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NATIONAL PARK SERVICE
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(2410)

MEMORANDUM

To: Concessions Specialists

CC: Regional Chiefs

From: WASO Commercial Services - Contract Management

Subject: Updated - Reducing Ecological Risks Associated with Pests in Firewood

To prevent the spread of invasive species in firewood, the National Park Service Natural Resources Division has developed updated guidance titled ***Reducing Ecological Risks Associated with Pests in Firewood***. Key management issues contained in this guidance applicable to NPS Commercial Services are provided below.

REQUIRED: To prevent the spread of invasive pests, park concessioners must purchase and sell only locally grown and harvested firewood in accordance with state quarantines. To find more information on state firewood policies and local quarantines, visit your state's Department of Natural Resources (NDR) web pages or visit this website for state by state information.

The term "local firewood" often means purchasing firewood from within no greater than 50 miles from the source, even if it is still within the state. "Local mileage" depends upon your specific state regulations. If local firewood is not available, concessioners must purchase and sell certified firewood. Certified firewood must have a USDA issued certificate indicating it is pest-free available upon request.

RECOMMENDED: Concession contract operating plans should specify how firewood is bundled. Vendors are strongly encouraged to use string/binder twine to bundle firewood which can be safely burned in the fire; not purchase firewood wrapped in clear plastic wrap which does not burn.

The full updated version of the Natural Resource Report, ***Reducing Ecological Risks Associated with Pests in Firewood*** (NPS/NRSS/BRMD/NRR—2014/817) is attached to this memo or can be downloaded from the Natural Resource Publications Management website. The report summarizes the current policies, regulations and recommendations available to park managers in addressing ecological risks associated with firewood. It also provides examples of successful management efforts and references for technical assistance.

For further information on these requirements please contact Kat Berry, WASO Commercial Services at 202.513.7153 or Carol DiSalvo, NPS Integrated Pest Management Coordinator at 202.513.7183.

Please distribute this memo to all parks with concession operations.

Attachment - FirewoodManagement-NRR2014

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Reducing Ecological Risks Associated with Pests in Firewood

Guidance for Park Managers

Natural Resource Report NPS/NRSS/BRMD/NRR—2014/817

ON THE COVER
Northeast Regional Integrated Pest Management Coordinator Wayne Millington prepares to inspect stacked firewood at Harper's Ferry National Historic Park, Harper's Ferry, WV.
Photograph by: Carol DiSalvo, Servicewide Integrated Pest Management Coordinator.

Reducing Ecological Risks Associated with Pests in Firewood

Guidance for Park Managers

Natural Resource Report NPS/NRSS/BRMD/NRR—2014/817

Carol DiSalvo

National Park Service
1201 I Street NW
Washington, DC 20005

June 2014
U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate high-priority, current natural resource management information with managerial application. The series targets a general, diverse audience, and may contain NPS policy considerations or address sensitive issues of management applicability.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by qualified individuals with subject area technical expertise and was overseen by a peer review manager.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available on the Integrated Pest Management website http://www1.nrintra.nps.gov/brmd/ipm/ and the Natural Resource Publications Management website (http://www.nature.nps.gov/publications/nrpm/). To receive this report in a format optimized for screen readers, please email irma@nps.gov.

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Executive Summary

This document summarizes the current policies, regulations and recommendations available to park managers in addressing ecological risks associated with firewood. It also provides examples of successful management efforts and references for technical assistance.

National Park Service (NPS) forested lands are facing serious threats from invasive forest pests (insects and disease pathogens). These pests destroy native trees, damage ecosystems, and create hazardous situations. The NPS must address this threat seriously. If we do not, our naturally forested ecosystems, cultural landscapes, historic specimen trees, associated local economies, and visitors' recreational experiences are at risk of decline due to forest pests. Research from the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), the US Geological Survey (USGS), and The Nature Conservancy has confirmed that the human movement of firewood from infested areas to non-infested areas is a significant mechanism for spreading invasive forest insects and disease pathogens. Forest pests that can be spread by movement of firewood include the nonnative emerald ash borer, Asian longhorned beetle, beech bark disease, Dutch elm disease, gypsy moth, hemlock wooly adelgid, oak wilt, red imported fire ant, sudden oak death, and others. Since effective pest management treatments are limited, education, prevention, early detection, and rapid response are critical.

Prevention and detection of these forest pests involves strengthening national, state, and NPS policies and regulations for importing and exporting plant-based materials, regulating intra- and inter-state management of firewood, and engaging park staff, concessioners, and visitors and firewood user groups. To protect park resources, we must know the composition of NPS forested lands, the specific pests that present a threat to them, and actively engage park staff, partners, neighbors, and site users, to help detect, report, and manage forest pests.

General guidance on the movement, use, and management of firewood on NPS lands

The movement of firewood presents a high risk pathway for the introduction and spread of invasive, nonnative and native forest pests which may threaten park resources or human health in parks. In addition to known forest pests, new associations of insects and fungi (such as with Dutch elm disease) continue to occur, causing extensive damage. Parks should follow current federal, state, and NPS regulations and policies, and the recommendations in this document when making decisions to mitigate the potential risks from pests associated with firewood. Individual parks can also issue more stringent regulations to manage risk associated with firewood for the protection of park resources and human health.

Key policies and regulations for managing risks associated with firewood are noted below. Consult Appendix I-V for additional references.

- NPS Management Policies 2006, Section 4.1.5 Restoration of Natural Systems; Section 8.8 Collecting Natural Products, (http://www.nps.gov/policy/mp/policies.html).

- Title 36-Parks, Forests, and Public Property Chapter National Park Service, Department of the Interior Parts 1 (General Provisions) and 2 (Resource Protection, Public Use and Recreation). See 36 CFR 1.5 (a).

-Plant Protection Act Authorizes State Quarantines
Each state has the authority to establish specific quarantines which are coordinated with USDA Animal and Plant Health Inspection Service (APHIS). Parks should cooperate with state agencies in the protection of natural resources and abide by federal and state quarantine regulations regarding the movement of firewood. (See http://www.aphis.usda.gov/brs/pdf/PlantProtAct2000.pdf).

Outreach and education is a critical and necessary component of forest protection. Parks should coordinate with partners to educate visitors on the reducing threats to resources from firewood. Visit the following website for pertinent information on education:

-Don't Move Firewood: http://www.dontmovefirewood.org/

- Buy It Where You Burn It:
http://www.nature.org/ourinitiatives/habitats/forests/explore/firewood-buy-it-where-you-burn-it.xml.

This document is posted on the Integrated Pest Management (IPM) website:
http://www1.nrintra.nps.gov/brmd/ipm/.

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I. Introduction

The movement of firewood serves as a high-risk pathway for native and non-native forest pests that threaten forested ecosystems and the environmental services they provide. Infested firewood also presents economical and recreational risks to National Park Service (NPS) managed lands and surrounding forests.

What is firewood?

Federal, state, and local entities have differing definitions of "firewood." At the federal level, firewood is defined as "wood that has been cut, sawn, or chopped into a shape and size commonly used for fuel, or other wood intended for fuel" (7 CFR § 301.92, 2010). Some states have specific definitions of firewood. For example, in New York State regulations, "firewood" is defined to be "any kindling, logs, chunkwood, boards, timbers or other wood of any tree species cut and split, or not split, into a form and size appropriate for use as fuel." [1] Individual parks are encouraged to contact their state natural resource office or department of conservation to obtain information on specific state definitions.

What is not considered firewood?

Kiln-dried, finished and cut lumber or lumber scraps from which the bark has been cut, like that purchased from a hardware store or discarded at construction sites, is not considered firewood.

Why are forests important and what value do they provide?

