FOUNDED IN 1887 BY THEODORE ROOSEVELT

BOONE AND CROCKETT CLUB

Boone and Crockett Club Responses to Forest and Grassland Climate Resilience Advanced Notice of Proposed Rulemaking (ANPRM) FR Doc. 2023–08429

Mr. Chris French
Deputy Chief
National Forest System
U.S. Forest Service
Washington, DC

Dear Mr. French:

We appreciate that the U.S. Forest Service is engaging with stakeholders on crafting policy to manage national forests and grasslands for climate resilience. As a leader in conservation for over 125 years, the Boone and Crockett Club has supported far-reaching conservation policies while advancing its mission. The United States has benefited from the foresight of Club members including Theodore Roosevelt, Gifford Pinchot, and George Bird Grinnell. Our leadership helped establish North American conservation and the Club continues to improve and expand upon its conservation legacy. The Boone and Crockett Club remains a champion of effective conservation policy and a pioneer in ethics, education, and leadership training.

Carbon emissions are driving a warming climate, increasing the propensity of extreme weather events, altering wildlife habitat and threatening wildlife populations (IPCC 2022). Data in the United States and globally show how the geographic ranges of vegetation and wildlife are shifting to contend with climate changes (Lenoir 2015). Hunters are attuned to fluctuations in and stresses on big game populations and their habitat and are seeing firsthand how climate change and declining forest health impacts our forests, streams, and coastlines.

The Club supports funding and incentives focused on natural climate solutions. Woody biomass, healthy soils, and diverse tree stands in well-managed forest ecosystems maximize carbon sequestration and promote biodiversity (Lal 2005, Di Sacco et al. 2021). Terrestrial ecosystems currently absorb approximately 30 percent of anthropogenic carbon emissions, and it is estimated that land ecosystems can provide 20 to 30 percent of the carbon mitigation required for warming to stay below the key thresholds established by the 2015 Paris Agreement (IPCC 2022). Well-managed, healthy forests are particularly important in mitigating climate change because of the substantial carbon sequestration potential of forested landscapes. This century, forests have globally sequestered twice as much carbon as they have emitted (Harris 2021). United States forest lands historically have been a significant carbon sink, currently offsetting 12 percent of total United States carbon emissions (EPA 2023).

Carbon uptake and sequestration has been declining in forests that lack active management and with aging forest stands. Replanting forests, planting new forests, preventing forest conversion,

and improving forest management each bolster carbon uptake and storage (Di Sacco et al. 2021). Actively managed forests have less risk of igniting into catastrophic wildfires that release many tons of carbon into the atmosphere (Prichard 2021). Sustainable, active management of forests, both public and private, would be a significant benefit to the climate, and help restore millions of acres of wildlife habitat. Active forest management will grow the economy, yield improved water quality and quantity, and offer better flood buffering.

The Forest Service has asked an important and fundamental question: "Given that climate change and related stressors are resulting in increasing impacts with rapid and variable rates of change on national forests and grasslands, how should the Forest Service adapt current policies to protect, conserve, and manage the national forests and grasslands for climate resilience, so that the Agency can provide for ecological integrity and support social and economic sustainability over time?"

The Boone and Crockett Club replies that the Forest Service should adapt current policies: (1) to accelerate active forest management; (2) increase non-federal partner capacity and responsibility for forestry projects; and (3) apply recent climate science to improve forest management and forest regeneration. These points are made in response to various questions posed by the ANPRM set forth below.

1. Accelerating Active Forest Management

Overarching Question 1*: How should the Forest Service adapt current policies and develop new policies and actions to conserve and manage the national forests and grasslands for climate resilience, so that the Agency can provide for ecological integrity and support social and economic sustainability over time?*

USDA and others have studied thoroughly and stated plainly the carbon storage benefits of a healthy forest compared to an unhealthy forest. The Forest Service also notes, in its Wildfire Crisis Strategy, that fuel buildups in unhealthy forests have now reached "crisis proportions" (USDA Forest Service 2022). Documentation of forested landscapes across federal lands shows that forests historically had many fewer trees per acre than today's forest stands, which contain hundreds or often thousands more trees per acre than historical stands (Woodall and Weiskittel 2021).

