

Management and Conservation of Pinyon and Juniper Woodlands **Public Workshop Hosted by the Bureau of Land Management and Forest Service** **Annotated Literature and Websites**

[BLM. 2020. Interpreting Indicators of Rangeland Health, Version 5. Tech Ref I734-6. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, National Operations Center.](#)

This handbook explores the evolution of concepts and protocols for assessing rangeland health, emphasizing the transition from “range condition” to the term "health" and the subsequent development of qualitative assessments. The handbook also describes the qualitative assessment protocol known as the Interpreting Indicators of Rangeland Health (IIRH), detailing its development process and successive versions. Lastly, it discusses the ongoing revisions to the IIRH protocol based on feedback from users and peer reviewers, reflecting the dynamic nature of rangeland assessment practices.

[BLM, Forest Service. 2023. Mature and Old Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management.](#)

This report provides a discussion regarding the national inventory of old-growth and mature forests on lands managed by the Forest Service and the BLM. This report addresses the lack of consistent definitions and previous inventory efforts for old-growth and mature forests on these lands. This report presents narrative frameworks and working definitions for these forest types, along with initial estimates of their extent. This report emphasizes the importance of these forests in providing ecological, social, Tribal, and economic values, as well as their vulnerability to climate change and associated stressors. Finally, the authors also discuss the challenges in defining and inventorying old-growth and mature forests, highlighting the need for consistent definitions and ongoing adaptive management processes.

[BLM, Forest Service. 2023. Pinyon-Juniper Woodlands. Internet website: <https://www.fs.usda.gov/sites/default/files/pinyon-juniper-fact-sheet.pdf>.](#)

This publication provides an overview of pinyon-juniper woodlands managed by the Bureau of Land Management (BLM) across several states. This fact sheet discusses the impacts of climate change on these ecosystems and outlines the BLM's management strategies, including conservation for forest health, wildlife habitat, recreation, and multiple uses. Additionally, the fact sheet addresses the ecological significance of these woodlands, their importance for wildlife habitats, and their cultural and social values to indigenous communities.

[DellaSala, Dominick A., B. Mackey, P. Norman, C. Campbell, P. J. Comer, C. F. Kormos, H. Keith, B. Rogers. 2022. Mature and Old-Growth Forests Contribute to Large-Scale Conservation Targets in the Conterminous United States. *Frontiers in Forests and Global Change*, 1-20.](#)

This publication provides a comprehensive assessment of mature and old-growth forests (MOG) across the conterminous United States, highlighting their significant decline due to logging and development. Utilizing three structural development measures, the authors identify MOG distribution by forest types, land ownerships, and conservation status, emphasizing their importance for biodiversity and carbon sequestration. Despite the concentration of MOG on federal lands, they fall short of conservation targets, with the majority vulnerable to logging. The



paper recommends enhanced protection measures, including elevating the conservation status of federal MOG, to mitigate CO₂ emissions and align with climate agreements and executive orders.

[DOI. 2023. 301 DM 7 Departmental Responsibilities for Consideration and Inclusion of Indigenous Knowledge in Departmental Actions and Scientific Research. Washington DC: DOI.](#)

This Department of Interior Manual emphasizes the significance of Indigenous Knowledge (IK) and its integration into decision-making processes within the DOI, defining IK as knowledge passed down through generations within Indigenous communities, derived from systematic methodologies, cultural ceremonies, and relationships with the environment. The manual underscores the importance of understanding the diversity among Indigenous Peoples and their unique knowledge systems and stresses the need for equitable and respectful engagement with Indigenous Peoples and their knowledge systems, acknowledging past injustices and upholding Tribal treaty and reserved rights. The manual outlines steps for engaging with Indigenous communities to identify respected knowledge holders and obtain Free, Prior, and Informed Consent (FPIC) before incorporating IK into Departmental actions. Finally, the DOI emphasizes the use of preferred terminology and descriptions of IK as determined by the Indigenous group being consulted.