Forests are multifunctional ecosystems which provide a wide range of ecological, cultural, political, economic, social, and recreational services. NPS forests, set aside by specific Congressional legislation, are part of once larger global forests. When properly managed forests provide renewable resources for people. They also provide the necessary structure and ecology of wildland habitat for local animal and plant species. Many forests are components of cultural landscapes for the interpretation of historic events, and others provide recreational opportunities for human visitors. The ecological services provided by large areas of NPS forested lands help to regulate local and global climate. Forests also influence weather events, regulate the hydrological cycle, protect watersheds and flow rates, prevent erosion, and provide a vast store of biodiversity, and genetic information. The economic value of forests includes timber production, fuel, and non-timber forest products (gathering, hunting, and subsistence use), medicinal use, eco-tourism and other recreational opportunities. Forests can also provide a spiritual or intrinsic experience, and time spent away from man-made landscapes and activity, to think, reduce stress, and emotionally connect with the natural world.

What are forest pests?

NPS policy, defines pests as: "living organisms that interfere with the purposes or management objectives of a specific site within a park or that jeopardize human health or safety" (NPS Management Policies, Section 4.4.5.1, Appendix I). Therefore, forest pests are living organisms that interfere with park purposes or jeopardize human health in forested areas. These forest pests may be native or nonnative species depending on the specific situation. The term forest pest is inclusive and can include insects, diseases, fungi, plants, etc. Decisions to manage pests are

[1] NY Department of Environmental Conservation, Frequently Asked Questions for Firewood Regulation website. http://www.dec.ny.gov/animals/44008.html (Accessed 17 February 2012).

made on a case-by-case basis in accordance with NPS policies and regulations. References on key forest pests associated with firewood are found in Appendix II.

What are the risks associated with firewood?

Firewood is obtained from recently killed or stressed trees with the bark in place; most wood pests develop in this environment. It has been shown that 20% of firewood may be infested with insect or pathogen forest pests. The U.S. government has recognized this risk on a national level and requires heat treatment of most imported firewood. Most states have regulations in place prohibiting the domestic movement of firewood; however, surveys show that firewood movement occurs readily through quarantine zones and over substantial distances. When campers visit parks they may unknowingly be transporting forest pests. Although regulations are in place they are often unclear or unknown to the public, and difficult to enforce.[2]

This document will assist park managers in preventing, detecting, and managing risks associated with firewood brought into parks, and to best manage risks associated with firewood collection, sales, and purchase. Definitions and references to federal, state, and NPS laws, regulations, and policies are provided throughout the document. References for key forest pests and technical assistance, as well as NPS-specific examples, are included in Appendices I-VI. This information is intended for use by park managers when developing management decisions (See section IV. Process for Formulating Firewood Management Decisions at Your Park).

To whom does this guidance apply?

This guidance applies to all park employees, concessioners, contractors, permittees, licensees, and visitors who are involved in the management of forested areas, associated developed zones, and use and/or sales of firewood on all lands managed or regulated by the National Park Service.

[2]USDA Animal and Plant Health Inspection Service. 2011Risk Assessment of the Movement of Firewood within the United States. Available at: http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/importexport?1dmy&urile=wcm%3Apath%3A/APHIS_Content_Library/SA_Our_Focus/SA_Plant_Health/SA_Import/SA_Hot_Issues/SA_Firewood (Accessed 23 May 2014).

II. Federal, NPS, State, and Partners: Regulations, Policies, and Technical Assistance Related to Firewood

This section refers to current legislation, policy, funding, and technical assistance that parks can reference when formulating management decisions regarding firewood use, sale, purchase, and disposal, to reduce risks to people and resources.

A. Federal Laws and Regulations

The Plant Protection Act 2000

The Plant Protection Act 2000 (PPA) gives the Secretary of Agriculture, and through delegated authority, USDA's Animal and Plant Health Inspection Service (APHIS), the ability to prohibit or restrict the importation, exportation, and the interstate movement of plants, plant products,

certain biological control organisms, noxious weeds, and plant pests. Under the PPA, violators face civil penalties for smuggling illegal plants or produce that could harbor plant pests or diseases. The PPA gives the Secretary of Agriculture the authority to subpoena documentary evidence and witnesses to prosecute violators. For more information on the Act see: http://www.aphis.usda.gov/brs/pdf/PlantProtAct2000.pdf . For information on permits see: http://www.aphis.usda.gov/plant_health/permits/faq/plants4planting_faqs.shtml.

Through APHIS' authority under the PPA, individual states have instituted quarantines prohibiting interstate transport of firewood in order to protect state/local forests from invasive forest pests. Each state has the authority to establish specific quarantines which are coordinated with USDA APHIS. Individual quarantines may state that firewood should not be brought across state lines unless a certificate is obtained from the USDA Plant Protection Program stating the firewood is "pest-free" and in compliance with quarantine regulations. Parks must abide by these quarantines (NPS Management Policies 2006, Section 4.4.1.1).

The Nature Conservancy maintains the following websites that provide up to date information on firewood pests and associated state quarantines:

1. Don't Move Firewood: http://www.dontmovefirewood.org/
2. Buy It Where You Burn It: http://www.nature.org/ourinitiatives/habitats/forests/explore/firewood-buy-it-where-you-burn-it.xml.[3]

The Consolidated Natural Resource Act of 2008 (PL 110-229)

Title III, Subtitle A, Sec.3 of this Act, entitled "National Park Service Authorizations", states that "the Secretary of the Interior may enter into cooperative agreements with State, local, or tribal governments, other Federal agencies, other public entities, educational institutions, private nonprofit organizations, or participating private landowners for the purpose of protecting natural resources of units of the National Park System through collaborative efforts on land inside and outside of National Park System units", and sets terms and conditions, limitations, and authorizes

[3] The Nature Conservancy, Forest Conservation: http://firewood.ca.gov/docs/FirewoodPoliciesURLs.pdf (Accessed 8 December 2013).

appropriations for such cooperative agreements. Cooperative agreements must provide clear and direct benefits to natural resources in units of the National Park Service such as the preservation of riparian systems, eradication of invasive, exotic species, and restoration of native wildlife habitat" (S. 241 and H.R. 658).[4]

This law expands NPS ability to cooperate on natural resource activities by allowing NPS funds to be expended outside of park boundaries. It authorizes the National Park Service to enter into cooperative agreements with State, local, or tribal governments, other Federal agencies, other public entities, educational institutions, private nonprofit organizations, or participating private landowners for the purpose of protecting natural resources associated with a unit of the National Park System. Appropriated funding can be directed to management activities occurring both inside and outside the jurisdictional boundaries of a park, as long as the activities enhance the condition of natural resources within the park. For more information, see: http://www.gpo.gov/fdsys/pkg/PLAW-110publ229/pdf/PLAW-110publ229.pdf and http://www1.nrintra.nps.gov/BRMD/PL110.cfm.

B. NPS Specific Regulations and Policies

Code of Federal Regulations (CFR)

One of the most important tools that park managers have at their disposal to address risks from firewood are the regulations found in CFR Title 36-Parks, Forests, and Public Property Chapter National Park Service, Department of the Interior Parts 1 (General Provisions) accessible at http://www.gpo.gov/fdsys/pkg/CFR-2011-title36-vol1/pdf/CFR-2011-title36-vol1-sec1-5.pdf , and in Part 2 (Resource Protection, Public Use and Recreation) accessible at http://www.gpo.gov/fdsys/pkg/CFR-2000-title36-vol1/pdf/CFR-2000-title36-vol1-part2.pdf.

Key sections and implications for firewood management and the Superintendent's Compendium are described below.

36 CFR 1.5 (a), Closures and public use limits (Compendium Authority)

Chapter 1 National Park Service, Department of the Interior, Part 1-General Provisions Section 1.5(a), "Closures and public use limits" is known as the Compendium Authority. The excerpts below allow park superintendents to:

> (1) Establish, for all or a portion of a park area, a reasonable schedule of visiting hours, impose public use limits, or close all or a portion of a park area to all public use or to a specific use or activity.
>
> (2) Designate areas for a specific use or activity, or impose conditions or restrictions on a use or activity.
>
> (3) Terminate a restriction, limit, closure, designation, condition, or visiting hour restriction imposed under this authority…"

[4] H.R. 658 (110th): Natural Resource Protection Cooperative Agreement Act
110th Congress, 2007–2009. Text as of January 24, 2007 (Introduced),
http://www.govtrack.us/congress/bills/110/hr658/text/ih (Accessed 27 September 2013).