Overstocked forests deprive the trees of the water, sunlight, and other nutrients to grow in a resilient manner, rendering the stands poor wildlife habitat and susceptible to catastrophic wildfire. These overstocked stands also release many tons of carbon when they burn. A key to achieving forest resilience in National Forests is expanding and accelerating active forest management activities, such as controlled burns and forest harvest, to reduce the high forest density that leads to the devastating wildfires that the western U.S. has experienced in recent years. Carbon emissions from wildfires in the U.S. have increased 700 percent since Congress passed the Healthy Forest Restoration Act in 2005 (EPA 2023). Much more work is needed.

The scale of active forest management recently has been relatively steady or perhaps growing slightly. The Forest Service has the vital goal of increasing active forest management in strategic

areas. The Boone and Crockett Club fully supports that goal. Most commentators agree with that goal and the science certainly supports it. The issue is how to increase active forest management at scale with available funding. The Boone and Crockett Club supports the direction of the Forest Service's 10-year plan to treat an additional 20 million acres of National Forest System lands and an additional 30 million acres of other federal, state, tribal, and private lands (USDA Forest Service 2022).

Most of the forest projects undertaken today are focused on restoration projects. Restoration projects, by design, have long-term benefits for forest health in terms of carbon sequestration, water quantity and quality, and wildlife habitat improvements. Yet, the environmental review and contracting processes take years, and occasionally are litigated by plaintiffs who oppose active forest management (Morgan 2021).

The only way to double or triple the acres treated–and gain the associated carbon sequestration, biodiversity, and fire prevention benefits–is to immediately commence two or three times as many projects as are currently in process with realistic expectations about staffing and funding. The Forest Service should review these projects under a new process that allows for rapid commencement of the work. The new process should integrate selective continuous monitoring and adaptive management to refine and duplicate successful restoration projects. Certain categories of restoration projects, such as expansions of prior completed projects and projects in already vetted locations should be pre-qualified to commence immediately. These "carbon-plus" projects should not be subject to the multi-year and labor-intensive NEPA process. The project approval process needs a serious revitalization to accomplish the monumental and crucial task of forest restoration and active management. The Boone and Crockett Club supports that work.

Two former Chairs of the White House Council on Environmental Quality (one from each party), working through the Aspen Institute, have proposed exactly this kind of fundamental change in permitting projects to minimize delays in active forest management (Aspen Institute 2021). CEQ Chairs Jim Connaughton and Katie McGinty explain that for categories of carbon-plus projects "where environmental impacts are well understood, either due to the nature or location of the project" criteria should be established enabling "project clearance without delay."

Forest restoration projects should similarly fall within a category of action that is profoundly carbon-plus, well understood for any other environmental impacts, and likely to save human lives and property from destructive wildfires in the long term. These projects should simply proceed without the time-consuming and labor-intensive process of NEPA. Environmental compliance in so many other areas of the economy have long ago left behind the outdated, rigid reviews like NEPA. Therefore, the Forest Service must transform their environmental review approach to streamline projects that further the goals set forth in the Wildfire Crisis Strategy.

Developing and maintaining forests that are resilient to the impacts of climate change requires trees of different species and ages. Forests with diverse composition of trees also maximize annual carbon sequestration and storage (Hoover 2023). Resilient forest ecosystems require diverse age classes of trees, which is often supported by the harvest of timber (Temperli et al. 2012). Managing forests for a mix of young and old forest habitat types supports a broader diversity of wildlife species because active management replicates the natural disturbances that

typically occurred in forests. Research suggests that mule deer, elk, and many other wildlife species benefit from active forest management (Lehmkuhl et al. 2001, Visscher and Merrill 2009).

In some years, smoke from wildfires comprises approximately 30 percent of U.S. carbon emissions. Human exposure to wildfire smoke exacerbates chronic respiratory conditions and can cause acute illness for exposed populations (D'Evelyn et al. 2022). By fast-tracking active forest management and focusing on creating diverse timber stands, the reduction of carbon emissions will provide important public health benefits for communities both near and far from national forests. Old growth forests are some of the largest carbon sinks in the world, but without forest management protocols many old growth acres are burning every year. When trees in old growth forests fall to a wildfire, hundreds of years' worth of carbon sequestration is released. We believe the Forest Service should continue to refine results of the old growth forest inventory launched in 2022 and plan to continue managing old growth forests, where permitted, to maximize forest health, carbon storage, and biodiversity.

