Testimony before the House Subcommittee on Forests and Forest Health's Legislative Hearing on HR 4200

From Dr. Jerry F. Franklin
Professor of Ecosystem Science
College of Forest Resources
University of Washington
Seattle, Washington 98195

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I have been engaged in studies of forest ecosystems, forest disturbances, and natural recovery processes throughout North America for over 45 years in both federal agencies and academia. I am currently participating with a small team of academic scientists in a review of scientific information on the fire ecology of western North American forests, including natural and artificial recovery processes following intense wildfire.

A very large body of scientific literature has accumulated during the last 25 years on the impacts of large natural disturbances on forest ecosystems and on subsequent forest recovery processes. Much of this was stimulated by a series of large disturbance events including the 1980 eruption of Mount St. Helens, the Yellowstone Fires of 1988, and several major hurricanes beginning with Hurricane Hugo. Major retrospective studies, such as of the 1938 New England hurricane, have also provide significant new insights into forest disturbance and recovery.

This scientific literature provides a large body of knowledge of relevance to development of policies related to forest recovery. A general lesson has been the great resilience and recuperative capacity that is characteristic of natural forests. The science has also provide significant new insights or correctives regarding the limitations and values of traditional responses to forest catastrophes, such as salvage and reforestation, particularly in light of the shift in management emphasis on many public lands from wood production to other values, including biodiversity and ecological processes.

In the following testimony I will address two specific topics: salvage and reforestation. It is important to recognize that these are two distinct activities that can be considered and conducted independently of each other. I have appended testimony that I provided the senate in 2004 in relation to the proposed National Reforestation Act of 2004 because of its relevance to HR 4200.

Timber Salvage

Salvage logging generally cannot be justified on the basis that it contributes to the recovery of forest ecosystems following catastrophic disturbances. There is essentially no scientific support for the view that salvage logging can contribute direct positive benefits to ecological recovery; there is abundant scientific evidence that salvage logging can have diverse and significant negative impacts of salvage logging on ecological recovery (e.g., Lindenmayer et al. 2004). It has been argued that salvage can generate some indirect environmental benefits, such as by generating timber sale receipts that can be used to aid in other rehabilitation activities, or benefits with regards to other issues, such as human safety. However, based on our current understanding of forest recovery following disturbances, timber salvage is most appropriately viewed as a "tax" on ecological recovery. The tax can either be very large or relatively small depending upon the amount of material removed and the logging techniques that are used.

Negative impacts of timber salvage on ecological recovery occur in many different ways, which cannot be comprehensively reviewed here. They include direct effects of removal of wood and indirect effects, such as the impacts of logging operations on water and soils.

One of the largest sets of impacts from salvage logging relates to the role of dead wood—snags and logs—in both intact and disturbed forest ecosystems. There is now a very large body of scientific literature documenting the importance of large wood structures in forest ecosystems (see, e.g., Harmon et al. 2004 and Maser et al. 1988). Snags and logs play important roles in energy and nutrient cycling, nitrogen fixation, and hydrologic and geomorphic processes, such as sediment storage. Wood is immensely important to the animal life of forest ecosystems, both vertebrate and invertebrate; probably ½ to 2/3 of the forest dwelling animal species utilize large wood as habitat.

The largest and most decay resistant snags and logs are the most important part of the legacy of dead wood created by disturbances, such as stand replacement fires. There are many reasons for this but the most important is that this class of wood makes the greatest contribution to habitat and key ecological processes—and for the longest time. Large trees of

decay resistant species, such as cedars and Douglas-fir will persist and play important functional roles in the forest for literally a century or more.

A key point is that the legacy of large dead wood generated by a stand-replacement event is all the large dead wood that the recovering ecosystem is going to get for a century or more—until it is mature enough to begin generating dead wood of comparable size. That single pulse of dead wood is all there is going to be to serve the multiple habitat and ecological roles played by dead wood. This is the basis for the concept that—from the standpoint of ecological impacts—***cutting live trees from a green forest will often have a lower ecological cost than removing dead trees from a burn or blowdown***. It is also why salvage logging has very long-term effects on recovery processes.

Obviously, we will sometimes choose to salvage for reasons related to other societal goals; considerations of ecological recovery are only one of the variables that go into such decisions. For example, we may well choose to salvage for socio-economic reasons, to recover timber values that would otherwise be lost, or to reduce fuel loadings in urban-wildland interface, or to deal with issues of human safety.