Constraints on use of the Compendium Authority
Pursuant to 36 CFR 1.5(a), the superintendent may impose closures and public use limits only when it is "Consistent with applicable legislation and administrative policies and based upon a determination that it is necessary for the maintenance of public health and safety, protection of environmental or scenic values, protection of natural or cultural resources, aid to scientific research, implementation of management responsibilities, equitable allocation and use of facilities, or the avoidance of conflict among visitor use activities…" Pursuant to 36 CFR 1.5(b), the closures authorized by this section are generally reserved for temporary or short-term actions, or actions that are likely to change periodically.

36 CFR 2.1, Preservation of natural, cultural and archeological resources
Regarding resource and visitor protection, 36 CFR 2.1 describes a number of conditions under which the movement of items (which can include firewood) into/out of parks is prohibited.

NPS Management Policies 2006
NPS Management Policies 2006 (http://www.nps.gov/policy/mp/policies.html) should be reviewed and referenced when making management decisions regarding firewood. For example:

> Section 4.1.5 Restoration of Natural Systems states: "The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function. Efforts may include, for example… restoration of areas disturbed by NPS administrative, management, or development activities (such as hazard tree removal, construction, or sand and gravel extraction)..."
>
> Section 8.8 Collecting Natural Products states: "The gathering of firewood will be allowed only where subsistence use is authorized by federal law or in specific areas designated by a superintendent in which dead and down wood may be collected for campfires or in small quantities for other uses within the park …"

C. State Regulations

State Departments of Natural Resources
Several states have installed regulations regarding movement of firewood. Per NPS policy (see Section B), parks should work cooperatively with state agencies in the protection of natural resources and abide by federal and state quarantine regulations regarding the movement of firewood. To obtain and share information on state quarantines, park pest issues, and learn of possible opportunities to join area partners to assist in managing pest issues on an area-wide basis, park staff are encouraged to contact their state counterparts.

D. Technical Assistance and Guidance

Parks can submit requests for technical assistance and annual insect and disease suppression funds per Section 5 of the Cooperative Forestry Assistance Act of 1978[5] which authorizes the Secretary of Agriculture to protect trees, forests, wood products, stored wood, and wood-in-use from insect and disease outbreaks on federal and private lands. Under Section 8(b)(3) of this document, the Forest Health Protection Act states that the USFS "plan, organize, direct and perform measures to prevent, retard, control or suppress incipient, potential, threatening, or emergency insect infestations and disease conditions affecting trees." A memorandum of agreement exists between the Department of the Interior (NPS and other bureaus) and USDA which supports this partnership and management of insects and diseases on DOI lands (Insect and Disease Agreement).[6]

The Secretary of Agriculture delegated implementation of this Act to the USFS who oversees distribution of the annual Forest Health Protection Funds for Insect and Disease Suppression on NPS lands. Parks may submit proposals that include prevention and suppression of forest insects and diseases. The call for NPS proposals is issued in late summer/early fall each year. For more information, please contact your Regional IPM Coordinator.

Local USFS field offices are available to provide technical assistance to parks for forest insect and disease issues and can be contacted directly by park staff interested in discussing forest pest suppression projects. Your USFS field office can be located at: *http://www.fs.fed.us/foresthealth/regional_offices.shtml***.**

Forest Service Manual 2900, Invasive Species Management

In December 2011 the USFS released a new manual, FSM 2900, Invasive Species Management, which provides National Forest System policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens). The manual incorporates the integrated pest management approach for invasive forest species (http://www.fs.fed.us/im/directives/fsm/2800/2900/2900_contents.doc).

National Firewood Task Force 2009

To address the management of pests in firewood on a nationwide basis, APHIS formed an interagency National Firewood Task Force (NFTF) in August 2009 to review risks associated with firewood. The taskforce developed recommendations to *"mitigate the pest and disease risks posed by people moving firewood."* These recommendations helped to initiate cooperation across agencies regarding regulatory responsibilities, outreach and education, and voluntary compliance for large scale firewood producers, campground managers, and consumers. The NFTF Risk

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[5] Cooperative Forestry Assistance Act, 16 USC Section. 2104c (1978). Website: http://www.house.gov/legcoun/Comps/Cooperative%20Forestry%20Assistance%20Act%20Of%201978.pdf. (Accessed February 5, 2014)

[6] Memorandum of Agreement between USDA and DOI to Conduct Forest Insect and Disease Management on Lands Administered by the US DOI. (1993). Website: http://www.fs.fed.us/im/directives/fsm/1500/1531-1531.06h.txt. (Accessed 21 February 2012).

Assessment with recommended actions is available at:
http://www.nd.gov/ndda/files/resource/NationalFirewoodTaskForceRecommendations.pdf

Animal and Plant Health Inspection Service

Additional information and technical assistance on forest pests can be found at http://www.aphis.usda.gov/.

Additional information on firewood can be found at:
http://www.aphis.usda.gov/wps/portal/banner/help?1dmy&urile=wcm%3apath%3a%2FAPHIS_Content_Library%2FSA_Newsroom

III. Use, Collection, Purchase, and Sale of Firewood

Firewood includes any unprocessed, wood like material that is gathered, cut, sold, or intended for use as fuel, including chips, limbs, branches, etc. with or without bark. The collection of firewood can be on a small scale for personal use or on a larger scale for commercial use. Collection, use, purchase, and sale of firewood in parks must comply with NPS, state, and other federal regulations. The terminology below provides basic background when making decisions on purchase and sale of firewood.

What is a cord of wood?

Firewood is typically sold as a "face cord" or "rick cord" which is 8 feet long, by 4 feet high, by 16" wide, on average. Nominally this is 43 cubic feet, however, due to the airspace between the stacked pieces of firewood the actual solid wood and bark volume is something less than this. The amount of wood in a stacked cord will depend upon the size and straightness of the pieces, how they are split, and how the wood is stacked. Because of these variables the solid cubic feet in a face cord can be roughly 20-30 cubic feet of solid wood and bark.[7]

What is green wood?

Green wood is freshly cut wood. It has high moisture content of 50% or greater, and has less heat value because energy is expended evaporating moisture trapped in the wood. In general, because of its moisture content, a cord of green wood will weigh 70 to 100 percent more than seasoned wood.

What is seasoned wood?

Seasoned wood is cut wood which is stored in piles and allowed to air-dry for a period of time so that the moisture content in the wood reaches equilibrium with the moisture in the surrounding air. Because it contains less moisture, seasoned wood has a higher heating value than green wood. Seasoning typically reduces the moisture content of the firewood to around 19%. However, "seasoned firewood" does NOT indicate that that lumber is pest-free. Reducing moisture content alone is not an adequate treatment method to control invasive insects and/or diseases.[8] Scientific studies have shown that some invasive exotic insects can survive in untreated, cut trees and firewood for over two years and still emerge to infest surrounding forests. It is also difficult to determine how long firewood has been "seasoned" as there is no measure to verify this.[9] Therefore parks should not purchase "seasoned wood" for firewood as it may contain pest species and increase risks to forests.

What is kiln dried lumber?

Kiln dried lumber is heated in a kiln to speed the curing/drying process. This practice is not regulated and only has a negotiated meaning between the producer and consumer. Depending on the temperature of the kiln and length of time lumber is treated, it may not necessarily raise the internal temperature of the wood high enough to kill pests, or hold it there long enough to be

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[7] Pers.com John Dramm, U.S. Department of Agriculture-Forest Service, Forest Products Lab, Madison, WI., September 19, 2013.

[8] New York Department of Environmental Conservation website http://www.dec.ny.gov/animals/28722.html (Accessed 17 February 2012).

[9] California Consumer Energy Commission website http://www.consumerenergycenter.org/residential/heating_cooling/firewood.html (Accessed 26 January 2014).

effective for that goal. USDA APHIS has established a heat treatment standard of wood reaching 71ºC (160º F) at the core for 75 minutes. Only when this standard is achieved, is kiln dried firewood able to receive the USDA Certification that it is pest-free, indicating that it is ready for distribution. See Figure 1 and Appendix IV for additional information on kiln drying and other heat-treatment methods.