One important way to address declining forest health is for the Forest Service to increase wood harvest from our forests. We encourage the Forest Service to partner with the private sector, NGOs, and state, local, and tribal governments to align forest management objectives with social and economic needs, such as increasing the supply of lumber for affordable housing.

Utilizing wood-based materials for more urban areas offers an opportunity to mitigate climate change by transitioning from carbon intensive concrete and steel. The process of producing mass timber materials would create a more wildfire resilient forest. According to a study done by Yale University, we can foster a more symbiotic relationship between cities and natural areas, envisioning cities as carbon sinks (Churkina et al. 2020). The idea revolves around extending the life expectancy of downed wood and constructing necessary housing in urban areas with high housing demand.

2. Increasing Partner Work on National Forests

***Overarching Question 4**: How should Forest Service management, partnerships, and investments consider cross jurisdictional impacts of stressors to forest and grassland resilience at a landscape scale, including activities in the WUI?*

4.c. How might the Forest Service better connect or leverage the contribution of State, Private and Tribal programs to conservation and climate resilience across multiple jurisdictions, including in urban areas and with Tribes, state, local and private landowners?

The Forest Service is responsible for managing numerous projects and partnerships. The magnitude of the workload across nearly 200 million acres makes it impractical for the Forest Service to handle it alone. Engaging in joint planning efforts to coordinate actions, share resources, and leverage expertise across jurisdictions maximizes the effectiveness of management activities on forests and grasslands. The Good Neighbor Authority Act (GNA) could play an even larger role in empowering non-federal partners. We believe the Forest Service should focus on distributing its resources, engaging stakeholders, and enhancing

initiatives that promote forest and grassland resilience. The GNA has enabled the Forest Service to establish collaboration and connection with states, counties, and tribes to facilitate productive management efforts. A significant impediment, however, is that states, counties, and tribes do not possess the same level of authority as federal agencies to retain and allocate funds generated from timber sales for conservation management according to their specific needs and priorities. This limitation restricts the ability of states, counties, and tribes to effectively participate in conservation projects hampering what could be a more constructive program for all parties involved. The Forest Service should fully support H.R. 1450 (Treating Tribes and Counties as Good Neighbors Act) this Congress. This bill would allow greater flexibility in GNA fund allocation by facilitating partnerships with state, tribal, and private communities and using the revenue generated from timber sales for cross-jurisdictional holistic projects. This approach would enhance overall resource management on all lands and contribute to more comprehensive and tailored conservation efforts.

Recently, the Forest Service joined with several non-profits, including the Mule Deer Foundation and the National Wild Turkey Federation, under 'Keystone' MOU's that delegate federal forest health work to partners with proven expertise. These are some of the many stakeholders across the country with substantial expertise managing resilient forests, supporting jobs in the outdoor recreation and wood products industries, and conserving wildlife. By joining with more NGO partners, collective resources can be more efficiently and effectively put in use to manage federal forests.

3. Using Climate Science to Better Manage Forests

Specific Questions

2. Adaptation Planning and Practices: How might explicit, intentional adaptation planning and practices for climate resilience on the National Forest System be exemplified, understanding the need for differences in approach at different organizational levels, at different ecological scales, and in different ecosystems?

2.ii. How can the Forest Service mitigate risks to and support investments in resilience for multiple uses and ecosystem services? For example, how should the Forest Service think about the resilience of recreation infrastructure and access; source drinking water areas; and critical infrastructure in an era of climate change and other stressors?

3.b. Given our current understanding of the threats to the amount and distribution of mature and old-growth forest conditions, what policy, management, or practices would enhance ecosystem resilience and distribution of these conditions under a changing climate?

