MANAGEMENT OF PINYON-JUNIPER "WOODLAND" ECOSYSTEMS

A Position of the
Intermountain Society of American Foresters

Adopted by the Intermountain SAF Executive Committee on February 15, 2013 and approved by the Forest Policy Department, Society of American Foresters, Bethesda, Maryland.
This position statement will remain in effect for 10 years, unless after substantial review, the Intermountain SAF Executive Committee decides otherwise.

Position

The Intermountain Society of American Foresters promotes management of Pinyon-Juniper[1] (PJ) forests and woodlands for a variety of resource benefits. In some cases it will mean managing pinyon and juniper ecosystems for sustained woodland habitat and products where these species are the persistent and dominant vegetation type. In some cases this will mean removal of pinyon and juniper to favor other vegetation types where PJ has expanded into other ecotypes. In many cases it will mean managing for a mosaic of vegetation types and stand densities within the same watershed.

Appropriate forest management and sound silvicultural tools should be used in PJ ecosystems to manage and sustain such systems in a healthy ecological condition while providing many values and benefits.

Management goals for PJ forests and woodlands vary and are determined through a variety of land management planning processes for private, state and federally owned lands.

Land managers are responsible for selecting appropriate, site-specific practices to accomplish the desired conditions. Professional foresters have experience and research to support effective use of silvicultural practices in PJ ecosystems. Skillful use of silvicultural practices, carefully attuned to the desires and needs of the landowner and to the ecology of the site, can more rapidly achieve and better maintain desired resource conditions with greater assurance of success than will acceptance of un-managed processes of change.

Foresters must have the support of decision-makers to use silvicultural practices to improve ecological conditions and to manage vegetation for a variety of goals, including when hazardous fuel build-up poses risks to landscapes. Land managers are expected and encouraged to use professional knowledge, experience, and judgment to improve the health, productivity, and condition of PJ ecosystems for the benefit of humans, wildlife, and the health of the land for today and for future generations.

[1] The PJ cover type, its distribution, and the species that compose it are described by Larson, Forest Cover Type 239, Pinyon-Juniper, pages 116-117 in Eyre, 1980.

Issue

Prior to the Euro-American settlement, American Indians used fire for a variety of reasons, including enhancement of wildlife habitat and hunting opportunities, facilitation of travel, enhancement of berry production on shrubs, etc. In other areas, American Indians managed some pinyon pine stands to enhance the production and collection of pine nuts, a highly nutritious food source.

Over the past century and a half, various land use practices have resulted in substantial changes in most landscapes on which PJ cover types thrive, changes that are still ongoing. Native forbs and grasses have been replaced by exotic and fire-prone species, altering fire behavior and fire regimes; PJ has expanded into adjacent vegetation types including sage-grass, mountain shrub, ponderosa pine, and aspen types; frequent low-intensity fires that once occurred on many landscapes (expansion PJ sites) have been replaced by infrequent high-intensity and larger fires; persistent PJ stands have become more dense, more fire prone, and more insect and disease prone; and human communities have expanded into PJ cover types, increasing the wildland-urban interface, the potential for fire ignition, and the threats that wildfire can pose to communities. These changes put most persistent and expansion woodlands at risk. Adjacent vegetation types may also be at increased risk.

Concurrently, the PJ type has been largely ignored by the forestry profession as "uneconomical" to manage. The results were that the type was left unmanaged or it was managed to convert it to other vegetative types deemed more favorable. While vegetation conversions have been used to reduce "expansion" PJ, many old-growth PJ stands have also been removed in favor of grass/shrub types. The difference between "expansion" and "persistent" PJ types has often gone unrecognized by land managers.

Currently our ecosystems are being affected by climate change, the outcome of which is yet uncertain. Models generally indicate a warming, drying West. This may mean pinyon and juniper trees will become established at higher elevations, replacing taller forest types and, at the same time, PJ may recede from the lower, drier sites. Warming climates likely also mean an increase in insect populations.

Pinyon-Juniper in the Southwestern US[2]
(2012 FIA Data, millions of acres)

State	Total Forestland	Total PJ	Percent PJ
Arizona	19	11	59
Colorado	23	6	28
Nevada	11	9	80
New Mexico	17	10	60
Utah	18	11	59
Southwestern US Total	88	47	53

The PJ cover type is the most extensive forest type in the Southwestern US. It dominates some 47 million acres in five states, comprising 53% of all forest cover types in these states.

[2] These 5 states comprise the primary distribution (90%) of the PJ cover type in the US. See Eyre 1980 for additional information.

In four states (see above) it covers more land than all other forest types combined.

The magnitude of area covered by this type strongly indicates the need for professional forest management.