Figure 1. Commercial lumber kilns that heat wood to 160º for 75 minutes allow wood to receive a USDA Certificate that it is pest-free. Photo credit: Larry Conrod, Victoria, British Columbia.

What is treated lumber?

Treated lumber is wood that has been sawn into uniform dimensions (made into lumber) and then treated with chemicals or other preservatives to protect it from being destroyed by insects, fungi, mold, and other organisms, which naturally consume and decompose wood. Chemically treated lumber or wood should never be burned as firewood as harmful toxic fumes from the chemical treatment can be released.

What is treated firewood?

Treated firewood refers to wood that is of a convenient shape and size for burning in a fire pit or fireplace and has been heat-treated to a specific internal temperature for a designated amount of time in order to kill any insects, fungi, mold, or other potential pests that may have been living in or on the firewood. This process is called heat treatment and is done to remove the risk of transporting potential pests in or on the firewood to new locations.

Are there standards for heat treating firewood? USDA has established heat treatment standards for firewood. The standards can be found in the USDA Heat Treatment of Firewood- Meeting the Phytosanitary Requirements 2011 at http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr200.pdf

Each heat treatment listed is effective against certain pests or pest types because different pests vary in their susceptibility to heat.

What heat treatment standards should be required in the park, and how can a park manager determine if firewood has been heat treated and pest free? USDA does not certify firewood; however, it does issue Federal Certificates to firewood that originates from a quarantine area and has been properly mitigated to remove the risk associated with the pest of concern being transported in or on that article. Only firewood producers making firewood from wood that originates in a quarantine area can apply the Federal Certificate shield (Figure 3) to their product. The Federal Certificate shield may be issued to wood that has been visually inspected for gypsy moth if that is the only applicable quarantine at the point of production, or it may indicate that the wood has been debarked, or perhaps even chemically fumigated as a treatment.

Park managers must follow State regulations regarding firewood if they exist. Some states have labeling requirements that stipulate the treatment applied be listed on the label; some firewood producers do so as a matter of routine. USDA APHIS maintains a set links to State firewood web pages at: http://www.aphis.usda.gov/newsroom/hot_issues/firewood/state_firewood.shtml.

Park managers should contact their State Plant Regulatory Official regarding specific state-level firewood requirements and regulations and visit the National Plant Board's website at: www.nationalplantboard.org. Park managers can also contact one of APHIS' State Plant Health Directors at: http://www.aphis.usda.gov/contact_us/ppq.shtml.

What is cured lumber?

The term cured lumber indicates that some moisture has been removed from wood, usually to make furniture, and can be done through air drying or kiln drying. This process does not guarantee pest-free lumber, thus, as with seasoned wood, cured lumber should not be assumed to be pest free.

How can parks purchase and sell firewood with minimal risk of introducing pests?

To prevent the spread of invasive pests, parks should purchase and sell local ("local mileage" depends upon your specific state regulations) or pest-free treated/certified firewood. It is important to know what is being purchased and to understand what the firewood label means.

Local and Certified Firewood

The use of local firewood (as defined by each state) reduces the risk of transporting a new pest in to the park. The term "local firewood" often means purchasing firewood from within no greater than 50 miles from the source, even if it is still within the state. Not all states use the 50 mile radius so it is important to check your individual state's regulations regarding firewood movement (see example from Wisconsin in Figure 2). Visit http://dontmovefirewood.org/the-problem/state-state-information/index.html to review your state's regulations.

FIREWOOD MANAGEMENT EXAMPLE: WISCONSIN May 2010

Wisconsin NR 45.045 Firewood

(1) In this section, "firewood" includes limbs, branches, roots, unprocessed logs, lumber, slabs with bark, cut firewood and chips, intended for use on any property.
(2) No person may possess firewood that originates from any of the following:
(a) **An area more than 25 miles** from the campground, or the property itself if there is no campground, to which the firewood will be transported.
(b) An area outside the borders of the state.
(c) An area, outside of the property on which firewood will be used, where firewood is identified as a carrier of invasive terrestrial invertebrates and plant−disease causing microorganisms, including any of the following:
1. An area that is in a zone of infestation designated by the department under s. 26.30 (7), Stats.
2. An area quarantined by the department of agriculture, trade and consumer protection under s. 94.01, Stats.
3. An area quarantined by the U.S. department of agriculture and animal and plant health inspection service under USC 7714 or 7715.
4. An area quarantined by an American Indian tribe within the reservation of the tribe.
(d) This section does not apply to firewood from sources approved by department of agriculture, trade and consumer protection, to dimensional lumber that is debarked, kiln dried and smoothed, or artificial fireplace logs.
(e) The department may seize and dispose of firewood possessed in violation of this paragraph.
Note: A list of firewood sources approved by Wisconsin Department of Agriculture, Trade and Consumer Protection can be obtained by contacting Robert Dahl, WI DATCP.
History: CR 09−103: cr. Register May 2010 No. 653, eff. 6−1−10. List of Wisconsin certified 2011 firewood dealers: http://dnr.wi.gov/invasives/firewood/ or contact the Firewood Hotline at 1-877-303-WOOD)

Figure 2. Wisconsin Department of Natural Resources Firewood Management Code
http://datcp.wi.gov/Plants/Firewood/Firewood_Restrictions/index.aspx

Purchase "Certified pest-free firewood," as defined by USDA

Certified firewood must be bundled and each bundle must contain a unique USDA issued certificate indicating it is pest-free. Figure 3 shows a USDA Electronic Firewood Certification Stamp for emerald ash borer (EAB, *Agrilus planipennis*) which denotes that the lumber has been heat treated by the designated establishment noted on the USDA, APHIS Plant Protection & Quarantine Compliance Agreement form in accordance with 7 CFR 301.53, and is certified as pest free. Certification stamps are attached to commercial labels or invoices moved with treated firewood produced under a compliance agreement for emerald ash borer. This stamp requires a compliance agreement number and shows a two letter treatment designation. The letters represent treatments: HT = heat treatment; DB = removal of bark and ½" of the underling wood; MB = methyl bromide fumigation; and KD = kiln drying.

Figure 3. An example of a USDA emerald ash borer *(Agrilus planipennis)* pest-free firewood certification stamp.

Firewood Vending Machines

Some parks and Commercial Services operations use firewood vending machines to supply firewood to campers. Vending machines supplied with local or certified firewood can reduce transport of infested firewood into the park and allow campers to obtain dry firewood at any time of the day or night. This can reduce the likelihood of campers transporting their own firewood or buying from an unknown vendor. Vending machines require 120 volt power source and can be fitted to accept cash, tokens, or credit cards (see Figure 4).

<u>Vendor contract specifications</u>

The potential vendor is required to submit a Commercial Use Authorization application to the park for approval. Firewood vendors are required to provide documented proof of where their firewood is obtained from as it must be certified as pest-free or purchased from the local area (check individual state regulations for specifications). The commercial use authorization must specify the acceptable types of wood and bundling material. String/binder twine is the preferred bundling material because it can be safely burned in the fire. Firewood wrapped in clear plastic

wrap is not recommended because the plastic should not be burned. Periodic evaluations to ensure the permit conditions are being adhered to by the firewood provider should also be conducted. See Appendix V for a park-specific example.

Figure 4. Firewood vending machines supplied with local or certified pest-free firewood reduce transport of infested firewood into the park and allow campers to purchase dry firewood any time of the day or night. Photo credit: Mike Martuch, Cocoa, Florida.

IV. Formulating Firewood Management Decisions at Your Park

To effectively protect forest resources, we must be proactive and understand the current and potential risks associated with infested firewood near parks.

Know your park's forested resources and define susceptible habitat.

