



DESIGNATING A PRESERVATION CORE IN MANAGED FORESTS

Over the centuries that humans have been practicing forest management, methods of management have continued to change and develop. The next advance in forestry should be the creation of a Preservation Core in all forests that are managed for timber products. Science supports this advance in forestry based on the reasons summarized herein.

This report highlights:

- What a Preservation Core is
 - Why Preservation Cores are beneficial
 - Standard size of a Preservation Core
 - How to identify a Preservation Core
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The Old-Growth Forest Network is a 501(c)(3) organization that works to connect people with nature by creating a national network of old-growth forests that will never be logged.

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AMERICA'S NEXT ADVANCE IN FORESTRY PRACTICE

What is a Preservation Core?

A Preservation Core is a section of the forest that will remain off-limits to harvesting or thinning for all time.

The Preservation Core of a forest serves as a control against which the management prescriptions may be compared.

Why are Preservation Cores beneficial?

A Preservation Core increases carbon fixation and sequestration, facilitates growth of large-diameter trees, benefits the forest's ecological integrity and biodiversity, secures genetic material into perpetuity, and supports global and national goals.

These science-based benefits are compelling reasons to implement Preservation Cores in managed forests, and are detailed in this report.

A Preservation Core will result in larger diameter trees over time.

The largest 1% of trees is responsible for 50% of biomass, and this “suggests that forests cannot sequester large amounts of aboveground carbon without large trees¹.” The presence of large trees is declining globally.² Many organisms are dependent upon the structural characteristics of large trees.

1. Lutz, J. A., Furniss, T. J., et al. (2018). Global importance of large-diameter trees. *Global Ecology and Biogeography*.

2. Lindenmayer, D. B., Laurance, W. F., & Franklin, J. F. (2012). Global decline in large old trees. *Science*, 338(6112), 1305-1306.

A Preservation Core will remove greater amounts of carbon dioxide from the atmosphere than the managed areas.

The 2015 Paris Agreement (Article 5) includes an explicit call to all nations to conserve and enhance forests and other biological carbon reservoirs. Identifying and implementing a Preservation Core would be an enhancement.

Old trees and old-growth forests act as carbon reservoirs,³ with old-growth forests sequestering significantly more carbon than managed forests (even when harvested wood products are considered in the equation).^{4,5,6} Additionally, large trees actively fix far greater amounts of carbon than smaller-size trees⁷ do.

3. Luyssaert, S., Schulze, E. D., et al. (2008). Old-growth forests as global carbon sinks. *Nature*, 455(7210), 213.

4. Nunery, J. S., & Keeton, W. S. (2010). Forest carbon storage in the northeastern United States: net effects of harvesting frequency, post-harvest retention, and wood products. *Forest Ecology and Management*, 259(8), 1363-1375.

5. Gunn, J. S., & Buchholz, T. (2018). Forest sector greenhouse gas emissions sensitivity to changes in forest management in Maine (USA). *Forestry: An International Journal of Forest Research*.

6. Harmon, M. E., Ferrell, W. K., & Franklin, J. F. (1990). Effects on carbon storage of conversion of old-growth forests to young forests. *Science*, 247(4943), 699-702.

7. Stephenson, N.L., et al. (2014). Rate of tree carbon accumulation increases continuously with tree size. *Nature* 507: 90–93.

A Preservation Core will provide habitat for birds that are dependent on old-age forests.

Some of the rarest birds are most likely to occur in the oldest forests, which provide integral habitat for their nesting and foraging requirements.^{8,9} Even partial harvesting by single tree selection can cause declines in these avian species,¹⁰ and higher densities and richness of bird species are found in natural, unmanaged forest areas¹¹ such as those within the recommended Preservation Core area of managed forests.

8. Alberta Biodiversity Monitoring Institute. (2017). Multiple species analysis: old-forest birds. ABMI Website: <http://abmi.ca/home/data-analytics/biobrowser-home/multi-species/multiple-species-old-forest-birds>.

9. Reynolds, R. T., & Linkhart, B. D. (1992, March). Flammulated owls in ponderosa pine: evidence of preference for old growth. In MR Kaufman, WH Moir, and RL Bassett, technical coordinators. Proceedings of the workshop on old-growth in the Southwest and Rocky Mountain Region. Portal, Arizona, USA (pp. 166-169).