The primary adaptation goals in most of the western National Forest System should be to reduce the density of stands in forests continuously impacted by or susceptible to wildfires, while simultaneously diversifying the range of age classes in forests. Since the early 20th century, most fire-prone forests in the western region have experienced a six- to seven-fold increase in tree densities alongside a 50 percent reduction in average tree size (North et al. 2022). This

prevalence of overcrowded stands shows that restoration treatments aimed at enhancing forest resilience need to be considerably more intensive than the current emphasis on fuel reduction.

Over 50 percent of the lands in the National Forest System have strict management limitations. In the western U.S., every region has at least 35 percent of its acreage as either Congressionally designated Wilderness Areas or Inventoried Roadless Areas (Riddle and Vann 2020). Before designating additional lands for management restrictions, the Forest Service and Congress should evaluate potential adverse impacts of reducing active management options.

In fact, there is evidence that set-asides or reserving land from management is not a universally effective management approach for the health of both mature and old growth forests and certain wildlife species. In conifer-dominated systems in the southern Sierra Nevada of California, Steel et al. have reported that forest health data from recent disturbances, such as drought and beetles, challenge the assumptions behind a static approach to conserving habitat in disturbance-prone systems. The authors suggest that strategic forest management interventions are needed to reduce the risk of large-scale disturbances (Steel et al. 2022).

Within their study area, Steel et al. also observed that dense, mature forests were in rapid decline. Within just ten years, half of moderate or high-density mature forest habitats experienced a decline in canopy cover below 40 percent. This led to a transition to lower density forests (covering 22 percent of the original extent) or non-forest vegetation (covering 28 percent of the original extent). Among the mature forest classification, areas with higher density witnessed more significant declines, with 85 percent of this subgroup falling below the 60 percent canopy cover threshold defining high density. This study highlights the risk posed by failing to engage in active forest management in favor of preservation or a "hands-off" approach to forest conservation (Steel et al. 2022).

The Forest Service should ensure that management decisions promote ecosystem and infrastructure resilience in the face of a changing global climate. Infrastructure investments should be made in the context of these changes, using the best available science to predict the future condition of the landscapes in question.

Recreation infrastructure not only faces the challenges of climate change, but also the burden of increased use, as more Americans use National Forest System lands for leisure activities. Recreation and travel plans must incorporate and account for both stressors. In designing and maintaining recreation infrastructure, the Boone and Crockett Club supports the use of climate-resistant materials and designs, expansion of fuel-breaks and fire-defensible spaces, enhanced communication with the public and stakeholders about emergency plans, and flexible staffing plans to adapt to changing visitation patterns, among other strategies that the USDA has pursued (O'Toole 2018).

Climate change will have varying impacts (from droughts to floods) on water availability, and the Forest Service should continue to incorporate this uncertainty into planning. Upwards of 55 percent of drinking water consumed in the United States flows through our National Forests, which presents an opportunity for the Forest Service to continue to ensure water quality and quantity needs are met nationwide. We encourage the Forest Service to promote clean water

amid a changing climate through short- and long-term forest management plans. In the short-term, the Forest Service should prioritize fuels reduction and thinning in dry, conifer forests that often burn at high severity. Top management priorities should be forests upslope from population centers and water supply sources. In the long-term, fostering diverse, multi-aged forests, which are the result of actively managed forests, will reduce the likelihood of catastrophic fire that results in substantial harm to water resources (Vose et al. 2017).

Timber harvest promotes carbon sequestration in wood projects. Several cities in Europe are incorporating cross-laminated timber (CLT) or similar mass timber products in new buildings for the purpose of sequestering carbon. According to the USDA, harvested wood can be used to create "durable wood products that can last more than 100 years." The Forest Service should plan its work in areas that have mill infrastructure to handle the wood from the ramped-up work on federal forests (Janowiak 2017).

2.iii. How should the Forest Service address the significant and growing need for post-disaster response, recovery, reforestation and restoration, including to mitigate cascading disasters for example, post-fire flooding, landslides, and reburns)?

The Forest Service should treat reforestation and post-fire resource protection work—such as removal of hazard trees, reopening roads, and erosion control—as emergencies. With existing authorities, the Forest Service should undertake post-burn projects immediately (as emergencies) to salvage timber, avoid run-off, and replant trees.