Vegetation maps are a tool for determining and prioritizing forest pest threats. For assistance in preparing or obtaining park vegetation maps contact the NPS Inventory and Monitoring Program's Vegetation Mapping Program at http://science.nature.nps.gov/im/inventory/veg/index.cfm.Vegetation maps can also be obtained from the USGS Vegetation Characterization Program, and the USGS Land, Fire, and Gap Program (USGS Gap Program, http://www.landfire.gov/vegetation.php).

2. Know present and potential forest pest species.

Information on current or potential pest species can be obtained from your Regional IPM Coordinator and local USFS Field Station. Parks can also track the pests of concern using the USDA's Hungry Pests site at http://www.hungrypests.com/ , then clicking on Pest Tracker at http://pest.ceris.purdue.edu/, and the USFS Insect and Disease Mapping and Reporting Tools at http://foresthealth.fs.usda.gov/portal.

3. Determine the pest status and pressure.

The USFS Alien Forest Pest Explorer can be used to generate customized maps that depict historical and future range expansion, historical damage, and forest susceptibility for key pests. Distribution and risk maps are available for over 70 forest pests to view or download from the Maps and Links page (http://nrs.fs.fed.us/tools/afpe/maps/), and GIS data layers can be downloaded to create customized maps from http://nrs.fs.fed.us/tools/afpe/.

4. Prioritize.

To prioritize actions, review forest maps, pest pressure and develop a management strategy with initial focus on early detection and rapid response (EDRR) efforts in high risk habitat areas as well as outlying areas.

5. Take action to manage risks from potentially infested firewood.

To protect forests and effectively manage risks from potentially infested firewood the following actions may be considered:

- Educate yourself and park staff by contacting your state natural resource department and local USFS field office to learn about local quarantines;
- Educate employees, contractors, and visitors, on risks associated with firewood;
- Allow firewood to be brought into the park only from the local area in accordance with state and federal regulations and quarantines;
- Purchase and sell only locally grown and harvested firewood in the park from the State and in accordance with State quarantines. To find more information on state firewood

policies and local quarantines, visit your state's Department of Natural Resources (DNR) web pages or visit this website for state by state information: http://www.dontmovefirewood.org/the-problem/state-state-information/index.html

- Coordinate with NPS Commercial Services, private campground operators, and other firewood users groups in/near the park, to ensure the import/export of firewood occurs in accordance with state and federal regulations. Purchase and sell only local, treated, or certified pest-free firewood (see Section III Firewood Use, Collection, Purchase and Sale).

- Consider establishing a "Firewood Exchange Program" where wood is confiscated from campers upon entry and disposed of and replaced with locally collected firewood;

- Provide a list of locations where local firewood can be purchased for your campground to NPS Commercial Services, private campground operators, and other firewood users groups. For an example, see New York State's efforts at http://www.dec.ny.gov/animals/28722.html

- Issue citations to campers bringing in firewood from outside the quarantine area;

- Prohibit campers from bringing firewood into the park.

6. Maintain a working relationship with NPS Regional IPM Coordinators

Managing invasive forest pests is an ongoing process. Incorporating education and management protocols into park procedures is a necessity in order to protect forested ecosystems and the ecological services they provide. The Regional NPS IPM Coordinators provide support for pest prevention and detection measures, and assistance when submitting funding proposals through the Forest Health Protection Funds for Insect and Disease Suppression Program (see Section II.D, Technical Assistance and Guidance). Visit: http://www1.nrintra.nps.gov/brmd/ipm/contact.cfm.

V. Summary: Ecological Risks Associated with Firewood

In summary, the most critical risk associated with the movement of firewood out of the local area is the potential of moving and introducing insect, fungi, and disease pathogens into an area where they are not naturally occurring. Introduction of these organisms presents a risk to the local ecology as their naturally occurring predators and other biological controls organisms are absent allowing the introduced species to flourish with no limitations. Once disrupted, the forest's ability to bounce back from normal periodic disturbance caused by drought, flooding, or pest invasion, is damaged. This adversely affects the resiliency of the forest and it may not be able to recover and may lose the intricate and interdependent relationships each local species depends upon.

Appendix I. Key References

Forest Pests, Risk Maps, Planning Tools

USDA APHIS
APHIS publications:
http://www.aphis.usda.gov/publications/plant_health/

APHIS Invasive Species Fact Sheet:
http://www.invasivespeciesinfo.gov/resources/usdafactsheets.shtml

The Northeast Forest Pest Outreach and Survey Project:
http://www.nisaw.org/2011/StateRegWorkshop/Panel1-ForestPestOutreach.pdf

Invasive Species and Firewood website:
http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth/sa_import/sa_hot_issues/sa_firewood/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOK9_D2MDJ0MjDzd3V2dDDz93HwCzL29jAx8TfULsh0VAY_1WkE!/

Center for Invasive Species and Ecosystem Health
Forest Pests of North America http://www.forestpests.org/ , provides images and information on insects, diseases, weeds, and abiotic factors that cause damage to urban, managed, and natural forests. This site aggregates pictures, publications, and tools from many sources and packages the resources in an easy, searchable format. This site is intended to be used by homeowners, land managers, volunteers, urban foresters, county agents, outreach educators, and anyone else interested in identifying and managing their trees and forests.

US Forest Service Insect and Disease Risk Maps and Publications
US Forest Service, Forest Health Protection (FHP) Mapping and Reporting Portal at http://foresthealth.fs.usda.gov/, provides access to state, county and local level forest insect and disease conditions data. This site also offers near real time forest disturbance information. Data input applications are restricted to cooperators with specific training and expertise. Here is a brief summary of several of the applications available to NPS staff:

- The Forest Pest Conditions Application is used to explore county level maps of major forest pest conditions for the last five years. This application also houses authoritative data on current pest and pathogen biological ranges.

- The IDS Explorer can be used to view, query, and export polygons from the Insect Disease Survey database and print high-quality maps.

- The Forest Disturbance Mapper is used to view, threshold, and download recent forest disturbance maps for use in real time detection of insect and disease activity at the 240 meter pixel level.

- The Soil drainage and Productivity Index Viewer identifies soil moisture and nutrient availability as an indicator of tree stress and suitable habitat.

- The NIDRM (National Insect and Disease Risk Map) Viewer provides access to composite and individual tree and pest impact layers at the 240 meter pixel level.

- The FHTET Host Maps Viewer allows access to over 300 individual tree species parameter layers such as basal area (sq. ft./ac.), stand density index, and tree species frequency at the 240 meter pixel level.

The US Forest Service recently released the 2013-2027 National Insect and Disease Forest Risk Assessment (NIDRM) which provides a nationwide assessment of the hazard of tree mortality due to insects and diseases displayed in a series of maps and summary tables. For an overview of this useful planning tool:
http://www.fs.fed.us/foresthealth/technology/pdfs/2012_RiskMap_Report_web.pdf

NIDRM GIS Data Access: http://www.fs.fed.us/foresthealth/technology/nidrm2012.shtml, provides these key data products:

- Zip files with downloadable GIS raster data (ArcINFO GRID format)
- Information on how to access NIDRM map and image services (direction connection from ArcGIS)
- Downloadable tabular summaries (MS Excel format) by NPS units

NIDRM Viewer: http://foresthealth.fs.usda.gov/nidrm/

NIDRM Host Maps: http://foresthealth.fs.usda.gov/host/

US Forest Service Forest Health Advisory System http://foresthealth.fs.usda.gov/fhas, provides a park level summaries of potential tree mortality caused by major forest pests and forest host information. NPS units can obtain park specific assessments of natural ecosystems and prioritize active management for pest prevention, suppression, and restoration in consultation with forest health specialists. Forest insect and disease summaries can be used as park specific announcements or bulletins that serve to advise and warn of potential hazards to trees within the park.

US Forest Service Forest Health Protection Program publications:
http://www.fs.fed.us/foresthealth/publications.shtml

US Forest Service Species-Specific Links
Asian longhorned beetle information:
http://www.na.fs.fed.us/fhp/alb/albvideo/albvideo.shtm

Emerald ash borer:
http://www.emeraldashborer.info/

http://www.emeraldashborer.info/firewood.cfm

http://www.emeraldashborer.info/identifyeab.cfm This site will assist the user in distinguishing the invasive nonnative emerald ask borer, *Agrillus plannipennis* from native Buprestid (metallic wood-boring) beetles.