[Eisenberg, C., S. Prichard, M. P. Nelson, P. Hessburg. 2024. Braiding Indigenous Knowledge and Western Science for Climate-Adapted Forests. University of Washington.](#)

This publication synthesizes Indigenous Knowledge (IK) and Western Science (WS) to develop climate and wildfire adaptation strategies for forest landscapes, aligning with federal directives to integrate these knowledge systems. Recommendations focus on proactive stewardship, recognizing Tribal Sovereignty, providing flexibility in landscape management, grounding policies in ethics of reciprocity, and catalyzing innovative approaches to forest stewardship. The report emphasizes the need for adaptive strategies to address escalating threats to North American forests, including extreme wildfires, pathogen outbreaks, and climate change impacts. These recommendations aim to restore resilience to forests while respecting cultural values and fostering sustainable management practices.

[Executive Office of the President. \(27 Apr 2022\). Strengthening the Nation's Forests, Communities, and Local Economies. Federal Register 87\(24851\), 24851-24855.](#)

Executive Order 14072 emphasizes the critical role of mature and old-growth forests on Federal lands in promoting community health, resilience, and prosperity, particularly in addressing catastrophic wildfires. The policy aims to pursue science-based, sustainable forest management, conserve old-growth forests, and support Indigenous traditional ecological knowledge, while promoting collaborative, locally led conservation solutions. Specific actions include conducting an inventory of old-growth and mature forests, coordinating conservation efforts, and promoting community-led economic development in the sustainable forest product sector. The order also commits to global efforts to combat international deforestation and calls for greater deployment of nature-based solutions to tackle climate change and enhance resilience.

[Forest Service. 2013. Forest Service Handbook 1909.12-Land Management Planning Handbook.](#)

This publication establishes procedures and responsibilities for implementing the National Forest System land management planning regulations, providing consistent overall guidance to Forest



Service Line Officers and Agency Employees in developing, amending, or revising land management plans for units within the national Forest System. The handbook also offers comprehensive policy direction and instructions for sustainable ecosystem management, forest restoration, and conservation, aligning with the National Forest Management Act.

[Forest Service. 2024. Mature and Old-Growth Forests. Retrieved from Forest Service Climate Risk Viewer: https://storymaps.arcgis.com/collections/87744e6b06c74e82916b9b11da218d28?item=8.](https://storymaps.arcgis.com/collections/87744e6b06c74e82916b9b11da218d28?item=8)

This tool provides an overview of the ecological significance of mature and old-growth forests, highlighting their diverse values and susceptibility to climate change. The tool references recent reports from the Forest Service and the BLM, specifically focusing on an initial Inventory Report and a forthcoming threat analysis report. Additionally, it examines historical trends in timber harvest rates and shifts in harvesting methods, underscoring the evolving management approaches aimed at conserving old-growth attributes. Finally, a map tool is provided to show how widespread threats to old growth forests are.

[Gray, Andrew N., K. Pelz, G. D. Hayward, T. Schuler, W. Salverson, M. Palmer, C. Schumacher, C. W. Woodal. 2023. Perspectives: The wicked problem of defining and inventorying mature and old-growth forests 546 \(2023\) 121350. *Forest Ecology and Management*, 1-11.](#)

Mature and old-growth forests are valued for their biodiversity, cultural significance, and ecological functions. This publication aims to define and inventory these forests across the United States, a task complicated by diverse perspectives and challenges in measurement and classification. While various criteria exist to identify old growth, practical limitations and the need for interdisciplinary approaches persist. This paper synthesizes key concepts, explores classification methods, discusses inventory techniques, and highlights ongoing challenges in managing these critical forest ecosystems.

[Noel, A. R., R. K. Shriver, S. D. Crausbay, J. B. Bradford. 2022. Where can managers effectively resist climate-driven ecological transformation in pinyon–juniper woodlands of the US Southwest?. *Global Change Biology*, 4327-4341.](#)

This publication investigates the potential impact of climate change on five species of Pinyon–juniper (PJ) woodlands in the US West, employing demographic models to assess population dynamics. Findings suggest that two species, *Pinus edulis* and *Juniperus monosperma*, are likely to experience population declines due to increasing mortality and decreasing recruitment rates. Management strategies aimed at reducing tree density may mitigate some impacts, but ecological transformation in warmer and drier PJ communities is projected for a significant portion of sites. The study emphasizes the need for proactive adaptation measures to address these changes and suggests a portfolio design approach for managing PJ woodlands across their geographic range.

