystem development should be on an unrestricted upward path." A.D. Bradshaw 1996. Underlying principles of restoration.. Can. J. Fish. Aquat. Sci. **53**(Suppl. 1): 3–9 (1996).

Ecological integrity is another useful benchmark for restoration. The USDA Committee of Scientists described ecological integrity as follows:

> [An] ecosystem has ecological integrity when it can maintain characteristic compositions, structures, and processes against a background of anthropogenic changes in environmental conditions. Ecosystems with high ecological integrity continue to express the evolutionary and biogeographic processes that gave rise to the current biota; they have a species composition, diversity, and functional organization expected from natural habitats of the region; and they are resilient to environmental change and disturbance occurring within their natural range of variability.

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) ecosystem management framework further defines ecosystem integrity as

> "the degree to which all components and their interactions are *represented* and *functioning*… [A] living system would exhibit integrity if, when subjected to disturbance, it sustains an *organizing, self-correcting capability to maintain resiliency*. … [A]n ecological system has maintained is integrity if it retains (1) the *total diversity* of the system and (2) the *systematic organization that maintains diversity*." (emphasis added).

It may appear relatively straightforward to maintain representative components of an ecosystem, but federal managers are often challenged to maintain *fully functional ecosystem components AND interactions* (for example by tolerating disturbances of all kinds and retaining abundant legacy structures after disturbance) and we are just learning to manage in a way that takes advantage of ecosystems' *self-organizing capabilities* (for example using variable density planting and thinning instead of uniform prescriptions, removing roads that intercept sediment, boulders, and large wood, and interrupt connectivity between uplands and streams, by retaining abundant legacy structures, etc.).

Restoration *principles*:

1. **Restoration is the prime directive, while commodities are a byproduct.** The agencies can best meet their legal obligations consistent with ecological principles by emphasizing restoration and viewing timber volume as a byproduct of careful restoration. The agency's social and economic objectives can be derived through thinning and other restoration activities. There are also lots of jobs and agency success to be had in addressing the restoration needs of the federal forests, and significant commodity by-products can be expected from careful variable thinning of dense forests of small trees.

2. **Protect areas that already provide quality habitat and watershed conditions**, such as roadless areas and mature and old-growth forests. Active restoration (other than prescribed fire) should not be a high priority in such areas. Even small patches of existing complex forest should be retained so they can act as refugia and centers for dispersal of late successional species. Active management is also contra-indicated in stands that are likely to develop complex conditions without intervention, such as naturally regenerated young forests that retain all the building blocks for developing late-successional old-growth habitat and where there is an expectation of continuing natural disturbance processes. In cases where fire exclusion is a concern, prescribed fire should be considered first.
3. **Control sources of degradation before attempting to address the impacts of degradation OR "address root causes first, then apply band-aids."** The current degradation of our forests and watersheds is caused by a century of ecologically insensitive logging, road building, fire suppression, mining, and livestock grazing. These are the sources of degradation that desperately need reform. While active management is needed in many areas, the agencies too often design projects that take one step forward (with restoration) and two steps back (with more commodity extraction). This often causes a vicious cycle of ecological degradation and restoration. It serves the agencies, but it does not serve the public interest.
4. **Prioritize active management in areas that are highly modified by past practices** such as timber harvest, road construction, and fire exclusion. Short-term efforts may include prescribed fire, selective removal of some brush and small trees. These practices may also be appropriate near communities that are at-risk due to fire suppression and past logging. Active restoration will be a priority where highly simplified dense plantations require variable-density thinning to redirect these stands toward a more appropriate late successional trajectory.
5. **Set restoration priorities to get "the biggest bang for the buck."** With limited resources and a huge backlog of restoration needs, the agency should set priorities that derive relatively large gains from relatively small investments. This priority setting process should be done within a NEPA context so that the public can comment on the agency's methods and conclusions.
6. **Favor practices with low impacts and high effectiveness.** Wherever possible, active restoration will favor low-impact practices such as prescribed fire and manual treatments rather than heavy equipment and commercial extraction.
7. **Recognize the important roles of natural disturbance.** Past management placed far too much emphasis on growing healthy, vigorous trees. Now it is clear that a healthy forest includes unhealthy and dead trees. Wind, ice, insects, disease, fire, flood ALL play critical roles in determining the heterogeneity of a healthy forest. Restoration efforts must resist the temptation to "salvage" and "sanitize" which are almost universally detrimental to healthy forest conditions.
8. **Build public trust.** The agencies must recognize that their professional training might give them biases toward resource extraction. Too few forestry schools are teaching ecosystem management and social sciences that FS professionals need.

The agencies must strive to find solutions that are publicly supported. Diameter limits are an example of a means to improve both ecological health and public trust. The best available information indicates that brush and trees smaller than 12 inches tend to contribute disproportionately to fire hazard, whereas trees over 12 inches dbh on balance help reduce fire hazard (and contribute to many other ecosystem services). This is because brush and small diameter trees tend to have their canopies (i.e. flashy fuels) close to the ground where it can carry flames into the canopy, and small trees do not yet have thick fire-resistant bark, while trees larger than about 12 inches tend to have fire resistant bark, greater "ground to crown" distances, and the canopy of the larger trees provides shade which maintains fuel moisture, reduces wind speed, and suppresses the growth of ladder fuels, which results in reduced fuel hazard and reduced costs of maintaining favorable fuel conditions.

9. **Reducing maintenance costs** is another important aspect of sound ecosystem management and intergenerational equity. We should not burden future generations with a huge backlog of expenditures required to maintain roads that have outlived their usefulness, fight uncharacteristically large and intense fires, remove invasive species, restore damaged soil, thin stands that were clearcut and planted too densely, and clean polluted groundwater. Recognizing that past management did not share this ethic, our responsibility today should be to unburden future generations, not further burden them. Relying on self-organizing natural processes is a great way to reduce future maintenance costs.

Here are some region-specific restoration concepts form the Pacific Northwest:

Areas that have been previously clearcut or salvage logged and densely replanted can often benefit from variable density thinning. See for example:

- Hunter, Matthew G. 2001. Communiqué #3: Management in young forests. Cascade Center for Ecosystem Management. 28pp.
- Carey, Andrew, B. 2002. brochure-- Promoting Habitat Complexity in Second Growth Forests, Pacific Northwest Research Station, USDA Forest Service, Forestry Sciences Laboratory, Portland, OR. http://web.archive.org/web/20060305025730/www.fs.fed.us/pnw/pubs/carey_habitat-complexity.pdf

Dry forests present more complex issues because they suffer from both logging and fire exclusion. Suitable dry forest restoration concepts can be found here:

- Craig D. Allen, Melissa Savage, Donald A. Falk, Kieran F. Suckling, Thomas W. Swetnam, Todd Schulke, Peter B. Stacey, Penelope Morgan, Martos Hoffman, And Jon T. Klingel. 2002. Ecological Restoration Of Southwestern Ponderosa Pine Ecosystems: A Broad Perspective. Ecological Applications, 12(5), 2002, pp. 1418–1433 q 2002 by the Ecological Society of America. htttp://www.biologicaldiversity.org/publications/papers/Allen-Restoration-2002.pdf
- Eastside Forests Scientific Society Panel 1993. Interim Protection for Late-Successional Forests, Fisheries, and Watersheds National Forests East of the

Cascade Crest, Oregon and Washington A Report to the United States Congress and the President. September 1993. http://www.fseee.org/eastsidepanel.htm
- Nelson, Cara, ed., Key Elements for Ecosystem Planning, Management Principles, Recommendations, and Guidelines for Federal Lands East of the Cascade Crest in Oregon and Washington. http://www.subtleenergies.com/ormus/bmnfa/keep.htm
- Brown, Rick. 2000. Thinning Fire and Forest Restoration, Defenders of Wildlife, December 2000. http://cbfinfo.com/cbf/wapro/Fire/Brown.pdf http://www.biodiversitypartners.org/Brown/brown01.html

What kinds of conservation efforts can enhance ecosystem resiliency and prevent degradation?

To protect and restore ecosystems, the Forest Service should manage for more healthy forests and watersheds operating within the natural range of variability (NRV), with fewer roads, and more old-growth forests, especially in areas with few or no roads. In fact these unroaded areas should be conserved and expanded to restore large blocks of unfragmented habitat. More attention must be given to the needs of wildlife species that depend on underrepresented habitat components such as large trees, dead wood, clean water, complex streams, and large blocks of undisturbed habitat. Management should favor retention and restoration of under-represented species such as pine and larch, at the expense of over-represented species like small white fir and grand fir. Use prescribed fire at the right time(s) of year to move stands toward the natural range of variability. Fire suppression should be de-emphasized while efforts are made to break up the continuity of fuels, but not at the expense of maintaining large blocks of habitat. Fuel reduction should focus on surface and ladder fuels, while retaining fire resilient medium or large trees. The Forest Service should manage for vegetation diversity, structural diversity, and for decadence, leaving abundant legacies similar to natural disturbances. Attention must be given to maintaining recruitment pools for future large trees and snags. Restoration silviculture should be focused on dense stands of small trees primarily within previously managed stands and should strive for variable stand density within and between stands. Soil processes, including the entire soil food web should be acknowledged and respected. Significant reductions in livestock grazing should be an integral part of the efforts to restore forest and watershed health.

Maintaining biodiversity in all its dimensions is a key means of enhancing resilience. This means genetic diversity, population diversity, species diversity, community diversity, ecosystem diversity, and landscape diversity. Providing connectivity (both temporal, such as biological legacies, and spatial, such as biological corridors) are also key to resilience. Living and dead biological material provides the building blocks of resilient ecosystems. Biomass provides a reservoir of nutrients; offers physical support, substrate, shade, and energy dissipation; and bounds, partitions, and adds complexity to physical space, so maintaining biomass is important to resilience. Soil is fundamental to ecosystems, so its conservation must be paramount.