Golden spotted oak borer
http://cisr.ucr.edu/goldspotted_oak_borer.html

Gypsy moth:
http://www.aphis.usda.gov/plant_health/plant_pest_info/gypsy_moth/index.shtml

Sudden oak death pest alert:
http://www.na.fs.fed.us/SOD/

Outreach and Education

NPS Resources

Recent NPS Resources can be accessed and downloaded to help parks with their outreach efforts on firewood risk awareness:

- NPS IPM Program's TEL Broadcast entitled "Firewood: a Pathway for Invasive Forest Pests and Threat to Forest Resources," which aired on April 20, 2010, is available at the DLC website: dlc.nps.gov/?p-342; or you can download the file: http://dlc.nps.gov/wp-content/uploads/2014/02/Firewood-A-threat-to-forest-resources_4-20-2010.mp4.

- NPS Firewood Pest Alert Posters are available for download in English and Spanish through the Regional IPM Coordinators and are also posted to the IPM intranet web at http://www1.nrintra.nps.gov/brmd/ipm/forest.cfm.

- Great Smoky Mountains National Park Public web page, Firewood Alert: Destructive Insects May Be Hitching A Ride! See: http://www.nps.gov/grsm/planyourvisit/firewood-alert.htm.

Non-NPS Resources

The websites below offer additional information on outreach and educational resources:

- The Nature Conservancy's Don't Move Firewood: http://www.dontmovefirewood.org/the-problem.html

- Beetle Busters; informational site for assistance with Asian longhorned beetle: http://www.beetlebusters.info/

- USDA APHIS: Hungry Pest: http://www.aphis.usda.gov/hungrypests

You may also contact your individual state's Department of Natural Resources or Department of Environmental Conservation for posters and outreach materials for your local area.

Pest Tracker: Where are the threats from Firewood Pests?

Pest Tracker, National Agricultural Pest Information System: http://pest.ceris.purdue.edu/

The Pledge: Promise Not to Move Firewood

This site contains a "pledge" which can be adopted in park interpretation programs and used as an outreach tool to educate the public and employees on their role in protecting forest resources by changing their own behavior: http://www.stopthebeetle.info/

Appendix II. Tracking the Pest Risk in Movement of Firewood within the U.S.

Campground Reservation Risk Analysis

The National Recreation Reservation System at http://www.recreation.gov/ is used nationwide by the public to make reservations for campgrounds on federally operated lands. In 2008 the Animal and Plant Health Inspection Service, in cooperation with National Recreation Reservation System, collected and analyzed zip code data from campers in conjunction with detections of invasive forest pests found in campgrounds. APHIS and several states used this data to focus public outreach efforts in high risk areas and to assist in the prevention and movement of infested firewood.

Report files included the destination state of the travelers/campers and listed the percentage of electronic reservations for each federally-owned campground that originated from quarantined areas (based upon zip codes) for emerald ash borer (EAB), Asian longhorned beetle (ALB), gypsy moth (GM), and pine shoot beetle (PSB). This information was used to provide an indication of relative risk for transporting firewood or other items that may contain forest pests of concern, and may be useful for planning early detection surveys. See poster titled: *Northeast Forest Pest Outreach and Survey Project: Zip-code Based Firewood Survey*
Michael Bohne & others at
http://www.fs.usda.gov/detail/r10/communityforests/?cid=fsbdev2_044228.

APHIS Risk Assessment of the Movement of Firewood within the United States

The following information is excerpted from the "APHIS Risk Assessment of the Movement of Firewood within the United States." [10]

1. Firewood is a well-known pathway for the movement of wood pests. Firewood is a raw wood product. It is minimally processed: cut to usable length, bark in place, possibly split, and often freshly obtained from recently killed or stressed trees. Surveys of firewood have found that upwards of 20% may be infested with insect or pathogen forest pests.

2. The United States requires treatment of all imported firewood, with a few exceptions from Canada and Mexico. The United States imported nearly $8 million of firewood from 29 different countries annually from 2005-2009. The fact that firewood treatment is nearly universally required to allow entry indicates the recognized risk of the product.

3. Regulations prohibiting the domestic movement of firewood are already justified and in place for several states for five exotic forest pests. Currently, 16 states have regulations prohibiting the movement of firewood due to the presence of invasive species, but the regulations are often unclear or unknown to the public, they may vary from state to state and are difficult to enforce.

[10] US Department of Agriculture (USDA) Animal and Plant Health Inspection Service.(APHIS). 2010. Risk Assessment of the Movement of Firewood within the United States, p.37-38. Website: http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth/sa_import/sa_hot_issues/sa_firewood/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOK9_D2MDJ0MjDzd3V2dDDz93HwCzL29jAx8TfULsh0VAY_1WkE!/

4. Firewood readily moves throughout the United States. There are commercial firewood distributors in all 50 states. Interceptions of firewood from 48 states into California have been documented at border inspection stations. Firewood surveys support the fact that firewood moves readily through the United States, even out of quarantine zones. Additionally, numerous surveys conducted at stores and campsites illustrate firewood is being transported frequently and over substantial distances.

5. Urban area susceptibility. Urbanization of the United States is increasing with forested areas being urbanized at the greatest rate. Our urban areas are centers of high human activity, trade, sale of ornamental plants and landscape materials, and for the importation of firewood for home use or camping. These activities can create a higher potential for invasion by forest pests or from infested firewood being transported into the neighboring forest and increasing the susceptibility of urban trees to various stresses including insects, diseases, and changes in climate. For example, the estimated cost of potential emerald ash borer (EAB) damage in United States communities from 2009-2019 is $10.7 billion based on 25 state infestation and removal and replant or treatment of 17 million ash trees. Estimates for Asian Long-horned Beetle (ALB) costs in urban areas ranges from $1.7 billion for nine selected cities to $669 billion for the entire United States. Additionally, the increased cost of fuel oil for home heating has been related to increased use of alternate fuel sources such as firewood. The increased demand of firewood would also increase the distance that firewood could be economically moved into urban areas, further increasing the risk of long distance movement and urban area introduction.

6. Diversity and coverage of forests in the United States. Forests cover 33% of the United States with 22 main forest types. Although some tree species are preferred for use as firewood based on some characteristics like heat production and splitting, all species of trees can and are utilized as firewood. Fuel wood use is reported in varying amounts and type depending on region of the United States. Transportation routes allow for rapid and extensive movement of people and firewood, increasing the chance for forest pest introduction and establishment into new areas.

7. The value of the economic resources in the United States at risk if exotic or native forest pests are spread to additional areas is very high. The lumber and paper industries in the United States is a $262 billion a year industry, employing 1.3 million people (US DOE, 2000). However, it is difficult to estimate the economic impact to forest pest introductions as costs would vary based on the area of infestation, rate of spread and damage incurred.

8. Regulatory costs of forest pest management. The current average cost of USDA-APHIS-Plant Protection and Quarantine forest pest regulatory programs from 2004-2008 is $279 million (Lewis, 2008) and there are significant additional regulatory costs at the state level. The high cost of regulatory response combined with the difficulty of forest pest eradication and the high value of industry and resources at risk emphasizes the need to prevent the spread of non-native and native forest pests in the United States.

Appendix III. Kiln and Heat Treatment Information

Heat Treatment Schedules are defined by the USDA Treatment Schedule (see T314) at: http://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf

USDA APHIS Heat Treatment Schedule - T314-a Heat treatment Schedule

1. Heat treatment procedures may employ steam, hot water, kilns, or any other method that raises the temperature of the center of the wood to at least 160°F (71.1°C) and maintains the center temperature for at least 75 minutes.

2. Facilities, temperature monitors and temperature sensors will be approved by CPHST (Center for Plant Health and Science Technology) prior to a compliance agreement being initiated. Compliance agreements must contain a diagram of the treatment facility to include at a minimum: dimensions, capacity, circulation fans, heat input location, and door locations.