We recognize that nationwide labor shortages act as a bottleneck for completing reforestation work on the ground. One means of increasing the labor supply for active forest management is through the recruitment of H-2B visa workers. Work performed by H-2B workers is critical to long-term forest sustainability, collecting seeds for tree nurseries, invasive species control, forest thinning, fuel reduction treatments to prevent catastrophic wildfire, and forest restoration. Timely completion of these objectives is also important for wildlife conservation initiatives. Because American workers do not typically apply for these forestry jobs; labor for these jobs is extremely scarce or non-existent without the H-2B option.

Failing to salvage wood after a fire or other natural disaster fails to capture already sequestered carbon from wood products, hampers reforestation efforts and can contribute to future fires. Currently, at least 80 percent of disturbed areas are untreated and can potentially reburn. By increasing the magnitude and speed of salvage and reforestation efforts following a disaster, the Forest Service can improve carbon performance and reduce future disaster risk.

2.v. Eastern forests have not been subject to the dramatic wildfire events and severe droughts occurring in the west, but eastern forests are also experiencing extreme weather events and chronic stress, including from insects and disease, while continuing to rebound from historic management and land use changes. Are there changes or additions to policy and management specific to conservation and climate resilience for forests in the east that the Forest Service should consider?

Forest Service lands in the east and midwest require a different management approach than western forested lands, as these lands face different risks and challenges.

A significant challenge when managing forests for multiple values, including wildlife conservation and climate resilience, is balancing the wildlife benefits provided by early successional forests with the carbon sequestration provided by mature forests. Both natural and anthropogenic changes to the environment have caused a decrease in the amount of early seral forests (King and Schlossberg 2014). Numerous studies suggest that early seral forests and its species should be considered a high priority for wildlife habitat (King and Schlossberg 2014, Littlefield and D'Amato 2022). Much like in the west, several eastern forests have dense stands of timber, which create environments where certain species, including those of conservation need, fare poorly. The presence of diverse forest communities plays a vital role in protecting the habitat of a wide variety of species, including forest-dwelling upland bird species including populations of grouse, turkey, and warblers (Hunter 2001, Akresh et al. 2023).

Additional timber harvesting and strategic thinning would help create and maintain habitat for culturally and economically important species which contribute to the overall health of the forest. Deployment of Inflation Reduction Act (IRA) funding, especially investments in ecosystem restoration, climate mitigation, wildlife fire risk reduction (including fuel breaks and reforestation), and Wood Innovation should be given equal opportunity in the east as in the west. Keystone MOU agreements with NGO partners focused on eastern forests would be beneficial in planning and conducting this work.

Forest management and conservation projects, including habitat restoration and timber production, provide significant economic benefits and create opportunities for recreational activities. These management projects support local jobs in the outdoor recreation and wood products industries, while simultaneously creating additional opportunities for hunters, anglers, and other outdoor recreationalists to enjoy our public lands and the wildlife that inhabit them for years to come.

The Boone and Crockett Club supports policies that promote diverse forest stands that maximize both carbon sequestration and biodiversity. Ecosystems that are managed to meet the unique niches of different species require a broad range of management regimes rather than a one-size-fits all approach focused on conserving or expanding specific habitat types. Conversely, forest management plans which reduce species diversity render an ecosystem far more vulnerable to issues like disease and natural disasters (Dymond 2014).

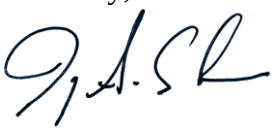
Conclusion

The Boone and Crockett Club wishes to stress the importance of utilizing active forest management to advance forest health objectives including significant carbon reduction initiatives and improvement of wildlife habitat. Implementing preventative measures such as the Good Neighbor Authority and increasing timber production can help reduce the likelihood of catastrophic fires, protect wildlife, create jobs, and enhance recreational opportunities. These and other active forest management actions are urgently needed, and the Forest Service should use all available tools to minimize procedural, administrative, or legal delays.

Thank you for the opportunity to provide comments on this proposed rule. We look forward to working with Forest Service staff and leadership.

For any comments or questions please contact Tony Schoonen, CEO Boone and Crockett Club, by phone at (406) 542-1888 or by email at tony@boone-crockett.org.