In making decisions about where and how to salvage, how can we minimize negative impacts on ecological values? One part of the answer to this question is to avoid salvage on affected lands where management objectives are focused primarily on ecological objectives—e.g., national parks, designated wilderness, and Late Successional Reserves. Where we do choose to salvage, we can retain some of the legacy of dead wood, especially of the larger, more decay resistant snags and logs. Retention of 15 to 20 % of the dead wood can contribute significantly to ecological recovery, particularly if it is composed of the larger, more decay resistant material.

Reforestation

Reforestation is a much more complex issue than timber salvage because it obviously ***can*** contribute to some aspects of ecological recovery. With reforestation you are actually putting additional resources in place (trees) rather than simply removing an ecological resource (wood). Again, I want to emphasize that there is no essential link between salvage and reforestation although proponents often make them appear linked.

Scientific advice on the issue of reforestation must be very much conditioned by the land-use objectives for the disturbed area. Is the management objective primarily wood production or wildlife habitat or a mixture of commodity and environmental goals? The large body of relevant science will provide different advice and support depending on the management goals. *Generic advice—such as proposals that the best way to contribute to ecological recovery is by rapid establishment of dense, coniferous forests—is inappropriate.*

Natural reforestation of large disturbed areas follows a variety of patterns. The process of re-establishing a fully stocked, closed canopy forest varies from very fast to very slow. Following massive wildfires in the Douglas-fir region ca. 1500 AD, regeneration of the forest was apparently very slow. The majority of the old-growth forests in this region, which is also the majority of our current northern spotted owl habitat, appear to have developed (closed) very slowly; for example, research at Oregon State University suggests that the original (and now old) Douglas-firs grew at early rates comparable to stand densities of 50 trees/acre. Many other wildfires in the Douglas-fir region, such as in 1700, 1800, 1845 and 1902 appear to have regenerated much more rapidly. There are many reasons for these differences; availability of tree seed was probably one of the most important. Massive blowdown events typically regenerate instantaneously from existing tree regeneration that is released by elimination of the overstory.

Rapid re-establishment of a fully stocked forest of one or more commercially important tree species traditionally has been viewed as the ideal following a stand-replacement disturbance. In large measure this reflected our traditional emphasis on wood production on forest lands and, in part, the belief that getting a forest back as quickly as possible would be good for all of the other forest values (although any deer hunter could have told us otherwise).

Aggressive reforestation following a large disturbance—typically by planting--is certainly appropriate where wood production is the sole or primary management objective, such as on corporate timberlands.

Rapid re-establishment of extensive tracts of dense coniferous forests is not appropriate for many other ecological values, however. First of all, it is clearly inappropriate to establish dense plantations of conifers on sites that have been subjected to uncharacteristic stand replacement fire as a result of uncharacteristic fuel accumulations—many of our pine and dry mixed conifer forests, for example. By creating such plantations we are simply creating the conditions—the fuel--for the next uncharacteristic stand-replacement fire! Why would we want to create dense stands on such sites while we are simultaneously trying to reduce uncharacteristic fuel loadings in many eastside and Klamath Mountain stands?

Aggressive reforestation is also antithetical to many other ecological values, particularly on sites that are characterized by infrequent, stand-replacement fires (e.g., westside Douglas-fir). For example, the gradually reforesting but vegetationally-diverse and snag and log-rich early successional habitat that sometimes develops following wildfire is optimal for many bird species (including neotropical migrants), game species, and important ecological processes, such as nitrogen fixation. Naturally disturbed areas with their legacies of dead wood intact and not yet dominated by closed coniferous forest are, in fact, the most biodiverse stage in forest succession. Providing for early successional habitat of this type by leaving all or portions of some naturally disturbed areas unsalvaged and unplanted is certainly an appropriate component of a regional plan to maintain biological processes and ecological diversity. Such early-successional areas should include sites representative of the more productive sites (e.g., plant association groups), not just the more remote, high elevation, or unproductive sites. I assume that it is clear to all that clearcuts are not comparable in form or function to the naturally disturbed, unsalvaged, unplanted early successional habitats referred to here.

Relevance to HR 4200

Perhaps the most relevant point of this testimony to HR 4200 is that generic responses to large catastrophic disturbances are not appropriate. There is a large body of scientific literature that can be drawn upon in developing appropriate management practices. But what is ultimately appropriate depends very much on upon the forest type, management emphasis, and landscape context.