10. Haney, J. C. (1999). Hierarchical comparisons of breeding birds in old-growth conifer-hardwood forest on the Appalachian Plateau. *The Wilson Bulletin*, 89-99.

11. Zlonis, E. J., & Niemi, G. J. (2014). Avian communities of managed and wilderness hemiboreal forests. *Forest ecology and management*, 328, 26-34.


A Preservation Core will result in greater abundance and diversity of amphibians in the forest.

Amphibians need a moist, undisturbed, forest floor with minimal fluctuations in light and temperature. Harvesting equipment can destroy the underground soil spaces and leaf litter layers that are needed by amphibians, resulting in drastically reduced amphibian populations.^{12,13} Evidence also indicates that there are long-term reductions in herpetofaunal communities of logged forest areas,¹⁴ thus emphasizing the need for a Preservation Core in order to conserve these sensitive species.

12. Herbeck, L. A., & Larsen, D. R. (1999). Plethodontid salamander response to silvicultural practices in Missouri Ozark forests. *Conservation Biology*, 13(3), 623-632.

13. Pough, F. H., Smith, E. M., Rhodes, D. H., & Collazo, A. (1987). The abundance of salamanders in forest stands with different histories of disturbance. *Forest Ecology and Management*, 20(1-2), 1-9.

14. Bury, B. R. (1983). Differences in amphibian populations in logged and old growth redwood forest. *Northwest Science*: 57(3), 167-178.



A Preservation Core will result in higher biodiversity of herbaceous plants, mosses, lichens, fungi, snails, and insects.

Many scientists have called for 'no-management' areas, such as the recommended Preservation Core, after discovering that the least managed areas contain the most species from across a diverse range of taxonomic groups.¹⁵

15. See multiple references in: Joan Maloof, (2016). *Nature's Temples*, Timber Press, USA.



A Preservation Core will secure irreplaceable genetic material into perpetuity.

Older populations of trees, such as those that will be retained in the Preservation Core forest area, are critically important reservoirs of genetic diversity and reproductive fitness¹⁶ that help ensure that tree species can adapt to our changing environment. Harvesting has been shown to reduce genetic diversity, sometimes causing the loss of over 90% of rare alleles in post-harvest stands of trees;¹⁷ a Preservation Core will help mitigate the loss of a forest's genetic material and genetic diversity.

16. Mosseler, A., Major, J. E., & Rajora, O. P. (2003). Old-growth red spruce forests as reservoirs of genetic diversity and reproductive fitness. *Theoretical and Applied Genetics*, 106(5), 931-937.

17. Rajora, O. P., Rahman, M. H., Buchert, G. P., & Dancik, B. P. (2000). Microsatellite DNA analysis of genetic effects of harvesting in old-growth eastern white pine (*Pinus strobus*) in Ontario, Canada. *Molecular ecology*, 9(3), 339-348.



A Preservation Core supports global and national policies such as:

- 2015 Paris Agreement (Article 5)
- U.N. Convention on Biological Diversity
- U.S. National Environmental Policy Act

How large should a Preservation Core be?

The larger the Core the more biodiversity it will contain and the more carbon it will sequester. We suggest a Core size of 17% in keeping with the U.N. Convention on Biological Diversity which, “conscious of the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components” calls for protecting 17 percent of the land surface.

In managed forests that are adjacent to forest preserves a smaller Core (10%) is acceptable as the minimum size.

The Core should be one contiguous area (vs. two or more fragmented areas) that is retained into perpetuity, and not rotated.

How should a Preservation Core be identified?

Existing old-growth forest, maturing secondary forest, or areas with large-diameter trees as well as the presence of any forest-obligate or rare species are all factors to be considered when identifying the area that will become the Preservation Core.

A Preservation Core should be designated in the forest management plans and with on-the-ground permanent signage.

Let's promote the next advance in American forestry practice... the Preservation Core



WWW.OLDGROWTHFOREST.NET



JOAN@OLDGROWTHFOREST.NET



OLDGROWTHFORESTNETWORK