Sincerely,



Tony Schoonen, CEO
Boone and Crockett Club

Works Cited

Aspen Institute. (Spring 2021). Building Cleaner, Faster. *Aspen Institute Energy and Environment Program.* www.aspeninstitute.org/wp-content/uploads/2021/06/Building-Cleaner-Faster-Final-Report.pdf

Akresh, M. E., King, D. I., McInvale, S. L., Larkin, J. L., & D'Amato, A. W. (2023). Effects of forest management on the conservation of bird communities in eastern North America: A meta-analysis. *Ecosphere*, *14*(1), e4315. https://doi.org/10.1002/ecs2.4315

Churkina, G., Organschi, A., Reyer, C.P.O., Ruff, A., Vinke, K., Liu, Z., Reck, B.K., Graedel, T.E., and Schellnhuber, H.J. (2020). "Buildings as a global carbon sink." *Nature Sustainability*. https://doi.org/10.1038/s41893-019-0462-4

D'Evelyn, S. M., Jung, J., Alvarado, E., Baumgartner, J., Caligiuri, P., Hagmann, R. K., Henderson, S. B., Hessburg, P. F., Hopkins, S., Kasner, E. J., Krawchuk, M. A., Krenz, J. E., Lydersen, J. M., Marlier, M. E., Masuda, Y. J., Metlen, K., Mittelstaedt, G., Prichard, S. J., Schollaert, C. L., … Spector, J. T. (2022). Wildfire, Smoke Exposure, Human Health, and Environmental Justice Need to be Integrated into Forest Restoration and Management. *Current Environmental Health Reports*, *9*(3), 366–385. https://doi.org/10.1007/s40572-022-00355-7

Di Sacco, A., Hardwick, K.A., Blakesley, D., Brancalion, P.H.S., Breman, E., Cecilio Rebola, L., Chomba, S., Dixon, K., Elliott, S., Ruyonga, G., Shaw, K., Smith, P., Smith, R.J., Antonelli, A. (April 2021). Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits. *Global Change Biology*. 27(7):1328-1348. https://doi.org/10.1111/gcb.15498

Dymond, S.F. (December 2014). The Relationship between Water Availability and Forest Dynamics in Northern Minnesota. *University of Minnesota.* *https://conservancy.umn.edu/handle/11299/171089*

EPA. (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks [Reports and Assessments]. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

Harris, N. L., Gibbs, D. A., Baccini, A., Birdsey, R. A., de Bruin, S., Farina, M., Fatoyinbo, L., Hansen, M. C., Herold, M., Houghton, R. A., Potapov, P. V., Suarez, D. R., Roman-Cuesta, R. M., Saatchi, S. S., Slay, C. M., Turubanova, S. A., & Tyukavina, A. (2021). Global maps of twenty-first century forest carbon fluxes. *Nature Climate Change*, *11*(3), Article 3. https://doi.org/10.1038/s41558-020-00976-6

Hoover, C.M. and Smith, J.E. (2023). Aboveground live tree carbon stock and change in forests of conterminous United States: influence of stand age. *U.S. Forest Service*. https://doi.org/10.1186/s13021-023-00227-z

Hunter, W.C., Buehler, D.A., Canterbury, R.A., Confer, J.L., & Hamel, P.B. (Summer 2021). Conservation of disturbance-dependent birds in eastern North America. *Wildlife Society Bulletin*. Volume 29, Number 2. https://www.srs.fs.usda.gov/pubs/ja/ja_hunter002.pdf

IPCC. (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.