High priority restoration *activities* will include:

1. **Rescaling the road system** so that it is much smaller, cheaper, and has much reduced impact on hydrology, water quality, fish & wildlife habitat and connectivity, soil, spread of invasive species, and undesirable human intrusions such as fire ignitions, poaching, theft, vandalism, and off-road vehicle use. The adverse effects of road construction are not widely understood by the public but the development of the extensive road network on the National Forest system has probably caused as much ecological problems as logging and fire exclusion. The NFMA rules should encourage a comprehensive rescaling and rationalization of the road system, with careful attention to expanding unroaded areas and low road density areas.
2. **Restoring connectivity and functionality to the stream network** will include: restoring instream flows; removing dams, culverts, riparian roads, and mid-slope roads that block passage of aquatic organisms as well as blocking delivery of beneficial sediment and large wood structure to streams; restoring stream-side vegetation composition and structure; and restoring disturbance processes such as floods and "good" structure-rich landslides.
3. **Preparing the landscape, the public, and infrastructure for wild and prescribed fire.** Fire is and essential and inevitable part of our forests. Fire management plans should be an important aspect of LRMPs. The agency needs to "firewise" their infrastructure (and help with that of its neighbors) so that essential ecosystem processes such as fire can be allowed to operate freely with less concern for community infrastructure. Fire-dependent ecosystems that are modified by fire suppression may also require pre-treatment to prepare them for wild or prescribed fire.
4. **Re-establishing large wild areas** with very low road densities where natural processes including fire, native insect outbreaks, and other disturbances can operate freely to create, renew, and maintain high quality habitat and watershed conditions. These areas should be built upon the existing complexes of inventoried and uninventoried roadless areas >1,000 acres. These areas will be large, self-sustaining and require very little capital investment or human intervention. The range of natural variability will be provided primarily by natural disturbances rather than anthropogenic disturbances.
5. **Retain abundant legacies after disturbances. Manage for decadence.** Treatments after disturbances large and small (including damage from native species) will recognize both the value of disturbance and the natural regenerative capacity of the ecosystem. The agency must recognize the adverse impacts of compound disturbances such as fire followed by logging and activity fuel treatment, and the natural pattern of long periods of growth and recovery between disturbances. Any post-disturbance treatments will "do no harm" and be based strictly on enhancing ecological restoration. Structural retention and natural processes will be emphasized. If any material is removed after natural disturbances it will be limited to small material that has developed due to fire suppression.

6. **Livestock grazing must be significantly reduced or phased out** in order to protect fish, wildlife, water quality, soils, vegetation, and to restore natural fire regimes. The dry summers of in many areas of the mountain west are just not appropriate for domestic livestock grazing, because, as the uplands cure and become unpalatable, livestock concentrate in riparian areas and cause serious adverse effects on water quality and aquatic habitat. Livestock compete with a variety of wildlife for herbage, water, and living space. Livestock also alter fuel profiles and plant species composition and conflict with the objectives of reintroducing low intensity fire. The presence of domestic livestock is also a major impediment to the restoration of native biota, e.g., the reintroduction of native predators such as wolves. Here is a recent review of the effects of livestock on wildlife that can help inform suitability analyses: Fleischner, T.L. 2010. Livestock grazing and wildlife conservation in the American West: historical, policy, and conservation biology perspectives. Pages 235-265 in J. DuToit, R. Kock, and J. Deutsch, eds. Wild Rangelands: Conserving Wildlife While Maintaining Livestock in Semi-Arid Ecosystems. Zoological Society of London/ Blackwell Publishing Ltd., Oxford, UK. See also Heiken, D. 1995. Right Place - Wrong Animal - Determining Grazing Suitability Based on Desired Ecosystem Outcomes for the Interior Columbia River Basin. AFSEEE, Eugene, OR. (attached).

7. **Roadless inventory and protection**. The FS has never completed an adequate inventory of its roadless areas. We find many areas that have been arbitrarily excluded from the RARE II inventory. Also, past inventories focused on roadless areas 5,000 acres and larger, but a growing number of scientific studies indicate the significant value of roadless areas smaller than 5,000 acres and larger than 1,000 acres. Recent scientific literature emphasizes the importance of unroaded areas greater than 1,000 acres as strongholds for the production of fish and other aquatic and terrestrial species, as well as sources of high quality water.

    a. Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A.Beckwitt and E. Beckwitt. 1994. Interim Protection for Late-Successional Forests, Fisheries, and Watersheds: National Forests East of the Cascade Crest, Oregon and Washington. A Report to the Congress and President of the United States.
    b. Strittholt, J.R., and D.A. DellaSala. 2001. Importance of roadless areas in biodiversity conservation in forested ecosystems: a case study – Klamath-Siskiyou ecoregion, U.S.A. Conservation Biology 15(6):1742-1754.
    c. DeVelice, R.L., and J.R. Martin. 2001. Assessing the extent to which roadless areas complement the conservation of biological diversity. Ecological Applications 11(4):1008-1018.
    d. C.Loucks, N. Brown, A. Loucks, and K. Cesareo. 2003. USDA Forest Service roadless areas: potential biodiversity conservation reserves. Conservation Ecology 7 (2) www.ecologyandsociety.org/vol7/iss2/art5/index.html
    e. Crist, M.R., B. Wilmer, and G.H. Aplet. In Review. Assessing the value of roadless areas in a conservation reserve strategy: An analysis of biodiversity and landscape connectivity in the Northern Rockies, USA. Applied Ecology.

f. Rhodes, J.J., D.A. McCullough, and F.A. Espinosa. 1994. A Coarse Screening Process for Potential Application in ESA Consultations. Technical Report 94-4. Prepared for National Marine Fisheries Service.

g. M. Philip Nott, David F. Desante, Peter Pyle, And Nicole Michel. 2005 Managing Landbird Populations In Forests Of The Pacific Northwest: Formulating Population Management Guidelines From Landscape Scale Ecological Analyses Of Maps Data From Avian Communities On Seven National Forests In The Pacific Northwest. A Report To The Pacific Northwest Region, USDA Forest Service. January 31, 2005. http://www.birdpop.org/downloaddocuments/usfsr6/nwffullreport.pdf.

> For many species, the conservation of large tracts of coniferous forest in excess of 900 hectares [2224 acres] is essential. Not only is the total amount of forest important but many species are edge-sensitive such that are breed more successfully in tracts of forest large enough to allow them to avoid the increased risk of predation or nest parasitism suffered close to the edge. (p 147)

In a letter to President Clinton urging the protection of roadless areas, more than 100 scientists noted:

> There is a growing consensus among academic and agency scientists that existing roadless areas–irrespective of size–contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American Ornithologists' Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) roadless regions smaller than 1,000 acres that are biologically significant…. Other scientists have also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered…. As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and those smaller areas that have special ecological significance because of their contributions to regional landscapes.

Letter to President Clinton from 136 scientists (Nov. 14, 1997).

The FS has a NEPA duty to inventory and consider alternative management for unroaded areas 1,000 acres and larger. Such areas are not only hydrologically and ecologically significant but the FS should also consider the contribution of unroaded areas to climate

adaptation and mitigation. Large unmanaged areas store large amounts of carbon and help keep it out of the atmosphere, and unroaded areas are more likely to exhibit ecological integrity and resilience so they are inherently better able to withstand climate change.

How can the planning rule be proactive and innovative in addressing the need for climate change adaptation and mitigation?

Please review the report on "Forests, Carbon & Global Warming" prepared by Oregon Wild. The report explains how climate change is likely to affect Pacific Northwest forests as well as how forest conservation and restoration (including sensible changes to this project) may help mitigate climate change. http://tinyurl.com/2n96m5 And see this related slideshow: http://www.slideshare.net/dougoh/forest-carbon-climate-myths-presentation/

Rick Brown of Defenders of Wildlife prepared a report for the National Forest Restoration Collaborative which provides some valuable insights on forest-climate interactions and the agency should consider it's framework and recommendations for managing forests to prepare and mitigate for climate change. Brown, Rick. 2008. The Implications of Climate Change for Conservation, Restoration, and Management of National Forest Lands. http://tinyurl.com/dm6zln.

Climate adaptation and climate mitigation are two distinct objectives, so our comments are in two parts:

Prepare for climate change.

Climate change is a huge force that will profoundly affect ecosystems in the coming decades. Humans cannot hope to intervene everywhere all at once to solve the climate problem. We must instead rely on the inherent adaptive capacity of ecosystems. This is what they have done through past climate changes and now they will be tested yet again. Climate change adaptation requires that ecosystems on the National Forests exhibit maximum ecological integrity in order to enhance resiliency and the inherent capacity of species and ecosystems to adapt. The key components of such a strategy are:

- Maintain biodiversity in all its dimensions. Genetic diversity is like a library of possibilities that have worked well during past climate variability, representing the sum of "tools" available for adapting to the future.
- Protect intact native ecosystems where species relations have stood the test of time and remain robust;
- Provide refugia and allow species to migrate. Buffer and expand protected areas to provide connectivity along climatic gradients. Manage the entire landscape to be amenable to dispersal of native species.
- Protect streams. Cold water fish are particularly vulnerable to climate change because of increased winter flooding, reduced summer stream flow, and increased stream temperature. To mitigate expected effects on fish we should provide generous riparian buffers to help shade streams and maintain lower stream temperatures. To render streams more resilient to hydrologic extremes, such as flooding, we should manage whole watersheds to improve their ability to absorb,

store, and slowly release water. This can be accomplished in part by reducing disturbance of vegetation and soils, reducing road densities, and retaining abundant woody debris.

Conservation biologist Reed Noss says "Good forest management in a time of rapidly changing climate differs little from good forest management under more static conditions, but there is increased emphasis on protecting climatic refugia and providing connectivity."[6] When Reed Noss says "good forest management" he is referring to forestry driven by principles of conservation biology, such as:

- Reduce anthropogenic stress in anticipation of increased climate stress, which means less logging, less roads, less weeds, etc.
- Maintain diversity of native species, genes, and ecosystem composition and structure.
- Maintain self-organized ecosystem resilience and resistance.
- Maintain natural disturbance regimes, such as recurrent wild fire and flood plain inundation.
- Maintain connectivity for wildlife interaction with food supply and migration to more suitable habitat under new climate conditions.
- Linking forest management with sustainable carbon-neutral energy planning.
- Complementarity captures the co-benefits that climate change preparation strategies will create by improving wildlife habitat, water quality, carbon storage, and other "ecosystem services."
- Equity should be provided across generations, among human communities and between human and natural systems.
- Uncertainty requires recognition that it is sometimes necessary to act on less than complete knowledge, which is the case in making climate projections.
- Humility requires recognizing that interventions to prepare ecosystems for climate change should be informed, limited, and strategic.
- Abundance and redundancy will spread the risks of habitat loss due to climate change spatially across landscapes.