Background

For the most part, the PJ type has either been left unmanaged or management has been for the conversion of the type to other vegetative types, most typically for grass-shrub types. Professional forest management using approved silvicultural practices has rarely been applied, given the extent of the type, largely due to high treatment costs and low product values to offset these costs.

While conversion of PJ may reduce fire risk, improve livestock grazing, and in some cases improve wildlife habitat, conversion does not address forest health, maintenance of ecological function on the landscape, nor PJ sustainability and its considerable ecosystem benefits and the products that can be derived from these woodlands.

Pinyon and juniper have a number of uses including, but not limited to, pine nuts, fuelwood, posts, charcoal, biomass, wood mulch, and bioenergy. Markets, however, are limited making management of PJ a cost, whether for sustained forest/woodland or for conversion. Encouragement should be given to market development to help offset management costs. Two examples follow. Many acres of pinyon pine could be managed for the sustained production of pine nuts, a highly nutritious food that has world-wide markets. PJ wood has been shown to have qualities that make it very useful for bioenergy production and for bio-char as a soil amendment. New technologies also may produce other products that can be profitably manufactured from woodland trees.

Some of the less-tangible benefits provided by persistent PJ forests include wildlife habitat (for both game and non-game species), protection and encouragement of development of biological soil crusts[3], amelioration of microclimate, reduction of wind and drifting snow, and soil protection (Belnap et al. 2001, Brotherson and Rushforth 1983, and Heede 1987 and 1990).

PJ is frequently called "invasive," a term which is properly applied only to species that are not in their native habitat (Clinton 1999). A more accurate term might be "opportunistic," as the type will expand into adjacent vegetation types, given favorable environmental conditions and lack of disturbance. When environmental conditions change, trees that have moved off-site are more likely to become stressed and more susceptible to mortality. However, trees that survive and are healthy under changing conditions are adapted to the new environment.

PJ is highly diverse; something too often overlooked by managers, and is very adaptable to a wide variety of conditions. Two main types should be recognized: "persistent" PJ and "expansion" PJ, roughly equating to the ecological potential of the site to maintain long-term site dominance by trees. Persistent PJ sites are those where pre-settlement aged trees

[3] Also known as cryptogamic or biotic crusts.

may be present, trees can be expected, or trees will regenerate in a very short time after a disturbance event. They may also be categorized as sites where woody vegetation can be expected to dominate due to site conditions (soils, etc.). Expansion sites are those where PJ is not normally found and into which PJ expands over a (typically) long period in the absence of the site's normal disturbance regime. These sites may also be categorized as "herbaceous" sites with long term presence of perennial grasses and shrubs.

During the 20th century, most long-term PJ types experienced a significant increase in stand densities (Miller et al. 2008). In the absence of frequent fire, PJ has expanded into adjacent vegetation types. Persistent and expansion PJ types are often closely intermixed. Densification and expansion has increased fuel loadings, creating the conditions that allow large high-intensity fires that threaten old-growth PJ sites as well as other adjacent vegetation types. This situation begs for management of both expansion and persistent PJ types.

Without recognition of the need and a mandate to manage PJ types, "all or none" management will likely continue to be the dominant management and many sites that could receive management will not. Such lack of management would contribute to the pattern of larger, more intense fires, region-wide insect outbreaks, slower than normal tree growth, and watershed deterioration.

Recommendations

Encourage the use of proven silvicultural methods and the best available science to enhance woodland/forest health, watershed health, wildlife habitat, landscape visuals, and to reduce the risk of wildfire.

No one silvicultural prescription will fit all sites. Silvicultural guidelines need to fit the ecology of the site (the biophysical setting) and of the larger watershed, as well as the socio-economic needs of the owner. Silvicultural prescriptions should be developed for a variety of woodland sites to achieve various landowner objectives while maintaining the health and resiliency of the PJ forest.

Management of persistent and expansion woodlands should typically occur concurrently. In persistent PJ types, first priority should be given to management for sustained forest/woodland cover. Other ecosystem components may be emphasized in expansion types.

Encourage the management of high producing pine nut stands for sustained production of pine nuts.

Consider artificial regeneration for disturbed areas.

Encourage biomass and bioenergy markets to develop and invest in the use of PJ with a focus on expansion PJ as well as sustainable management of persistent PJ.

Use appropriate stand and landscape inventory methods and historic records to better define and recognize the difference between expansion and persistent PJ.

Educate public and private managers and resource specialists to recognize the diversity of persistent PJ types and the options for managing these types.

PJ types lend themselves to both even and uneven-aged silvicultural systems. The site should be evaluated and the management goals taken into consideration when deciding which system to use.

Consider the potential for climate change and adapt prescriptions accordingly. This may mean modification of residual tree density, preferred tree species, etc. Management should consider the trajectory of change and apply adaptive management that strives for healthy landscapes, retaining future options by keeping many ecosystem components healthy and present on the landscape.