[National Park Service. 2024. Series: Pinyon-Juniper Woodlands. Internet website: https://www.nps.gov/articles/series.htm?id=0216D798-933C-2108-EB4384D97499E89A.](https://www.nps.gov/articles/series.htm?id=0216D798-933C-2108-EB4384D97499E89A)

This is a 5-part series written by the National Park Service, with articles providing background on key aspects of pinyon juniper woodland management. These include distribution, species composition and classification, ecosystem drivers, disturbance processes and succession, anthropogenic use and post settlement stressors, and challenges related to climate change.



[Redmond, M. D., A. K. Urza, P. Weisberg. 2022. Managing for ecological resilience of pinyon–juniper ecosystems during an era of woodland contraction. *Macrosystems Ecology*, 1-16.](#)

This publication addresses the urgent need for managing future drought resilience in semiarid pinyon–juniper woodlands, which have experienced extensive tree mortality and expansion in recent decades. The authors propose a landscape prioritization framework to guide management practices based on historical woodland structure, current vegetation composition, future climate suitability, and habitat value. Emphasizing the importance of adaptive management strategies, the paper highlights critical knowledge gaps and calls for improved management of these ecosystems undergoing substantial changes due to land use, biological invasions, and climate change.

[Shriver, R. K., C.B. Yackulic, D.M. Bell, J.B. Bradford. 2022. Dry forest decline is driven by both declining recruitment and increasing mortality in response to warm, dry conditions. *Global Ecology and Biogeography*, 2259-2269.](#)

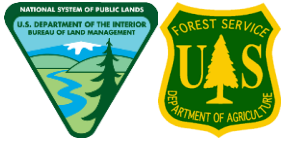
This publication addresses the challenge of predicting range shifts in response to climate change for dry forest tree species, focusing on pinyon pine and juniper in the Western United States. By developing range-wide demographic models, the authors assess both mortality and recruitment rates to understand where species range contractions are occurring. They find that four out of five species are declining in parts of their range, with *Pinus edulis* showing the highest vulnerability, particularly in warmer and drier conditions. The paper underscores the importance of considering both mortality and recruitment in assessing population trends and highlights the urgent need for management actions to mitigate the impacts of increasing temperatures and drought on these species' long-term viability.

[USGS. 2009. Piñon and Juniper Field Guide: Asking the Right Questions to Select Appropriate Management Actions. Reston, VA: DOI.](#)

This publication discusses the importance of piñon-juniper woodlands in the Great Basin and the challenges they face due to tree infilling and changing fire regimes. The publication highlights the goals of woodland management, focusing on restoring ecosystem functionality and resilience through balanced plant communities. The USGS introduces a management guide designed to assist field biologists, land managers, and other stakeholders in conducting rapid, qualitative assessments of woodland sites to inform decision-making and treatment prioritization. Additionally, this report underscores the importance of interdisciplinary collaboration and local knowledge in achieving successful management outcomes.

[USGS. 2023. Ecological Effects of Pinyon-Juniper Removal in the Western United States—A Synthesis of Scientific Research, January 2014–March 2021. Department of the Interior.](#)

This publication discusses the impact of increasing density and expansion of pinyon-juniper woodlands on ecosystem function and wildlife habitat in the western United States. This literature review highlights the BLM's establishment and subsequent discontinuation of the Pinyon-Juniper Management Categorical Exclusion (PJCX) for expediting tree removal projects. The publication describes a review conducted to understand the ecological effects of tree removal techniques permitted by the PJCX on vegetation, soils, abiotic resources, and wildlife communities. The review focuses on studies from 2014 onward and identifies both positive and negative responses of various ecological variables to pinyon-juniper removal treatments. This publication underscores



the importance of integrating factors like climate change and grazing into future research to address key knowledge gaps and improve restoration outcomes.

[Woodall, C., A. Kamoske, G. Hayward, T. Schuler, C. Hiemstra, M. Palmer, A. Grey. 2023. Classifying mature federal forests in the United States: The forest inventory. *Forest Ecology and Management*, 1-14.](#)

This publication emphasizes the importance of mature and old-growth (MOG) forests by directing U.S. Federal agencies to define and inventory these resources on USFS and BLM lands. In response, the proposal suggests implementing a flexible and robust mature forest classification system known as the Forest Inventory Growth Stage System (FIGSS). The proposed approach estimates that approximately 45 percent of all USFS/BLM forests are mature, offering a foundation for future iterations that may integrate cultural values, emerging technologies, and traditional ecological knowledge for enhanced accuracy and relevance.