The latter 10 principles are taken from Chapter 1 of Climate Leadership Initiative. 2008. Preparing the Pacific Northwest for Climate Change — A Framework for Integrative Preparation Planning for Natural, Human, Built and Economic Systems. Institute for a Sustainable Environment. University of Oregon. February 4, 2008. http://climlead.uoregon.edu/publicationspress/Preparing_PacNW_for_ClimateChange_4-2-08.pdf This document also has a similar set of recommendations for increasing resiliency in aquatic systems.

Mountainous areas with a high degree of topographic complexity make great climate refugia because the elevation variations allow wildlife to find suitable climate conditions without having to move very far. Areas with maritime influence, such as the Pacific Northwest, can also serve as climate refugia because they are somewhat buffered from

[6] Reed F. Noss (2001) Beyond Kyoto: Forest Management in a Time of Rapid Climate Change. Conservation Biology 15 (3), 578–590. http://www.sustainablenorthwest.org/wss/wssagenda/wss-web-library/making-forests-resilient-web-library/Noss_2001.pdf

the extremes of continental climate patterns. The FS manages lost of mountains that meet these criteria and they deserve special protection.

Here are some climate adaptation concepts specific to forests …

… unhealthy, low quality and fragmented forests are likely to be less able to withstand climate change than healthy, intact ecosystems. Although the science of climate change conservation approaches is still in its infancy, some clear indications already exist. Amongst the most relevant for forests are:

- The need to maintain representative samples of healthy, intact ecosystems through ecologically representative protected area networks, in order to protect the most resilient forest types.
- The importance of improving management outside protected areas. Commercially-managed forests or forests used for other purposes should maintain samples of natural habitat and as full a range of species as possible, to provide a safety net in case the designated protected areas can no longer support the type of forests they were established to preserve.
- Establishment of more effective environmental monitoring, to act as "early warning systems" of harmful changes.
- Development of greater understanding about and implementation of linking habitats such as "corridors" and "stepping stones" to facilitate migration in times of rapid climate change.
- Active protection and management of selected species or habitats highly threatened by climate change, such as particularly endangered animal species and habitats such as island mangroves.
- Development of protection strategies within community forest management projects, the operations of commercial timber companies and the approaches of state forest enterprises. Such an approach assumes considerable liaison work and partnerships between groups that may not have naturally worked together in the past.
- Maintenance of a diverse gene pool in forests, to facilitate rapid species evolution in time of climate change. This element is of relevance in a period in which increasing standardisation of commercial tree species is being promoted.

Such approaches will not "solve" the problems of climate change in forests, but they will provide a considered response that could help minimise losses.

Nigel Dudley. 1998. Forests And Climate Change. Forest Innovations – a joint project of IUCN, GTZ and WWF.
http://www.equilibriumresearch.com/upload/document/climatechangeandforests.pdf

Other helpful resources that can help the FS plan for climate adaptation:

- Risto Seppälä, Alexander Buck and Pia Katila. (eds.). 2009. Adaptation of Forests and People to Climate Change. A Global Assessment Report. IUFRO World Series Volume 22. Helsinki. 224 p. http://www.iufro.org/science/gfep/ (See Appendix.)
- Ecological Society of America POSITION STATEMENT: ECOSYSTEM MANAGEMENT IN A CHANGING CLIMATE.

http://www.esa.org/pao/policyStatements/pdfDocuments/Ecosystem%20Management%20in%20a%20Changing%20Climate.pdf
- Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655 http://ecoinformatics.oregonstate.edu/new/FuelRedux_FS_CStorage_Revision2.pdf
- Seven recommendations from Aarhus to COP15. International climate conference 'Beyond Kyoto: Addressing the Challenges of Climate Change. 13-Mar-2009. http://www.eurekalert.org/pub_releases/2009-03/haog-7rf031309.php
- Malcolm, J.R., and L.F. Pitelka. 2000. Ecosystems and Global Climate Change: A Review of Potential Impacts on U.S. Terrestrial Ecosystems and Biodiversity. Pew Center on Global Climate Change, Arlington, VA. http://www.pewclimate.org/docUploads/env_ecosystems.pdf

Mitigate climate change.

Climate change mitigation requires that we recognize that the National Forest are an important part of the global carbon cycle and manage the National Forest to store more carbon in living ecosystems, and minimize the uncharacteristic or accelerated transfer of carbon from the forest to the atmosphere. This means managing for more mature and old-growth forests and fewer young, logged forests.

Since the public already owns the National Forests, we don't need to compensate the FS for doing the right thing in terms of carbon storage, which is to protect existing large stores of carbon in roadless areas and mature and old growth forests, let young forests grow and store more carbon, and let natural disturbance processes determine the amount of carbon that the land can sustainably stored on our National Forests.

The objectives of forest management with respect to mitigating climate change should be two-fold effort to *protect* and *restore* forests —

- Minimize the release of additional forest carbon into the atmosphere. The best way to *retain* carbon in existing forests is to protect mature and old-growth forests and roadless areas.
- Rebuild depleted carbon stores within forested landscapes. Probably the best way to *rebuild* forest carbon stores in forests is to allow forests that were previously logged or burned to regrow and become mature and old-growth forests.

Additional strategies for carbon storage and climate mitigation:

- Retain more live and dead trees during harvest, so that stand level carbon stores are not depleted as dramatically during harvest. Thinning is much preferable to regeneration harvest. Most forests can grow for centuries without regen harvest.
- Reduce demand for wood products by recycling, using wood sparingly, and making things to last, so they do not need to be replaced as often; and by making sure log prices accurately reflect the true cost of logging and associated carbon emissions and other external costs.
- Avoid carbon losses from soil by reducing soil disturbance from roads, logging equipment, grazing, mining, and OHVs.

How the National Forests are managed has a real and substantial impact on how much carbon is stored. Management-driven deviations from business-as-usual can lead to significant *increases* or *decreases* in carbon storage. Depro et al (2008) "found that a 'no timber harvest' scenario eliminating harvests on public lands would result in an annual increase of 17–29 million metric tonnes of carbon (MMTC) per year between 2010 and 2050—as much as a 43% increase over current sequestration levels on public timberlands and would offset up to 1.5% of total U.S. GHG emissions. In contrast, moving to a more intense harvesting policy similar to that which prevailed in the 1980s may result in annual carbon losses of 27–35 MMTC per year between 2010 and 2050."[7]

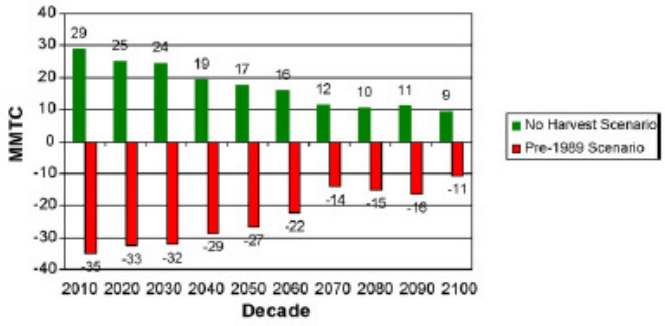

Fig. 8. Comparison of annual carbon stock changes with business-as-usual scenario.

Plan and project level NEPA analyses should start with an accurate and up-to-date inventory of carbon storage and carbon flows on federal land. This is required by both the National Forest Management Act (16 USC §1601(a)(1)&(2)) and the Federal Land Policy & Management Act (43 USC §1711(A)). NEPA analyses should disclose and consider that logging has several adverse consequences on greenhouse gas (GHG) pools and flows:

1. Logging kills growing trees that would otherwise continue to capture and sequester carbon through photosynthesis. Killing the trees also stops them from pump carbon into the soil where a lot of carbon is stored. Forests deliver massive amounts of carbon into the soil as photosynthate that supports a vast below-ground ecosystem and as course woody debris. Logging kills the food supply for the below-ground ecosystem. "Contrary to commonly accepted patterns of biomass stabilization or decline, biomass was still increasing in stands over 300 years old in the Coast Range, the Sierra Nevada and the West Cascades, and in stands over 600 years old in the Klamath Mountains." Tara Hudiburg, Beverly

[7] Depro, B., Murray, B., Alig, R., Shanks, A. 2008. Public land, timber harvests, and climate mitigation: quantifying carbon sequestration potential on U.S. public timberlands. Forest Ecology and Management. 255(3-4): 1122-1134. See also: Alyssa V. Shanks. 2008. Carbon Flux Patterns on U.S. Public Timberlands Under Alternative Timber Harvest Policies. MS Thesis. March 2008. http://ir.library.oregonstate.edu/dspace/bitstream/1957/8326/1/A_Shanks_Thesis_04%2002%2008_final.pdf

Law, David P. Turner, John Campbell, Dan Donato, And Maureen Duane 2009. Carbon dynamics of Oregon and Northern California forests and potential land-based carbon storage. Ecological Applications, 19(1), 2009, pp. 163–180 http://terraweb.forestry.oregonstate.edu/pubs2/Hudiburg2009EA.pdf

2. Forests store lots of carbon when biomass is allowed to accumulate. Logging "captures mortality" and truncates the "essential link between live and dead biomass pools" which interferes with the process of accumulation of dead wood biomass. "As forest stands grow older, dead biomass pools increase unless timber harvest removes live trees. Aggressive management reduces tree mortality which is input into dead biomass carbon pools; the result is the extremely low level of dead biomass, especially coarse woody debris in intensively managed forests." Krankina, O. 2008. REVIEW of Sierra Pacific Industries Report – "Carbon Sequestration in Californian Forests: Two Case Studies in Managed Watersheds" prepared for Defensders of Wildlife and others. http://savethesierra.org/downloads/SPI_Review.pdf
3. Avoided logging of mature & old-growth forest results in avoided emissions of GHG, because logging virtually always accelerates the transfer of carbon to the atmosphere and increases the rate of decomposition of wood through several mechanisms.
    a. Logging raises soil temperature thereby increasing the rate of decay of woody debris and the rate of decay of the below ground ecosystem, which converts carbon to gaseous form (CO2).
    b. Logging decreases the average piece size, and increases the surface area of the wood, thereby increasing the area exposed to biological decomposition.
    c. Logging debris is often burned, or as hog fuel, biomass, etc.
4. Some argue that logging is helpful because carbon is sequestered in wood products, but this is misleading and inaccurate:
    a. The logging and manufacturing process must be looked at in its entirety. The carbon in finished wood products represents just a small fraction of all the carbon impacted by logging. Of all the carbon that is killed, combusted, and/or exposed to accelerated decay in a logging operation, most ends up as slash, sawdust, waste/trim, hog fuel, and non-durable goods like paper. Some say that converting forest to wood products "delays" emissions, but in fact logging accelerates emissions because they are the result of a process that kills trees that would continue to actively sequester carbon if not logged, and logging involves tremendous waste in the process of logging, milling, and manufacturing.