The provisions for pre-approved practices in Section 104 need to reflect these important variables, in my view. What is going to be generically appropriate (and that is presumably what pre-approved practices are) will vary with different forest types and management emphases. Plant association groups provide the best handle on ecological differences among forest sites and types and could be the basis for developing pre-approved practices. Management objectives are a second critical stratification that needs to be considered in developing pre-approved practices. Obviously, some practices are consistent with objectives dominated by wood production but not to lands where ecological values, such as biodiversity and aquatic ecosystems, are dominant.

Finally, there needs to be some provision for analysis of landscape-scale considerations, including cumulative effects. There currently appears to be no provision in the bill for such larger, spatial scale considerations—i.e., where does the disturbed area fit within a larger drainage or within the regional landscape. Landscape context is critical in determining what activities are appropriate following a major disturbance event. This should also include a consideration of landscape pattern *within* the disturbed area to be sure that activities, such as salvage, do not “high grade” a landscape of its best legacies.

Thank you for the opportunity to present this testimony.

Literature Cited

Harmon, Mark E., et al. 2004. Ecology of coarse woody debris in temperate ecosystems. Advances in Ecological Research 34:59-234.

Lindenmayer, D. B., et al. 2004. Salvage harvesting policies after natural disturbance. Science 303:1303.

Maser, Chris, et al. 1988. From the forest to the sea: a story of fallen trees. 153 p. USDA Forest Service General Technical Report PNW-GTR-229.

Appended Material

Testimony submitted by Dr. Jerry F. Franklin, Professor of Ecosystem Science, College of Forest Resources, University of Washington to the Senate Committee on Energy and Natural Resources addressing Senate Bill 2709 – the National Reforestation Act of 2004, September 22, 2004.

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COMMENTS ON HR 4200, FOREST EMERGENCY & RECOVERY ACT

Jerry F. Franklin, College of Forest Resources, University of Washington

1. Section 3 (3) (c): Plantation. It might be useful to define “plantation” in this section. The point has been made in the hearing and info materials provided on HR 4200 that reforestation will not include establishment of “plantations”. Hal Salwasser and I found this to be confusing because, by common usage and the Society of American Forester’s definition, a plantation consists of any “stand composed of trees established primarily by planting or artificial seeding”. This is true regardless of whether it is composed of a single species (monoculture) or several species or is composed entirely of seedlings grown from on-site native seed sources or from elsewhere or is composed of exclusively of native or exotic species.

2. Section 3 (7) “scientifically designed study”: Some greater specificity is needed to ensure credible scientific studies, in my opinion. For example, the definition could indicate that studies must meet statistical standards for scientific studies, such as in the area of replication and random assignment of treatments, must have independent peer review, and have a funding plan as well as cost estimate. Forest Service and BLM proposals for conducting scientific studies (and monitoring) as a part of recovery projects typically have very little credibility because there is no provision for sustained funding of such studies and for scientific analysis and reporting of the results of such studies. Congressional provision for sustained funding of research projects and monitoring would help improve the credibility of such proposals.

3. Section 3 (10) “ Federal Land”: This is where lands get excluded from being covered by this bill and its pre-approved practices. Some other categories of federal lands that are devoted primarily to environmental and ecological objectives should be excluded from coverage as part of this bill. In addition to designated wilderness and national monuments I think that wild and scenic rivers, administratively designated lands, such as research natural areas and botanical areas, and, especially, the Late Successional Reserves established under the Northwest Forest Plan should be identified as lands to which this act does not apply. This does not mean that restoration activities would never be undertaken on such lands but, rather, that they would not be subject to pre-approved practices under the act.

4. Section 101(b) “Peer review required”: What passes for scientific peer review can be a very mixed bag. The bill should provide for independent peer review external to the federal agencies (but which could include federal scientists as part of the review teams). Direction as to who should conduct such peer review might be helpful. It could be conducted or directed by universities in affected states or regions. Another option might be for the National Academy of Sciences to manage a peer review process, preferably one that included regional input.

5. Section 101 (d) “Catastrophic Event Research Project” : See comments under paragraph 2, above, regarding what constitutes a scientifically credible research project and provision for sustained funding.