Consider the human environment (resource use, cultural and social needs, recreation, visuals, etc.) as part of ecosystem management.

Fire may be a silvicultural tool in some vegetation types, but is typically detrimental to pinyon and juniper. Fires in PJ are typically wind-driven crown fires. Pinyon is very intolerant of fire and even moderate to low intensities of surface fire will cause mortality, either directly or indirectly. Most juniper trees are typically killed in fires, however, some few may escape as juniper can tolerate some fire and survive, as long as a substantial portion of the crown survives and the trunk is not totally girdled.

Broadcast fire should generally not be used as a tool for sustaining PJ. Fire may be used where PJ is to be eliminated or discouraged in favor of other vegetation types. Judicious use of fire (typically pile burning away from leave trees) can be used to reduce post-harvest fuels within PJ stands. Some residual woody slash can be beneficial for wildlife habitat, tree and herbaceous plant regeneration, and for erosion control.

Mechanical activities in pinyon stands infected with black stain root disease can result in spread of the disease, and there are currently no known control measures. Use pre and post-treatment surveys to determine the presence of black stain. Management activities and post-treatment monitoring provide an opportunity to improve our understanding of this little known disease. Further research and development of practical silvicultural methods that address this disease should be encouraged.

Definitions

Expansion PJ sites: those where PJ is not normally found and into which PJ expands over a (typically) long period in the absence of the site's normal disturbance regime. These sites may also be categorized as "herbaceous" sites with long term presence of perennial grasses and shrubs.

Persistent PJ sites: those where pre-settlement aged trees may be present, trees can be expected, or trees will regenerate in a very short time after a disturbance event. They may also be categorized as sites where woody vegetation can be expected to dominate due to site conditions (soils, etc.). Persistence relates closely to the ecological potential for long term site dominance by PJ.

The following definitions are from *The Dictionary of Forestry,* Helms 1998.

Silviculture: the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Stand: a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

> All-aged stand: a stand with trees of all or almost all age classes.
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> Uneven-aged stand: a stand with trees of three or more distinct age classes, either intimately mixed or in small groups.
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> Even-aged stand: a stand of trees composed of a single age class in which the range of tree ages is usually ±20 percent of rotation.

Rotation: in even-aged systems, the period between regeneration establishment and final cutting.

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About the Society

The Society of American Foresters, with over 15,000 members, is the national organization that represents all segments of the forestry profession in the United States. It includes public and private practitioners, researchers, administrators, educators, and forestry students. The Society was established in 1900 by Gifford Pinchot and six other pioneer foresters.

The mission of the Society of American Foresters is to advance the science, education, technology, and practice of forestry; to enhance the competency of its members; to establish professional excellence; and to use the knowledge, skills, and conservation ethic of the profession to ensure the continued health and use of forest ecosystems and the present and future availability of forest resources to benefit society.

The Society is the accreditation authority for professional forestry education in the United States. The Society publishes the Journal of Forestry; the quarterlies, Forest Science, Southern Journal of Applied Forestry, Northern Journal of Applied Forestry, and Western Journal of Applied Forestry; The Forestry Source, and the annual Proceedings of the Society of American Foresters national convention.

The Intermountain Society of American Foresters includes over 200 members in Nevada, Utah, southern Idaho, and southwest Wyoming.

Intermountain
Society of American Foresters
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Authored by:

Doug Page	Team Lead, BLM Southwest Utah Zone Forester, IMSAF Communications Chair
Gerald Gottfried	USFS Research Forester, SWSAF
Robin Tausch	USFS Research Ecologist (retired)
Ron Lanner	USU Professor of Forestry (retired), NorCal SAF
Skip Ritter	BLM, Nevada Forestry State Lead (retired)

Reviewed by:

James N. Long	USU Professor of Forestry
Timothy Beaty	USFS (retired), IMSAF Chair
Aaron Wilkerson	BLM, Utah Forestry State Lead
Darren McAvoy	USU Extension Forester
Richard Tholen	BLM WO Forester (retired), IMSAF Policy Chair and Chair Elect
John Roberts	Idaho State Lands (retired), IMSAF Past Chair
Fred Baker	USU Entomology Professor, IMSAF CFE Contact and Student Chapter Faculty Advisor
Rod Brevig	IMSAF Membership Chair
Darrel Kenops	USFS (retired), IMSAF Newsletter Editor and Snake River Chapter Policy Chair
Roland Shaw	USFS (retired), Nevada Division of Forestry, IMSAF Nevada Chapter Past Chair
Frank Roth	USFS R4, IMSAF Utah Chapter Meetings Chair
George Bacon	IMSAF Snake River Chair
John Riling	USFS Silviculturist, IMSAF Snake River Chapter Secretary-Treasurer
John Barnwell	SAF National Office, Assistant Director, Forest Policy