        > "… carbon is lost into the atmosphere during and after harvest as slash left on-site quickly decays. (See figures 14 and 15.) There are also losses of carbon that occur during the creation of forest products. These losses to decay and wood products make carbon sequestration slower when harvesting is allowed. The young timberlands that replace older harvested lands grow quickly, but hold less in total carbon stores than their older counterparts; the net sequestration from forest products adds to total carbon stores, but

does not come close to the vast amounts of carbon stored in non-harvested older timberlands. This finding differs from other papers that have shown that the highest carbon mitigation can be reached when high productivity lands are used exclusively for wood products creation (Marland and Marland, 1992). The wood products considered in these studies were either long lasting or used for fuel purposes. Allowing harvested timber to be allocated to all types of wood products increases carbon emissions and results in no harvest regimes sequestering more carbon."

Alyssa V. Shanks. 2008. Carbon Flux Patterns on U.S. Public Timberlands Under Alternative Timber Harvest Policies. MS Thesis. March 2008. http://ir.library.oregonstate.edu/dspace/bitstream/1957/8326/1/A_Shanks_Thesis_04%2002%2008_final.pdf

b. Much of the wood products which can reasonably be considered "durable" are in fact less durable than leaving the carbon stored safely inside a mature tree that might live to be hundreds of years old. Most of our wood products are disposable. It turns out that well-conserved forests on average store carbon more securely than our "throw-away" culture and economy does.
c. BLM's Western Oregon Plan Revision FEIS shows that decades of converting old-growth forests to plantations has reduced current forest carbon stores on BLM lands in western Oregon by 149 million tons (even accounting for forest regrowth since the time of logging), while some of that wood was converted into products, only 11 million tons of that carbon remains stored in wood products today, so logging our public forests to make wood products results in approximately 13 times more carbon emissions than carbon storage. See WOPR FEIS Figures 3-17 (p 3-221) and Figure 3-18 (p 3-224). Further logging of mature forests will exacerbate this outcome.
d. Even a "suppressed" tree stores carbon better than a dead tree after it is logged, limbed, bucked, debarked, milled, planed, processed, trimmed, manufactured, used, and then discarded. Recent evidence shows hat slower-growing older trees tend to channel their energy into structural support and defense compounds to "maximize durability while minimizing … damage". Colbert & Pederson. 2008. Relationship between radial growth rates and lifespan within North American tree species. Ecoscience 15(3), 349-357 (2008). http://www.ecoscience.ulaval.ca/catalogue/FA3149-black.pdf

The FS should review and consider the key points in Ingerson (2009) some of which include:

1. When wood is removed from the forest, most of it is lost during processing. The amount lost varies tremendously by region, tree species and size, and local infrastructure.

2. The majority of long-term off-site wood carbon storage occurs in landfills, where decomposing wood gives off significant amounts of methane, a gas with high global warming potential.
3. In addition to wood processing losses, fossil fuels are required to turn raw logs into finished products and ship them from forest to mill to construction site to landfill.
4. Once wood losses and fossil emissions are accounted for, the process of harvesting wood and turning it into products may release more greenhouse gases than the emissions saved by storing carbon in products and landfills. …
9. Properly managed, wood can be a renewable source of building materials and fuels, but solving the climate crisis will require reducing the use of all materials and energy."

Ingerson, A. 2009 Wood Products and Carbon Storage: Can Increased Production Help Solve the Climate Crisis? Washington, D.C.: The Wilderness Society. http://wilderness.org/files/Wood-Products-and-Carbon-Storage.pdf

Some argue that partial harvest has negligible impacts on carbon stores, but this is not necessarily true. Partial removal projects should analyze and consider the following factors:

- As stands develop from young to mature to old they recruit large amounts of material from the live tree pool to the dead wood pool which continues to accumulate large amounts of carbon for centuries. Logging, even thinning, captures that mortality and can dramatically affect the overall accumulation of carbon in the dead wood pool.
- Thinning might help or hinder forest growth. Focusing tree growth of fewer stems may, over the long-term, increase the size, vigor, and longevity of the trees and increase ratio of wood volume to surface area which helps slow decay. But even if the growth rate of individual trees may be enhanced by thinning, the growth rate of the stand as a whole will decrease due to the removal of many growing trees. The increase in volume growth on retained trees is less than the total volume growth of the whole stand in the absence of thinning. Furthermore, thinning can damage residual trees' roots, stems, and canopies which may inhibit growth rates (See Table 2 *in* Han-Sup Han and Loren D. Kellogg. 2000. Damage Characteristics in Young Douglas-fir Stands from Commercial Thinning with Four Timber Harvesting Systems. Western Journal of Applied Forestry. 15(1):27-33. http://www.reo.gov/ecoshare/ccamp/pdf/WJAF.pdf);
- Opening the canopy may warm the soil in the stand and increase soil respiration;
- Thinning may increase or decrease fire hazard depending on the complex interaction of fuel structure (thinning may reduce small surface and ladder fuels or increase slash and remove medium and large trees that are relatively fire tolerant) and microclimate effects (thinning makes the stand hotter-dryer-windier);
- Even if thinning does reduce fire hazard, we can't predict where or when fires will occur, so such thinning must be extensive and frequent thus requiring the removal of far more carbon via thinning than wildfire would have removed. Essentially, the carbon "lost" by fuel reduction logging is greater than the carbon "saved" from fire. See Mitchell et al (2009) below;
- Thinning may increase stand diversity and the fraction of carbon stored in species other than dominant crop trees.

- Thinning in mid-seral and mature forests will "capture mortality" and truncate the important process of accumulating carbon pools in the forest floor. See Geisen, T. et al. 2008. Four centuries of soil carbon and nitrogen change after stand-replacing fire in a forest landscape of the western Cascade Range of Oregon. Canadian Journal of Forest Resources 38:2455-2464; and Thomas William Giesen. 2005. Four Centuries of Soil Carbon and Nitrogen Change After Severe Fire in a Western Cascades Forest Landscape. MS THESIS. Oregon State University. Building up carbon stores in the forest floor takes time, and if the slow-to-decompose large material is removed from the site, the high level of carbon accumulation found in old forests are not likely to materialize.
- There is no bonus wood from thinning. "In this as in other LOGS installations, the unthinned plots have consistently produced more total volume (CVTS) than any of the thinning treatments." Curtis, Robert O.; Marshall, David D. 2009. Levels-of-growing-stock cooperative study in Douglas-fir: report no. 18—Rocky Brook, 1963–2006. Res. Pap. PNW-RP-578. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 91 p. http://www.fs.fed.us/pnw/pubs/pnw_rp578.pdf "[T]he data have not supported early expectations of 'bonus' volume from thinned stands compared with unthinned. … [T]hinnings that are late or heavy can actually decrease harvest volume considerably." Talbert and Marshall. 2005. Plantation Productivity in the Douglas-fir Region Under Intensive Silvicultural Practices: Results From Research And Operations. Journal of Forestry. March 2005. pp 65-70 *citing* Curtis and Marshall. 1997. LOGS: A Pioneering Example of Silvicultural Research in Coastal Douglas-fir. Journal of Forestry 95(7):19-25.

Before attributing carbon benefits to fuel reduction logging please consider the conclusions of Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655
http://ecoinformatics.oregonstate.edu/new/FuelRedux_FS_CStorage_Revision2.pdf

> ABSTRACT: ... Our simulations indicate that fuel reduction treatments in these ecosystems consistently reduced fire severity. However, reducing the fraction by which C is lost in a wildfire requires the removal of a much greater amount of C, since most of the C stored in forest biomass (stem wood, branches, coarse woody debris) remains unconsumed even by high-severity wildfires. For this reason, all of the fuel reduction treatments simulated for the west Cascades and Coast Range ecosystems as well as most of the treatments simulated for the east Cascades resulted in a reduced mean stand C storage. One suggested method of compensating for such losses in C storage is to utilize C harvested in fuel reduction treatments as biofuels. Our analysis indicates that this will not be an effective strategy in the west Cascades and Coast Range over the next 100 years. We suggest that forest management plans aimed solely at ameliorating increases in atmospheric CO2 should forego fuel reduction treatments in these ecosystems, with the possible exception of some east Cascades Ponderosa pine stands with uncharacteristic levels of understory fuel accumulation. Balancing a demand for maximal landscape C storage with the demand for reduced wildfire severity will likely require treatments

to be applied strategically throughout the landscape rather than indiscriminately treating all stands.

Note: The only treatment that showed some promise was understory removal (not canopy removal) in fire-suppressed pine stands, but the carbon storage benefit from reduced fire severity in this best case scenario was minuscule, only about .6-1.2%. The modeled treatments on the eastside of the Cascades failed to include canopy removal which is a common practice in fuel reduction efforts and one that removes more carbon than understory treatments. Also, this analysis might give too much credit to fuel treatments because they excluded climatic variation from the analysis (meaning that in their analysis the treated stands never burned uncharacteristically in spite of the treatments.)

What kinds of data, research, and monitoring could assist land management planners to incorporate climate change adaptation considerations into plans?

Local climate parameters (especially precipitation, temperatures and wind), disturbance regimes (fire, insects, wind, ice), plant community changes, weeds, fish and wildlife species range changes, species population changes, rates of vegetation growth and mortality, potential effects of CO_2 enrichment on water use efficiency, carbon inventories and fluxes.

It is also essential to track how all these parameters are affected by management so the FS can distinguish between the effects of climate vs. management.

How should the planning rule address uncertainty? How do other public and private entities recognize and incorporate uncertainty in their planning efforts?

Uncertainty can be partly addressed with the precautionary principle. Actions with negative effects that could be long term and are difficult to reverse should receive special scrutiny. Examples of such activities include: road building, removal of large trees or snags that take a long time to regrow, removal of large amounts of carbon, detrimental soil impacts, weeds, stream channel modifications, vegetation type changes, and local extirpation of species.

How can a new planning rule appropriately build in the flexibility land managers will need to adapt to changing science, information or conditions? What mechanisms should be used to incorporate new data? Do you know of any successful adaptive management regimes that can inform our process?