Janowiak, M., Swanston, C., Ontl, T. (2017). Carbon Benefits of Wood-Based Products and Energy. (June 2017). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center. https://www.fs.usda.gov/ccrc/topics/forest-mgmt-carbon-benefits/wood

King, D. I., & Schlossberg, S. (2014). Synthesis of the conservation value of the early-successional stage in forests of eastern North America. Forest Ecology and Management, 324, 186-195. https://www.fs.usda.gov/research/treesearch/46878

Lal, R. (2005). Forest soils and carbon sequestration. *Forest Ecology and Management*, *220*(1), 242–258. https://doi.org/10.1016/j.foreco.2005.08.015

Lehmkuhl, J. F., Kie, J. G., Bender, L. C., Servheen, G., & Nyberg, H. (2001). Evaluating the effects of ecosystem management alternatives on elk, mule deer, and white-tailed deer in the interior Columbia River basin, USA. Forest Ecology and Management, 153(1), 89–104. https://doi.org/10.1016/S0378-1127(01)00455-8

Lenoir, J., & Svenning, J.-C. (2015). Climate-related range shifts – a global multidimensional synthesis and new research directions. *Ecography*, *38*(1), 15–28. https://doi.org/10.1111/ecog.00967

Littlefield, C. E., & D'Amato, A. W. (2022). Identifying trade-offs and opportunities for forest carbon and wildlife using a climate change adaptation lens. *Conservation Science and Practice*, *4*(4), e12631. https://doi.org/10.1111/csp2.12631

Morgan, T.A., Niccolucci, M.J., and Berg, E.C. (2021 May 11). Response to the Journal of Forestry Article: "US Forest Service Implementation of the National Environmental Policy Act: Fast, Variable, Rarely Litigated, and Declining". *Journal of Forestry*. Volume 119, Issue 6, Pages 589–604. https://doi.org/10.1093/jofore/fvab027

North, M. P., Tompkins, R. E., Bernal, A. A., Collins, B. M., Stephens, S. L., & York, R. A. (2022). Operational resilience in western US frequent-fire forests. *Forest Ecology and Management*, *507*, 120004. https://doi.org/10.1016/j.foreco.2021.120004

O'Toole, D. (2018). Recreation lands in a changing climate. USDA Forest Service Climate Change Resource Center. https://www.fs.usda.gov/ccrc/topics/recreation

Prichard, S. J., Hessburg, P. F., Hagmann, R. K., Povak, N. A., Dobrowski, S. Z., Hurteau, M. D., Kane, V. R., Keane, R. E., Kobziar, L. N., Kolden, C. A., North, M., Parks, S. A., Safford, H. D., Stevens, J. T., Yocom, L. L., Churchill, D. J., Gray, R. W., Huffman, D. W., Lake, F. K., & Khatri-Chhetri, P. (2021). Adapting western North American forests to climate change and wildfires: 10 common questions. *Ecological Applications*, *31*(8), e02433. https://doi.org/10.1002/eap.2433

Riddle, Anne A., Vann Adam (2020, August 28). Forest Service Inventoried Roadless Areas (IRAs). (CRS Report No. R46504). https://crsreports.congress.gov/product/pdf/R/R46504.

Steel, Z.L., Jones, G.M., Collins, B.M., Green, R., Koltunov, A., Purcell, K.L., Sawyer, S.C., Slaton, M.R., Stephens, S.L., Stine, P., Thompson, C. (2022). Mega-disturbances cause rapid decline of mature conifer forest habitat in California. *Ecological Applications*. https://doi.org/10.1002/eap.2763.

Temperli, C., Bugmann, H., & Elkin, C. (2012). Adaptive management for competing forest goods and services under climate change. *Ecological Applications*, *22*(8), 2065–2077. https://doi.org/10.1890/12-0210.1

USDA Forest Service. (2022). Confronting the wildfire crisis: a strategy for protecting communities and improving resilience in America's Forests. https://www.fs.usda.gov/managing-land/wildfire-crisis

Visscher, D. R., & Merrill, E. H. (2009). Temporal dynamics of forage succession for elk at two scales: Implications of forest management. Forest Ecology and Management, 257(1), 96–106. https://doi.org/10.1016/j.foreco.2008.08.018

Vose, James M.; Martin, K.L.; Luce, C.H. (December 2017). Forests, Water, and Climate Change. U.S. Department of Agriculture, Forest Service, Climate Change Resource Center. https://www.fs.usda.gov/ccrc/topics/forests-water-and-climate-change

Woodall, C.W. and Weiskittel, A.R. (2021). Relative density of United States forests has shifted to higher levels over last two decades with important implications for future dynamics. *Nature Portfolio*. 11:18848. https://doi.org/10.1038/s41598-021-98244-w