6. Section 102 (a) (1) “Evaluation Required”: I think that the threshold of 1000 acres is too low a threshold for requiring an evaluation as a “catastrophic event”. Based on the number of such events that are likely each year and the size of event that would require the level of urgency implied by pre-approved practices, a threshold of 10,000 acres would seem more appropriate as an event requiring an evaluation by the Secretary. Events of 1000 to 10,000 acres could be used as the scale in the next section (Section 102 (a) (2)).

7. Section 104 (a) “list of Available Pre-Approved Practices”: This is really the core of the bill—it is the mechanism that facilitates rapid agency response to events; it is also where the potential exists for activities to be pre-approved that are inappropriate to specific forest types, land-use objectives, or particular landscape contexts. Consequently it is important to develop different sets of pre-approved practices (i.e., stratify pre-approved practices) by Plant Association Groups (PAGs) and land allocations or management objectives (e.g., timber dominant, watershed dominant, wildlife dominant, etc.). This is an alternative location to deal with Late Successional Reserves if it isn’t dealt with earlier in the bill (see comment 3, above); that is, the bill could require that a separate set of pre-approved practices be developed for Late Successional Reserves and similar land-use allocations/designations.

8. Section 104: There also needs to be some provision in this section or elsewhere in the bill that requires a landscape-level analysis of the event in determining where pre-approved practices can be applied. Landscape context can be critically important in determining whether specific practices are appropriate, including the potential for cumulative impacts on landscape-level resource values. Hal Salwasser made the point for understanding the landscape context very well in his testimony; without this process pre-approved practices may be applied at a scale that is inappropriate to natural resource objectives.

9. Section 104 (a) (3) “Peer Review Required”: As noted above, more specificity on “independent peer review” is required to insure a credible peer review process. Again, this process could be managed by the National Academy of Sciences and incorporate scientists and managers familiar with different regions, forest types, and natural resource issues.

10. Section 104 (d) (2) (B) “”regarding which mortality is highly likely. . .”: Assessing which trees will probably die may need additional congressional direction. Marking of trees that are “expected to die” has often been done with little scientific rigor —i.e., based upon criteria that have been developed and tested scientifically. Dr. Richard Waring at Oregon State University has done some independent assessment of some marking of such “trees expected to die” following fires in eastern Oregon and, based upon physiological measurements, found that many supposedly stressed and dying trees actually have high physiological vigor and probability of survival. Bottom line, some scientific rigor is needed to insure that marking of live trees which “likely to die in five years” is credible.

This comment is also applicable to Section 105 (b) (1) (B) of HR 4200.

11. Section 104 (h) and Section 105 (h) “Monitoring”: For a monitoring program to be credible the bill needs to include provisions for (1) development of a scientifically credible monitoring program, (2) sustained funding of the monitoring program, and (3) adequate management of the long-term data set(s) generated by the monitoring program. Items (2) and (3) are essentially never accomplished even in the few instances in which a scientifically credible monitoring program is developed. Further, I would think that Congress would want to be a little more explicit about the nature of the “third-party monitoring group”. I have always thought that monitoring is an area where there is high potential for involvement of local stakeholder communities, such as has occurred at Lakeview, Oregon.

12. Section 107 (1) “Guidance. . . “: Somewhere – in the introduction to this section or elsewhere in the bill, it would be very helpful for congressional direction that recognizes that, **“**aggressive, expedited, and comprehensive reforestation**”** efforts may not be appropriate everywhere! There are unquestionably circumstances on federal forest lands where prompt establishment of closed coniferous forests is not the most appropriate response, given management objectives for that specific site. As written, Section 107 (1) could be interpreted that there is a uniform congressional policy directing aggressive, expedited and comprehensive reforestation following all catastrophes.

13. Section 303 “. . . Experimental Forests.” I am not sure what the objective was in providing a section specifically on experimental forests. These properties certainly do need congressional recognition and attention. For example, there is a major problem in providing for maintenance of forest roads and trails on experimental forests and ranges with the decline in national forest appropriations for such activities. I am concerned that this section not result in increased pressures on experimental forests to do salvage and reforestation activities.

14. General comment: I am not sure the level of direction or detail that congress wants to incorporate in this bill but a generic provision or direction for leaving some of the larger snags behind would certainly be consistent with the basic objectives of assisting in ecological recovery and providing for wildlife habitat. Such a provision could provide for retention of 20% of the largest and most decay resistant snags (or logs in the case of blowdown events).