NFMA has built means of flexibility including staged decision-making, plan amendments and plan revisions when appropriate.

The FS should adopt methods to avoid the phenomena of “group think” *which* has taken the agency down many dead end roads before (e.g. “clearcutting is efficient, everything

else be damned") and it may be at play again (e.g. "fuel build up is bad, everything else be damned"). We need to think as complex as a forest and not let simple slogans drive improper decisions. We need to make sure that flexibility leads to better decisions, not just create lame excuses to bend the rules.

Integration of science into adaptive management and decision-making is paramount. The rules should require managers to use best available science. And should adopt a robust and scientifically credible mechanisms for monitoring and adaptive management. Consider the framework and methods described in V. Sit and B. Taylor, eds., Statistical methods for adaptive management studies. B.C. Ministry of Forests Research Branch, Victoria, B.C. http://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh42.htm.

Monitoring is another requirement that becomes increasingly important in the face of climate change. "An important element of any [climate] adaptation strategy will be to ensure that adequate monitoring is undertaken. The monitoring needs to be capable of documenting changes in forest species, processes and ecosystems, and should also be capable of enabling the evaluation of the effectiveness of adaptation strategies. This is a critical part of … adaptive management …" Risto Seppälä, Alexander Buck and Pia Katila. (eds.). 2009. Adaptation of Forests and People to Climate Change. A Global Assessment Report. IUFRO World Series Volume 22. Helsinki. 224 p. http://www.iufro.org/science/gfep/ "Science-based management principles will become more critical because past experience may not serve as a guide for novel future conditions. Preparing for and adapting to climate change is as much a cultural and intellectual challenge as an ecological challenge …" Jill S. Baron, Linda A. Joyce. Guidelines for Helping Natural Resources Adapt to Climate Change. In Mountain News, Newsletter of the Consortium for Integrated Climate Research in Western Mountains. CIRMOUNT, Vol. 3, No. 1, February 2009. http://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_feb_09.pdf

How should plans anticipate and address changing conditions or impacts outside of agency control? How can external factors be incorporated or recognized in plan guidance and requirements?

The National Forests must be managed to mitigate for degraded conditions on non-federal lands. Non-federal lands typically contain an over-abundance of young forests, so federal lands should mitigate by providing a compensatory amount of older forests. Non-federal lands have severely depleted carbon stores so federal lands should provide "extra" carbon storage to compensate. Same for clean water, fish & wildlife populations, large snag habitat, recreation, scenic quality, etc.

Federal lands already outperform non-federal lands in virtually every measure of ecological and hydrological function, but federal lands need to do better because our forests are still recovering from past practices that degraded our forests and the ecosystem services that flow from them.

Should a new planning rule include standards to address watershed health? If so, what might those look like? Should the Agency be held accountable only for actions and problems on its NFS lands or take into account water availability and quality factors that are outside of the Agency's control?

What planning or management guidance could the Agency incorporate in the rule to protect and enhance water resources?

Again, the FS needs to mitigate and compensate for degraded conditions on non-federal lands and to compensate for degraded conditions on federal lands resulting from past and ongoing practices. For instance, drinking water quality at many points of diversion is determined by the mix of land uses on federal land non-federal lands upstream. Since non-federal land use still produces relatively low quality water, extra precautions should be taken to protect the quality of water from the federal portion of watersheds. Habitat for cold water fish and other aquatic organisms faces similar stresses from non-federal land use practices and should receive extra protection on federal lands.

The FS needs to anticipate an acceleration of the hydrologic cycle due to climate change. This will likely involve more frequent and/or more intense storms during the rainy seasons. The road drainage systems on most National Forests were designed with

The FS can start to prepare for these hydrological impacts of climate change by rescaling and rationalizing the roads system: reducing road density, reducing density of road/stream crossings, removing or enlarging culverts, removing side cast, removing riparian and midslope roads, and avoiding any more road construction. Other important actions to enhance watershed resilience: maintaining and restoring the integrity of stream systems, especially stream bank stability (protect riparian areas from logging, livestock, and OHVs); maintaining high canopy cover and healthy cover of native vegetation can also help buffer hydrologic extremes (avoid regen logging, reducing or eliminate livestock grazing).

The Klamath Resource Information System (KRIS) Restoration Strategy says:

> **Strategic Elements**
>
> From a review of efforts to develop a regionally comprehensive restoration strategy (FEMAT 1993, Bradbury et al. 1995, The Pacific Rivers Council 1996, Spence et al. 1997), one can identify the basic elements of any restoration strategy:
>
> 1. **Protect refuge areas**: At both a regional and local watershed level, the best remaining habitats that support native salmonids should be a priority for protection and any necessary restoration treatment. Such refugia are critical for the recovery of populations because they provide source areas for recolonization.
>
> 2. **Think process over structure**: Instream habitat conditions are largely determined by watershed processes, and should not be manipulated independent of this context. Moreover, effective restoration treatments address the underlying

processes of ecosystem deterioration and do not merely modify damaged areas to achieve short-term goals.

3. **Protect source areas**: As a function of cumulative watershed effects, headwater areas can influence aquatic habitat conditions along an entire river course, and are therefore a priority for protection and restoration.

4. **Diffuse time bombs**: Many habitats exist downstream from disturbed slopes that have not yet expressed their potential impact. Priority areas for recovery are those which are above prime habitat or refugia that will inevitably be triggered by a major storm or catastrophic event.

5. **Maximize cost-effectiveness**: The threat of extinction for some aquatic species and the insecurity of continued restoration funding intensifies the need for cost-effectiveness in restoration expenditure. Protection, in general, is more cost-effective than restoration. Strategic restoration of many small high quality habitats is usually more cost-effective than large efforts to restore one area.

6. **Establish new policies that facilitate restoration of low-elevation floodplains, wetlands, and other critical aquatic habitats**: Most such areas are held in private ownership and are unlikely to receive restoration treatment due to fears and lack of incentives. New policies should discourage channelization, revetment, debris removal, diking and draining, development, and other human activities that tend to impede floodplain function and the maintenance of habitat. Fiscal resources could be devoted to education, the development of improved regulatory policies, and provision of financial incentives for floodplain and wetland restoration.

http://www.krisweb.com/restore/strategy.htm

Note: All the actions listed above make sense with or without climate change.

One way to approach planning for an NFS unit is to think about the future of the planning area through the context of its watersheds. Do you see benefits and/or drawbacks to a rule requiring land management planning on a watershed basis?

Watershed-based planning makes some sense, but this is only one way of slicing the issues of scale and cumulative effects. The geographic range of species is another way of defining the geographic scale of planning, as has been done with the spotted owl. If watershed planning is adopted, provision must be made for integrating plans across watershed boundaries to account for the cumulative effects of management on species whose range spans across watersheds.

Do you see benefits or drawbacks to a rule requiring adherence to regionally specific Best Management Practices?

As in the past, a tiered framework is probably best. The 1982 NFMA planning regs had some standards that applied to *implementation* of all plans across the entire NFS. Then the "regional guides" adopted other standards, and finally forest plans adopted standards, some of which were forest-wide and some of which were specific to land allocations.

This framework remains sensible and workable, especially to the extent that the FS reorients itself around the concept of ecological restoration, with resource extraction as a secondary by-product.

The rules should include clear enforceable standards to guide managers in their work. The standards in the new rules should apply to both the development and implementation of plans. Ever since the old growth/spotted owl litigation exposed the Forest Service's bias toward logging and resource extraction, the agency has been try to pare down or eliminate enforceable standards. This is a mistake. Enforceable standards and accountability help the FS find balance. Too much discretion leads to abuses because the system of incentives that FS managers work under encourage removal of the very trees that need to be conserved for water quality, wildlife habitat, and carbon storage. Excessive discretion leads to lack of accountability. Mandatory standards, if clearly articulated, will actually help avoid conflict and controversy because the directives are easier to see and follow.

How should the new rule provide for diversity?

Diversity of plan and animals communities should be implemented by insuring viability of well distributed populations of all native species. Viability is best provided by adhering to principles of conservation biology which focuses largely on provision of high quality habitat at appropriate scales and configurations.

Species viability is one of the requirements that the FS is trying to escape from, but this is a mistake. It is more important than ever for the FS to focus on species viability, in part because there is greater public awareness of the value of biodiversity and the FS should avoid the loss of public trust that will result if it retreats from the viability requirement. In addition, insuring species diversity and viability is an essential part of preparing for climate change. Finally, it will be difficult for the FS to fulfill its policy of "avoiding trends toward listing" without a strong and enforceable viability standard.

How should the planning rule guide protection of at-risk species of animals and plants and their habitat?

The diversity requirement should be met by insuring species viability for all native species.

The FS should adopt a balanced approach to biodiversity conservation that includes both "fine-scale" and "coarse-scale" conservation efforts. Fine-scale efforts include surveys, buffers, and monitoring of individual species. Coarse-scale efforts include ecosystem reserves, and restoring natural processes that recreate natural habitat patterns.

Protecting biodiversity is not only a legal and moral imperative, but it is more important than ever because of climate change. The FS has already identified "Manag[ing] for biodiversity at multiple scales…" as a "Key overarching [climate] adaptation strateg[y]" Kathy A. O'Halloran 2009. Adaptation Considerations for National Forests in the Face of Climate Change. In Mountain News, Newsletter of the Consortium for Integrated Climate

Research in Western Mountains. CIRMOUNT, Vol. 3, No. 1, February 2009. http://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_feb_09.pdf

Current biodiversity, including all the genes currently in existence, represents the complete library of genetic possibilities that evolved and remained viable under past climatic variation, and all this biodiversity must be conserved in order to maintain the best possible chances of successful adaptation to future climate variations. "A key attribute of ecosystems required to ensure resilience and adaptability is that of genetic diversity among and within species. Rice and Emery (2003) have suggested that space for evolutionary development must be incorporated into conservation and restoration programs …" James A. Harris, Richard J. Hobbs, Eric Higgs, and James Aronson 2006. Ecological Restoration and Global Climate Change. Restoration Ecology Vol. 14, No. 2, pp. 170–176 JUNE 2006. http://www.cof.orst.edu/cof/teach/fs505/Readings/Harris%20ea%202006.pdf .

> Various general strategies to conserve biodiversity include establishment and maintenance of viable protected areas networks…. Some characteristics of protected area networks that are thought to improve their viability in the face of a changing climate include:
>
> • redundancy of populations;
> • maximization of reserve connectivity, size, and number;
> • protection of areas that offer significant heterogeneity in topography, habitat, and microclimate; and
> • development of biodiversity-friendly management schemes in the landscapes surrounding reserves (Markham and Malcolm, 1996; Malcolm and Markham, 1997).
>
> Techniques to accomplish the latter include reduction of fragmentation of natural habitats and establishment of corridors that function as habitat rather than as mere transit lanes (Simberloff et al., 1992). The potential for climate change should be explicitly incorporated into decision-making concerning the selection of appropriate areas for conservation .

Malcolm, J.R., and L.F. Pitelka. 2000. Ecosystems and Global Climate Change: A Review of Potential Impacts on U.S. Terrestrial Ecosystems and Biodiversity. Pew Center on Global Climate Change, Arlington, VA. http://www.pewclimate.org/docUploads/env_ecosystems.pdf

How can the new planning rule account for variables outside of Agency control, including those impacts that are the result of climate change?

The FS has limited ability to affect land management outside of the National Forest except through its state and private forestry and international programs (which it should continue to do, especially with respect to climate change adaptation and mitigation).

The NFMA regs however are specific to the management of the National Forests. As stated earlier, we think the NFS should be managed to mitigate for the degraded conditions on non-federal lands. This in one concrete thing the FS can do to "account for variables outside of it's control."

Should species diversity provisions in planning look beyond the individual unit to a watershed or landscape scale, and if so, what is a practical and workable way to incorporate a broader perspective?

The watershed scale would be appropriate for aquatic species but terrestrial species such as birds, reptiles, mammals, plants, and invertebrates are not tied to watersheds so the specific geographic range of those species is another scale of integration needed for sound ecosystem management.

How could wildlife habitat monitoring be addressed in a planning rule?

Monitoring is frequently identified as a critical need for improved ecosystem management, but it always seems to get short shrift in funding and priority setting. To break this cycle, the FS should highlight the uncertainty caused by climate change and redouble our efforts to see that monitoring gets prioritized and the information used to inform improved management.

Habitat monitoring cannot really be used as a proxy for population monitoring because species populations are not always closely coupled to habitat. Various factors can cause decoupling such as invasive species, habitat fragmentation, disturbance patterns, or other non-habitat variables relevant to species persistence. A prime example of such decoupling is the barred owl which has invaded, occupied, and now excludes Threatened spotted owls from a large fraction of the already rare mature & old-growth habitat that it depends upon. This does not mean that habitat is rendered unimportant. In fact, it might mean that habitat is more important than ever. Experts say that the co-existence of the spotted owl and barred owl may well depend on the provision of additional suitable habitat which can alleviate competitive interactions.

How can the planning rule reflect the interdependency of social, economic, and ecological systems in a way that supports sustainable management of national forests and grasslands?

The rules should embrace public values like clean water, carbon storage, biodiversity, recreation, and economic development based on quality of life. Recognize that environmental health is a foundation and prerequisite for social and economic health. The FS has allowed economics to trump ecological values for too long. The non-market public values that flow to the public-at-large from well-conserved federal forests far outweigh the market values that flow to just a few from commercial logging for logging's sake.

All references to "timber targets" or its synonyms should be removed from the Forest Service lexicon. Timber production as a goal makes no sense on federal lands. Non-federal lands already over-produce timber. Due to economic externalities (real costs such as water pollution and carbon emissions that are shifted from forest landowners to the public), wood is under-priced and overproduced on non-federal lands; and as a

consequence, public goods such as clean water, a stable climate, and healthy wildlife populations are under-produced, in part because they cannot be captured and sold so they lack a well-organized markets and they are consequently under-produced compared to the public need. That why federal lands must be clearly and exclusively devoted to providing those public goods.

The following public values far outweigh the small contribution of federal lands to the nations supply for fiber, forage and minerals, the vast majority of which are provided from non-federal lands.

1. Federal forests provide high quality drinking water for the majority of Oregon residents. Intact watersheds on federal forest lands also provide quality late season water flow for fish, irrigation, industrial, and municipal use.

2. Federal forests provide quality of life that attracts and inspires quality workers and the quality companies that want to hire them.

3. Federal forests provide critical habitat that prevents fish and wildlife from going extinct, and federal forests provide hunting and fishing opportunities.

4. Federal forests provide a wide variety of recreation for residents and tourists.

5. Federal forests can provide jobs through restoration of streams, roads, and young plantations.

6. Federal forests provide resource protection so that non-federal landowners can make plans in reliance on some level of regulatory stability.

7. Federal forests store carbon and help moderate climate change.

8. Federal forests provide less than 10% of the logs used by mills in Oregon and Washington. If needed, logs can be provided by thinning young plantations, or from non-federal lands.

9. Federal forests provide logs that employ less than 1/5 of 1% of the jobs in Oregon and Washington. Those jobs can be provided through restoration and thinning young stands instead of logging old-growth.

10. Federal forests provide a beautiful scenic backdrop for Oregonians' life, work, and play.

11. Logging mature and old-growth federal forests harms all these values, while protecting mature and old-growth forests, and shifting efforts toward restoration of roads streams and plantations will enhance all these values.

12. The public supports protection and restoration and this "new path" will reduce conflict and controversy and begin to build public consensus around federal forest management.

13. Federal forests give Americans a sense of shared ownership of an important natural resource and provides a backdrop for public discourse on how the human community relates to the natural community.

The ecosystems and watersheds of North America and the NFS are still very degraded from past practices. Restoration must be the prime directive for the next several decades at least. This does not mean the logging must cease, but it must become a by-product of restoration. Commercial extraction of fiber, forage, minerals must be secondary to provision of ecosystem services. See the "Hierarchy of linked goals and needed actions on the National Forests" above.

There is lots of work to do on the National Forest but commercial logging of large or old trees is not the kind of work that needs doing. There is lots of thinning that needs to be done in dense stands of small trees, not every acre needs thinning but a large fraction of the dense stands that are accessible form existing roads can and should be thinned. The FS also needs to rescale and rationalize the road system. The FS needs to manage and reintroduce fire. Removing weeds, managing recreation are also big tasks in the coming decades.

How can the Agency recognize and incorporate provisions in the planning rule for managing lands for the sustainable delivery of ecosystem services?

See the "Hierarchy of linked goals and needed actions on the National Forests" above.

How can plans guide units of the NFS in achieving natural resource conservation and restoration goals in a way that is compatible with providing a set of opportunities for goods and services to support vibrant rural and national economies?

Economic views have not evolved quite as much as ecological views but they need to. Economic diversity is as important as biodiversity. Since resource extraction is provided by non-federal lands, the FS should help diversify rural economies by enhancing other non-extractive industries.

Based on well-founded economic principles, there is no doubt that the national forests over-produce private goods like fiber, forage, and minerals, while under-producing public goods like clean water, biodiversity, carbon storage, scenery, and recreation. This is due to "externalities" (whereby real economic costs such as air and water pollution that are shifted from wood producers to the public) wood products are over-produced and public goods are under-produced. To correct this serious flaw in the market, public lands must be devoted to providing those under-produced public values like clean water, flood control, wildlife habitat, carbon storage, recreation scenery, nutrient cycling, etc.

Americans expect to get their wood products from well-managed private lands, while public lands should be reserved so they can provide public services such as clean water,

habitat for fish and wildlife, nutrient cycling, recreation and scenic vistas, and carbon storage that helps provide a livable planet.

Wood products to support "vibrant rural and national economies" come from non-federal lands. In fact, the financial crisis was due in large part to an over-abundance of easy credit, which lead to too many mortgages, and too much home construction, and too much lumber production, and too much logging (mostly on non-federal lands).

The FS operates under an untested assumption that resource extraction is beneficial to rural communities, but this is not often true. Evidence shows that rural communities which remain dependent on a narrow base of resource extraction industries fare poorly compared to more diversified rural economies.

Given that wood products are not needed from federal lands, the best use of the National Forest to support "vibrant rural and national economies" is to provide an optimal mix of ecosystem services and quality of life that attracts highly educated and highly mobile workers to livable communities surrounded by natural beauty and recreation opportunities. These are highly desirable workers. Jobs will follow these workers.

The Sonoran Institute has conducted a study of rural economies in the west and identified some insightful correlations. "It turns out there is an inverse relationship between resource dependence and economic growth; the more dependent a state's economy is on personal income earned from people who work in the resource extractive industries, the slower the growth rate of the economy as a whole." Ray Rasker. Prosperity in the 21st Century West. Sonoran Institute. 2004. http://www.sonoran.org/pdfs/Prosperity%20Report.pdf The Sonoran Institute's Report also found that proximity to "protected public lands" is positively correlated with economic growth, as were access to education, transportation, airports, entertainment, and mountains. Raymond Rasker. A New Look at Old Vistas: The Economic Role of Environmental Quality in Western Public Lands. Colorado Univeristy Law Review. 1994. http://www.sonoran.org/programs/pubs/Rasker%20-%20CU%20Law%20Review%201994.pdf

"The broadest set [of ecosystem outputs] is appropriate to publicly owned lands because constituencies are likely broadest and most diverse, and because some types of outputs will only be available from public lands (Hyman 1973). … All of this is part of a broader question of who benefits and who gains from management of FS- and BLM-administered lands. Understanding this provides the basis for assigning costs of land management." Haynes, Richard W.; Graham, Russell T.; Quigley, Thomas M., tech. eds. 1996. A framework for ecosystem management in the Interior Columbia Basin including portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-374. pp 18-22.

The Northwest Forest Plan Ten-Year Monitoring Report "synthesis" report reveals a major new finding, that rural community vitality does not equate with logging more old-growth on federal lands. The synthesis report says, "From a socioeconomic perspective, it was assumed that timber flow from federal lands was a key determinant of community

well-being. This turns out to be true in some communities, but not in most. It seems that social values have changed since the Plan's inception. For example, the planned harvest of old-growth forests in matrix areas or thinning older forests within reserves is now unacceptable to more people." The Monitoring Report says "overall growth in regional economies reduced the impacts of reductions in federal timber flows," and "Social acceptance of forest management has also shifted, suggesting the importance of building and maintaining trust with citizens. Concern about community dependency has shifted to concern about community adaptability." http://www.reo.gov/monitoring/10yr-report/documents/synthesis-reports/index.html

Nelson (1999) articulated some important considerations about rural communities and federal land resource extraction vs. conservation:

> The fallacy of the community stability policy can be exposed at two levels. First, as learned from lessons of the former Soviet Union, centrally planned economies do not work. Even if it were possible to manipulate natural ecosystems- of which we know very little-to produce a steady and predictable flow of grazing, mineral, energy, and timber resources, it is unlikely that the economy of nearby communities would remain stable. Factors such as price, the application of labor-saving technologies, international competition, the availability of capital, and the changing preferences of consumers all play as much a role in determining the health of local resource dependent industries as does the supply of raw materials from public lands.
>
> Second, the premise that public resources such as forage, timber, minerals, and energy can stimulate local economic stability presumes that the local economy is indeed dependent on federally-owned resources. All too often the role public land managers play in community development is based on an antiquated, mythical view of the economy.
>
> …
>
> Three forces are at work in shaping the world economy. First, the industrial economy is becoming uncoupled from the primary products economy (i.e., raw materials). Many of the most valuable "products" in today's economy, like computer software and medical technology, require few raw materials. Second, within the industrial economy itself, employment has become uncoupled from production. Manufacturing efficiency has decreased the demand for physical labor. Instead, human resources are increasingly applied in research, design, engineering, finance, marketing, and other "knowledge-based" or "value-added" applications. Third, capital has become "footloose"-money follows good ideas, no matter where they occur on the globe.
>
> …
>
> Today, where the final product rolls off the assembly line is less important than who adds the most value to production. And, if most of a finished product's value lies in the amount of human ingenuity and modern technology that is applied, then those countries with the best trained and educated work force will command the largest piece of the economic pie.
>
> …
>
> Lester Thurow points out that the seven key industries of the next few decades

are all "brainpower" industries: microelectronics, biotechnology, new materials industries, civilian aviation, telecommunications, robots and machine tools, and computers and software. An important aspect of these industries is that they are "footloose"-they can locate anywhere in the world. According to Thurow: "Where they will be located depends upon who can organize the brainpower to capture them. In the century ahead comparative advantage will be man-made."

…

Worldwide, services account for sixty percent of the Gross Domestic Product ("GDP") of rich countries. 18 In the United States, services account for seventy-two percent of GDP and seventy-six percent of employment (manufacturing, by contrast accounts for only twenty-three percent of America's GDP and eighteen percent of all jobs). Since 1982, services accounted for ninety-one percent of new jobs.

…

From 1969 to 1991 Montana's economy added over 141,000 new jobs, yet farming, ranching, mining, oil and gas, and the lumber and wood products industries combined lost over 7500 jobs during that time.

…

Throughout the West, the economy has adapted to changing conditions. Despite this, the common mythology of the region is that the extraction and export of raw materials are what matter. A commonly heard phrase is that "true wealth comes from the ground." Over the last two decades, however, it has become increasingly obvious that wealth also lies in resources that are not based on agriculture or the extractive industries. Although these traditional industries will-and should-remain as integral components of a diverse economy, it is clear that a "rear-view mirror" approach to economic development will not suffice. 43 Communities in the West must shift their focus from what worked in the past, and ask instead what will work in the future. Economic wealth consists of much more than raw materials. There is also wealth in the quality of the environment for non-consumptive uses,

…

For many rural communities, the economic benefit of living adjacent to public lands has historically been access to vast repositories of raw material. Because of this economic history there has been a tremendous bias on the part of public agencies to equate quantitative expansion in commercial activities with social and economic well-being. Lacking is a perspective on economic development that measures the role of quality of life as provided to community residents living next to public lands: the mountains, scenery, wildlife, clean water, wilderness, and other non-commercial amenities.

…

The implications for public land management are obvious. If public lands play a role in maintaining the quality of life, then land managers can assist rural communities by protecting those qualities.

…

When asked of their attitudes toward development, ninety percent of recent migrants and eighty-five percent of established residents felt that it was important to "[k]eep [the] environment in its natural state." The authors concluded that

"amenities and quality-of-life factors are increasingly important to people's decisions about moving," and that "newcomers appear to want more access for recreational use of wilderness, preservation of established wilderness and designation of additional wilderness in the same area."

…

Ken Deavers found that the rural counties which do relatively well are those counties that are "attractive to growing numbers of mobile retirees moving out of cities and other rural areas, and to owner/managers of footloose industries with a preference for a rural location." Since 1983, nearly eighty-five percent of non-metro population growth has occurred in counties with quality "locational assets-lakes, mountains, shorelines, and so forth-that make them attractive for residence and recreation." Since some of the nicest places to live in the West are also adjacent to public lands, the implications for public lands management are obvious. As the West makes a transition away from heavy dependence on natural-resource industries, particularly timber and mining, the role of the agencies in promoting community stability should also shift. This transition should reflect the economic realities of the new West, and the economic role that environmental quality plays in economic development.

…

Community stability can best be assured by economic diversity.

…

The cornerstone of an economic diversity strategy is the creation of a favorable business climate and the protection of the cultural, social, and environmental qualities that make a community a pleasant place to live and do business. In addition, the strategy should include investment in the infrastructure, such as education and telecommunications facilities, in order to promote entrepreneurial activity. In many instances, the most economically productive role of public lands is not in resource extraction or tourism, but in protecting the landscape, the wildlife, the rivers and streams, and the scenery-all those things that collectively enhance the quality of life for local residents.

…

In the 1800's the challenge for the West was to promote growth-to make the most use of the natural resource endowments of the region. In the 1990's, the challenge is to use this endowment intelligently, without despoiling the quality of life for the region's residents, and without foreclosing opportunities for economic diversification. Simply put, if scenery is part of what attracts and retains modern business activity, beyond tourism, then an unsightly clearcut will have more than ecological costs; it will be bad for the economy.

…

a community stability strategy which emphasizes commodity extraction has been shown to be counter-productive, particularly when those activities threaten the amenity-based foundation of the new economy.

Peter B. Nelson. 1999. Quality of Life, Nontraditional Income, and Economic Growth New Development Opportunities for the Rural West. Rural Development Perspectives, vol. 14, no. 2. http://www.ers.usda.gov/publications/rdp/rdpsept99/rdpsept99e.pdf

Areas with high levels of natural amenities have enjoyed growing populations and income levels in the past decade. Much of this growth has come from the immigration of people with income from self-employment or investments. These new migrants are usually well-educated and often work as executives or professionals or in such industries as finance, insurance, and real estate or business services. Communities may find that policies that enhance the quality of life (better schools, environmental protection, etc.) can attract more of these people who are in a financial position to act upon their residential preferences. This in turn can stimulate economic development.

How could the Agency foster collaborative efforts? What kinds of participation, forums for collaboration, and methods of providing input have you found most engaging?

Collaboration is appealing and can help lead to decisions that enjoy a base of public support, but the Forest Service cannot abdicate it's legislated role and must always retain authority and the responsibility to make decisions in the best interests of the public at large.

Use collaborative processes but not to over-ride national interests and public values. Collaboration can be useful but must include all adequate representation of all interest groups including those that may not be local. Collaboration efforts are potentially troublesome if they could put the fate of our forests in the hands of a limited group who are live close to the forest or those with an economic interest in the forest and if collaborative efforts fail to include adequate representation from public interests and national interests.

Collaboration must also account for the interests of future generations by embracing principles of intergenerational equity which require that we hold the earth and its resources in trust. To do otherwise is morally unacceptable. We have both rights and responsibilities that flow from the fact that we hold the Earth in trust for future generations. At the same time, we are beneficiaries entitled to some use and benefit from the earth's resources, but those uses must be appropriate and limited.

> Three principles form the basis of intergenerational equity. First, each generation should be required to conserve the diversity of the natural and cultural resource base, so that it does not unduly restrict the options available to future generations in solving their problems and satisfying their own values, and should also be entitled to diversity comparable to that enjoyed by previous generations. This principle is called "conservation of options." Second, each generation should be required to maintain the quality of the planet so that it is passed on in no worse condition than that in which it was received, and should also be entitled to planetary quality comparable to that enjoyed by previous generations. This is the principle of "conservation of quality." Third, each generation should provide its members with equitable rights of access to the legacy of past generations and should conserve this access for future generations. This is the principle of "conservation of access."

Edith Brown Weiss, Intergenerational equity: a legal framework for global environmental change. Chapter 12 *in* Edith Brown Weiss, editor. 1992. Environmental change and international law: New challenges and dimensions. United Nations University Press. http://www.unu.edu/unupress/unupbooks/uu25ee/uu25ee0y.htm

What should the rule require to ensure a planning process that is both efficient and transparent while allowing for full public collaboration and participation within a reasonable timeframe?

Efficiency should not be a huge concern. Democracy is time consuming and could even be described as inefficient compared to a dictatorship, but democracy and NEPA, though inefficient, lead to more informed and more fair decisions that are more likely to be accepted by those who must live with the decisions.

Public participation and discourse are not only an essential ingredient in our democracy, and required by National Environmental Policy Act, but can help lead to better decisions. "Risk characterization involves complex, value-laden judgments and a need for effective dialogue between technical experts and interested and affected citizens who may lack technical expertise, yet have essential information and often hold strong views and substantial power in our democratic society." Stern and Fineberg. 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. A Report by the Committee on Risk Characterization of the National Academy of Sciences' National Research Council. http://www4.nationalacademies.org/news.nsf/isbn/030905396X?OpenDocument

Stern (1998) explained how "[B]roadly based deliberation makes for better informed decisions … :

- deliberation helps formulate scientific questions so that the answers will be decision relevant;
- broadly based deliberation provides a more complete knowledge base for decisions by bringing to bear knowledge of local conditions, more likely to be possessed by nonscientists, so that analytic assumptions made in the absence of full knowledge are reasonable given real-world conditions (an example offered is the need to listen to people who work in farm fields when estimating the exposure of farm workers to pesticides);
- broad participation ensures that all the outcomes of concern receive consideration and not just those that are readily quantifiable, thus providing a more complete picture of the choices available and their implications;
- broadly based deliberation can help determine the appropriate uses for potentially controversial analytical techniques and the appropriate interpretations to put on their results;
- deliberation can help make sense of summaries of scientific information, which have the potential to create conflicting or mistaken impressions; and
- deliberation can help identify which disagreements among the parties interested in a decision might be resolved by gathering further information.

Stern, Paul C. 1998. *Understanding Risk and Moving Forward*. Human Ecology Forum Vol. 5, No. 1. http://www.humanecologyreview.org/pastissues/her51/51stern.pdf

What kinds of information, methods, and analyses should the Agency provide to the public during the planning process to aid understanding of the possible consequences of a proposed rule and alternatives?

Use critical thinking methods both in internal deliberations and in public descourse. The agency is required by NEPA and the APA to become well informed and understand environmental consequences before making decisions, to use "accurate scientific analysis" (40 CFR §1500.1), and to avoid arbitrary and capricious decision-making (5 USC § 706). "An agency decision is arbitrary or capricious if: (1) the agency entirely failed to consider an important aspect of the issue; (2) the agency offered an explanation for its decision that was counter to the evidence before it; (3) the agency relied on factors that Congress did not intend for it to consider; or (4) the agency's decision is so implausible that it could not be ascribed to the product of agency expertise." Colo. Envtl. Coalition v. Dombeck, 185 F.3d 1162, 1167 (10th Cir. 1999).

In preparing the NEPA analysis, please avoid the common fallacies of logic and rhetoric; exclude erroneous facts and assertions; and avoid arbitrary and capricious methods by using the analytical tools identified in Carl Sagan's "Baloney Detection Kit." http://www1.tpgi.com.au/users/tps-seti/baloney.html Instead, please use critical thinking methods:

> Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness. It entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question-at-issue; assumptions; concepts; empirical grounding; reasoning leading to conclusions; implications and consequences; objections from alternative viewpoints; and frame of reference. Critical thinking - in being responsive to variable subject matter, issues, and purposes - is incorporated in a family of interwoven modes of thinking, among them: scientific thinking, mathematical thinking, historical thinking, anthropological thinking, economic thinking, moral thinking, and philosophical thinking.

http://www.criticalthinking.org/University/defining.html

Avoid false inferences. Type II errors occur when we conclude that there is no difference between treatments when in fact a difference exists. Type II error may result in the continuation of activities damaging to the environment. For example, the agency may erroneously conclude that logging and road work will not cause erosion and sedimentation, or that forests will develop along functionally similar successional and trophic pathways regardless of the level of legacy retention. The method for estimating and limiting Type II error rate is known as "statistical power analysis". See Judith L.

Anderson; Errors Of Inference *in* V. Sit and B. Taylor, eds., Statistical methods for adaptive management studies. B.C. Ministry of Forests Research Branch, Victoria, B.C. http://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh42.htm

When the agency develops projects to reduce fuel hazard or reduce damage from insect infestations, the agency must beware of Type I errors, i.e., the agency may assume that a certain treatment generates beneficial effects when in fact the effect may be negative or non-existent. For example, the agency needs to account for both the decrease in fuels, and countervailing influences such as: activity fuels, fuel desiccation, increased wind, and future growth of vegetation.

Avoid other mental traps. All members of the ID Team must recognize the mental traps that can lead to overconfidence and eventually mismanagement. These include:

> **Self-attribution Bias**: We attribute our successes to ourselves, and we blame our losses on others or bad luck. [e.g. We have not been able to get the cut out because of litigation from unreasonable environmentalists.] This hobbles us in two ways. First, we don't learn from our mistakes because we don't see them as mistakes. Second, we assume we are skilled or smart when we're just lucky.
>
> …
>
> **Conservatism Bias and Confirmatory Bias**: Once we form opinions, we tend to overvalue information that reinforces them and undervalue information that undermines them (conservatism bias). We even tend to seek out supporting information (confirmatory bias). Thus, we irrationally cling to incorrect conclusions, and, to paraphrase Simon and Garfunkel, hear what we want to hear and disregard the rest.
>
> **Over-optimism**: We tend to be overoptimistic and overconfident. According to James Montier, when students are asked whether they will perform in the top half of their class, an average of 80 percent say yes. This tendency makes it easier for part-time hobbyists to dismiss a century's worth of academic research showing that only a tiny fraction of full-time professionals can beat the market.
>
> **Outcome Bias**: We tend to evaluate decisions based on outcomes instead of probabilities. Thus, we congratulate ourselves for stupid choices that happen to turn out well and vow to never again make smart choices that happen to turn out badly. Our errors get reinforced, and our wise decisions rejected.
>
> **Buffett's "Rearview Mirror":** We base our expectations for the future on what has happened in the recent past. ...
>
> **Hindsight Bias**: When we reflect on the past, we imagine that we knew what was going to happen when we didn't. As James Montier puts it, "You didn't know it all along, you just think you did." This allows us to imagine, for example, that we knew that the tech boom of the late '90s was a bubble and that everyone who

suggested otherwise was an idiot or crook. It also makes us overconfident about our ability to predict what will happen next.

Henry Blodget. Born Suckers — The greatest Wall Street danger of all: you. Posted Tuesday, Dec. 14, 2004. http://slate.com/Default.aspx?id=2110977

See also, "Straight and crooked thinking" by Robert H. Thouless, Pan Books, ISBN 0 330 24127 3, copyright 1930, 1953 and 1974. http://www.246.dk/38tricks.html and "Logic and Fallacies - Constructing a Logical Argument" (1997) http://www.infidels.org/news/atheism/logic.html.

What kind of administrative review process should be offered to the public in the planning rule? Should there be a pre-decisional objection or a postdecisional appeal process?

Predecisional objections are difficult because the objectors do not know what decision they are responding to. Objections also eliminate an opportunity for public comments preceding the decision and deprive the decision-maker of some public concerns from people who would like to comment but don't want to object.

How should the planning rule account for the relationship of NFS lands to surrounding landscapes?

First, manage federal lands to mitigate for the degraded conditions on non-federal lands.

Second, recognize that the "good neighbor" policy must be reciprocal. Non-federal landowners must not be allowed to insist on more logging on federal land when those same landowners often fail to maintain good conditions on their own lands. Non-federal lands often have lots of dense young stands which are very hazardous from a fuel perspective. Compared to NFS, non-federal lands have documented degraded conditions in terms of water quality, habitat, carbon storage, weeds, road density, and many other conditions.

What other planning and assessment efforts or processes at the national, state or local level should the Agency look at that could inform an ''all-lands'' approach?

Embrace "suitability analysis" as required by NFMA. The National Forest Management Act requires that the rules adopt of a process of identifying the suitability of the land for various types of resource management. This can be a useful way of keeping OHVs and mountain bikes on existing roads; keeping livestock out of sensitive riparian areas; keeping commercial logging out of mature & old-growth forests; keeping roads from being built near streams or on steep slopes; etc.

This is another place that climate change considerations can come into play. For instance, in order to keep carbon stored in forests, logging is not a suitable activity in unroaded areas and mature & old-growth forests.

How can the planning rule support the creation of a shared vision for each planning area through the planning process?

Give primacy to restoration goals and make fiber, forage, and minerals secondary by-products. That's the shared vision that the public can support.

Local and regional differences will have an impact on desired conditions and on the successful creation and implementation of a shared vision for any given planning area. Given that different areas will have different needs, should the planning rule allow a choice of planning processes? How could the planning rule create different process choices, and how could they be presented in the rule? What kinds of provisions would need to be included to guide and evaluate a process choice?

Forest ecosystems across the NFS are diverse and each forest has a unique relationship with nearby communities and stakeholders, but there is a paramount national interest in creating a consistent planning framework for conservation and restoration across the National Forest System.

Much discussion has been centered on how land management plans should be viewed; are they strategic documents that lay the foundation for specific future actions to help meet unit goals? Or, should land management plans also make project or activity decisions?

Forest Plans make decisions about future uses and require NEPA analysis. NFMA is clear that LRMPs will establish clear requirements (mandates and prohibitions) for future management of different forest zones, some areas with more active management, and some with more passive management. These expectations about future management have real and significant impacts on the environment and must be subjected to NEPA analysis. The National Forest have long been managed under a stable and workable system of tiered decision-making, with NEPA analysis at the regulatory, plan, and project levels. The courts have upheld this tiered decision-making framework,[8] and the FS should not abandon it now.

Based on your response to the question above, what is the range of options for fully complying with NEPA during land management plan development, amendment, or revision?

Given that most forest plans were adopted almost 20 years ago and most were heavily biased in favor of resource extraction, new EISs should be required in order to fully embrace the new restoration paradigm set forth in the "Hierarchy of linked goals and needed actions on the National Forests" above.

[8] *Sierra Club v. Epsy*, 38 F.3d 792 (5th Circ. 1994).

Should the new planning rule require standards and guidelines that are required for all plans?

The FS should adopt uniform national standards that create a cohesive agency-wide structure for managers to follow. Forest ecosystems across the NFS are diverse and each forest has a unique relationship with nearby communities and stakeholders, but there is a paramount national interest in managing National Forests consistently across the nation. For instance, water that drains from the national forests often flows hundreds of miles downstream where it provides water for drinking, fish & wildlife, agriculture, industry, recreation. "Local control" of forest watersheds should not trump the interests of those downstream. Similarly, the carbon stored on the National Forests provides important ecological services for communities and ecosystems nationwide (even worldwide) by helping to reduce the severity of global warming. Local control of decisions affecting carbon storage should not trump the greater interests of humanity. Clear national standards are a good way to ensure that local interest do not trump the public interest.

How can the agency analyze and describe the environmental effects of a planning rule in the environmental impact statement?

If the rules are good, the EIS will be easier. If the rules are weak and viewed ad inadequate, then the EIS will be vulnerable to challenge. The burden of NEPA analysis is somewhat proportional to how controversial the rules are.

Sincerely,

Doug Heiken
for …
Oregon Wild, and
Scott Greacen, Executive Director, EPIC
George Sexton, Klamath Siskiyou Wildlands Center
Kimberly Baker, Klamath Forest Alliance

Attached:

- Oregon Wild's 22 Oct 2007 Comments on the 2007 DEIS for the previous NFMA regulations, including attached comments on the NOI dated 11 June 2007.
- Heiken, D. 2009. "Why Mature Forests Must be Protected." Oregon Wild, Portland, OR.
- Heiken D. 2009. "The Straight Facts on Forests, Carbon & Global Warming," Oregon Wild, Portland, OR.

- Heiken, D. 1995. Right Place - Wrong Animal - Determining Grazing Suitability Based on Desired Ecosystem Outcomes for the Interior Columbia River Basin. AFSEEE, Eugene, OR.