3. The temperature monitoring equipment (thermocouples, temperature data loggers etc) must be accurate to within +/- 0.5 °C (0.9 °F) at the treatment temperature, capable of collecting temperature data at least once every five (5) minutes and recording or storing data for 30 days. The temperature monitoring equipment must also be calibrated (by a source that can provide accreditation such as NIST) prior to facility certification tests and a minimum of once an annually thereafter. In addition, if a permanent temperature recording system is used, the system must be recalibrated when any part or portion of the system is repaired or replaced.

4. Temperature monitoring equipment must be able to provide a record of the treatment that identifies each sensor and indicates time and temperature.

5. Internal wood temperatures shall be obtained and verified by sensors located in the larger pieces of firewood at representative locations within the stack. The number of temperature sensing elements required per load will vary with the size of the load. The minimum requirement is four (4) sensors – one (1) for measuring air temperature and three (3) for measuring internal wood temperature. For loads greater than 5,000 ft^3 (142 m^3) of wood, a minimum of one additional sensor for measuring internal wood temperature must be provided for each additional 2,000 ft^3. For example, a load of 9,000 ft^3 would require a total of six (6) sensors (one ambient air temperature sensor and five [3 + 2 additional sensors]). At least one sensor shall be placed in a large firewood piece in a portion of the load furthest away from initial heat circulation. Sensors will be placed in the wood in pre-drilled holes to measure core wood temperature. Probes are to be sealed into each hole with putty (electricians putty is recommended) to prevent reading ambient air temperature. Other recording arrangements may be considered if approved by CPHST.

6. Begin treatment when all the temperature sensors reach the threshold temperature of 160° F (71.1° C). Treatment will be complete when all temperature probe readings are at or above the threshold temperature for the entire 75 minutes.

7. Temperature equipment will be certified by USDA APHIS PPQ personnel at regular intervals (suggested monthly) except in those cases where a facility is inactive in excess of 2 months. Certification will occur before production activities resume.

Figure 5. Specific temperatures and heating duration schedules have been established by USDA APHIS to ensure pests are destroyed.

Appendix IV. NPS Park Examples of Firewood Management Efforts

Several parks have implemented procedures and regulations regarding use, collection, sale, and purchase of firewood. Examples are provided below.

Sleeping Bear Dunes National Lakeshore: Firewood Vending Machines and Strapping Material

In order to improve access to pest-free local firewood, Sleeping Bear Dunes National Lakeshore permits sale of firewood via vending machines through a 2- year commercial use authorization (CUA). The firewood vendor periodically deposits bundles of wood into a locked metal trailer on-site in the park. The vendor can store up to 6 cords in the park and each vending machine holds 1 cord. Bundles of 40” X 15” of dry, burnable (not green) firewood are loaded into the coin operated vending machine for visitors to purchase. Rates for purchasing the firewood are determined through consultation between the park and the firewood provider. The CUA specifies that string/binder twine is acceptable as a bundling material because it can be safely burned in a fire and that firewood wrapped in plastic is not acceptable. Park staff are conducting periodic evaluations to ensure the permit conditions are being adhered to by the firewood provider.

Yosemite National Park: California Forest Pest Council Press Release

Yosemite National Park served as a member of the California Firewood Task Force and represented all California national parks. This Task Force works cooperatively to provide public outreach and education with one voice to protect California forests from risks associated with firewood.

California Forest Pest Council News Release
Help keep California forests healthy – Keep firewood local
Date: September 29, 2011
Contact: Katie Palmieri, Public Information Officer

SACRAMENTO--As part of a nationwide effort to encourage the public to buy and burn firewood locally, the California Firewood Task Force kicked off a public outreach campaign in September to inform campers, wood cutters, arborists, and the general public about the risks of long-distance movement of firewood. "Firewood can carry insects and pathogens that may or may not be visible, making it impossible to know if you are transporting an invasive pest from one location to another when moving it. Once an invasive species is established in a new area, it can do a lot of damage environmentally and economically as the trees in those areas have no natural defenses to fight off pest attack," said Don Owen, chair of the California Firewood Task Force.

The multi-pronged campaign includes surveying camper knowledge about invasive species and firewood in areas affected by the goldspotted oak borer (an invasive beetle in San Diego County likely brought into the state on firewood), providing firewood posters to campgrounds and parks for posting in public locations, mailing information to industry professionals, and offering educational Frisbees and playing cards to campers as a way to facilitate one on one interaction with campers while also providing them with useful information. "As we increasingly become a global community, the movement of invasive pests and pathogens is becoming more frequent. Buying and burning wood locally is a simple way to help minimize the chances of spreading invasive species, and it is something everyone can do with little impact," continued Owen, "The feedback gathered through the surveys will be useful for developing our long-term outreach campaign, helping us insure that we reach out to our audience as effectively as possible."

Made up of state, federal, and local agencies as well as non-profit organizations, the California Firewood Task Force* was established in November 2010 by the California Forest Pest Council. **For more information about the Task Force or keeping firewood local, go to http://www.firewood.ca.gov/ or contact Katie Palmieri at (510) 847-5482.**

*The California Firewood Task Force is made up of representatives from the California Agricultural Commissioners and Sealers Association, California Department of Food and Agriculture, California Department of Forestry and Fire Protection, California Forest Pest Council, California Oak Mortality Task Force, California State Parks, Goldspotted Oak Borer Committee, National Park Service, University of California Center for Forestry, University of California Cooperative Extension, USDA Animal and Plant Health Inspection Service, and USDA Forest Service.

Great Smoky Mountains National Park Quarantines Press Release

Great Smoky Mountains National Park's July 2011 press release alerted the public that quarantines are in effect and that violators must abide by immediately burning their firewood.

Great Smoky Mountains National Park: Immediate Press Release July 26. 2011Park Announced Firewood Restrictions:

Firewood

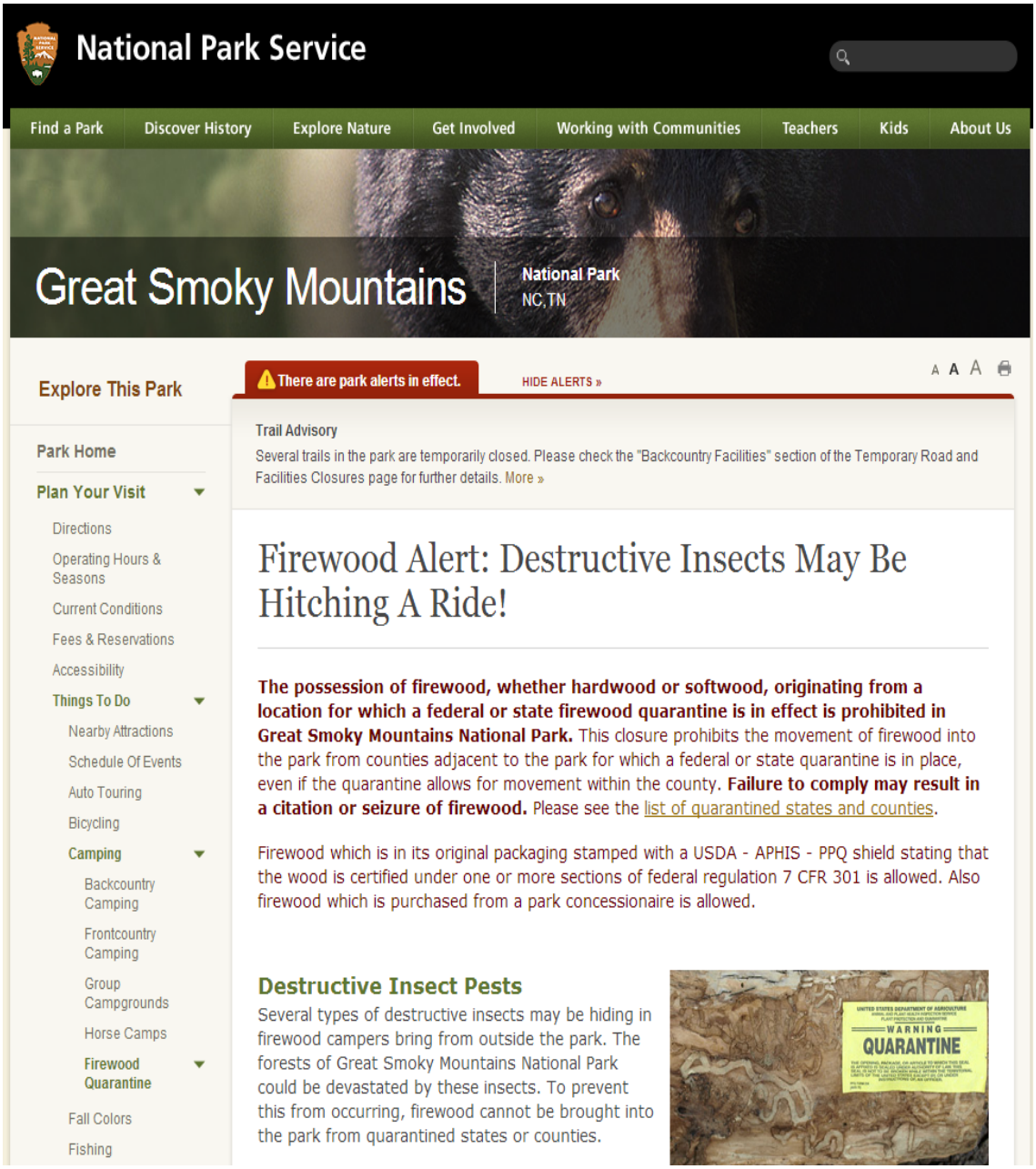
The possession of any firewood originating from any location for which a federal or state firewood quarantine is in effect is prohibited. This closure prohibits the movement of firewood into the park from counties adjacent to the park for which a federal or state quarantine is in place even if the quarantine allows for movement within the county. See exception below. ("Buffer areas are not considered quarantined). Firewood in violation of the above shall be burned immediately by the camper in established fire rings. Failure to comply with this action may result in a citation and/or seizure of firewood. GSMNP considers firewood to be any wood cut, sold or intended for use as firewood, including chips, limbs, branches, etc. with or without bark. Kiln-dried, finished and cut lumber or lumber scraps from which the bark has been removed during the milling process and like that purchased from a hardware store or discarded at construction sites, is not considered firewood.

Exception: Firewood which is in the original packaging and is accompanied by a certificate or limited permit issued and attached in accordance with 7 C.F.R.§ 301.53-5 and 7 C.F.R.§ 301.53-8 is allowed even if purchased from a vendor in a quarantined area, or wood that has been approved for use by park administration.

This closure is intended to prevent or slow the introduction of exotic insects or diseases into the Great Smoky Mountains National Park. The emerald ash borer (EAB) has already killed tens of millions of trees in those states that have been infested. As a result, the movement of firewood within and from infested areas is regulated by the states and the federal government. The USDA has documented that a number of other harmful species can be transported in firewood.

Great Smoky Mountains National Park Firewood Alert 2014

Great Smoky Mountains National Park posted this Firewood Alert on their home page, at **http://www.nps.gov/grsm/planyourvisit/firewood-alert.htm**, to inform park visitors that it is prohibited to possess or bring firewood into the park if it originates from a quarantined area.



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Great Smoky Mountains National Park NC,TN

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Frontcountry Camping

Group Campgrounds

Horse Camps

Firewood Quarantine

Fall Colors

Fishing

There are park alerts in effect. HIDE ALERTS »

Trail Advisory

Several trails in the park are temporarily closed. Please check the "Backcountry Facilities" section of the Temporary Road and Facilities Closures page for further details. More »

Firewood Alert: Destructive Insects May Be Hitching A Ride!

The possession of firewood, whether hardwood or softwood, originating from a location for which a federal or state firewood quarantine is in effect is prohibited in Great Smoky Mountains National Park. This closure prohibits the movement of firewood into the park from counties adjacent to the park for which a federal or state quarantine is in place, even if the quarantine allows for movement within the county. **Failure to comply may result in a citation or seizure of firewood.** Please see the list of quarantined states and counties.

Firewood which is in its original packaging stamped with a USDA - APHIS - PPQ shield stating that the wood is certified under one or more sections of federal regulation 7 CFR 301 is allowed. Also firewood which is purchased from a park concessionaire is allowed.

Destructive Insect Pests

Several types of destructive insects may be hiding in firewood campers bring from outside the park. The forests of Great Smoky Mountains National Park could be devastated by these insects. To prevent this from occurring, firewood cannot be brought into the park from quarantined states or counties.

Shenandoah National Park Firewood Ban Press Release

Shenandoah National Park's February 2010 press release on the park's firewood ban educated the public and enlisted their help to slow the spread of invasive emerald ash borer in the park.

Shenandoah National Park Press Release
For Immediate Release – February 22, 2010
Contact Karen Beck-Herzog

Shenandoah National Park to Ban Outside Firewood

Beginning March 1, 2010, Shenandoah National Park will institute an Outside Firewood Ban in an attempt to slow the spread of the Emerald Ash Borer. The Emerald Ash Borer (EAB) is a destructive invasive exotic beetle that feeds on ash trees. As of 2009, the EAB is responsible for the deaths of tens of millions of ash trees throughout the Midwest and in some eastern states. Currently, the closest documented EAB infestation is in Fairfax County, Virginia, only 55 miles east of Shenandoah's northern boundary. Foresters across the state are working to control the spread of this devastating insect through quarantines, bans, and public education.

The EAB is often spread by the movement of infested firewood. Over the last several years, EAB infested firewood has been found at campgrounds, hunting camps, NASCAR events, rest stops, and picnic areas throughout the Midwest and Eastern U.S. The park's campgrounds and picnic areas are the most likely areas for EAB introduction into Shenandoah National Park. Because of the seriousness of a potential infestation, park managers are implementing the firewood ban effective March 1, 2010. The regulation will require that visitors not bring any firewood (or wood scraps) into the park. Visitors may gather dead and downed firewood in the park or purchase wood at Park Camp Stores. The park's vendor's sources have been approved and are being monitored for EAB. Additionally, visitors are encouraged to use charcoal for cooking fires.

White ash trees, comprising approximately 4% of the park's overall forest, are found in 16 forest communities that together cover 65% of the park's acreage. Given what is known about EAB infestations, an outbreak in Shenandoah National Park could lead to the loss of white ash in the park and surrounding areas. Shenandoah's managers want to avoid the same widespread devastation to the ash population that the woolly adelgid has wrought on the Eastern Hemlock.

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Pictured Rocks National Lakeshore Emerald Ash Borer Management Strategy

Pictured Rocks National Lakeshore's 2006 Emerald Ash Borer Strategy educates employees in all divisions and identifies specific tasks assigned to individual employees to reduce risks (individual names have been removed).

Pictured Rocks 2006 Emerald Ash Borer Management Strategy

August 29, 2005

N1617(PIRO)

Memorandum

To: Staff, Pictured Rocks

From: Superintendent, Pictured Rocks

Subject: Emerald Ash Borer Management Strategy – 2006

History

Emerald Ash Borer (*Agrilus planipennis*) is an exotic wood boring beetle discovered in southeast Michigan in the summer of 2002. Emerald Ash Borer (EAB) is believed to have arrived in Michigan on wood packing material from Asia 6-10 years ago. The beetle, which only attacks ash trees (*Fraxinus* sp.), is capable of killing trees of all sizes, including trees that appear to be healthy; the beetle has killed over 6 million trees in southeast Michigan to date.

To prevent and control the spread of EAB, the Michigan Department of Agriculture has quarantined 13 counties in southeast Michigan (Wayne, Washtenaw, Livingston, Oakland, Macomb, Monroe, Lenawee, Ingham, Genesee, St. Clair, Jackson, Lapeer, and Shiawassee). The quarantine prohibits the movement of ash, ash products, EAB and any species of firewood outside of the quarantined counties. The State of Michigan has also banned the transport of firewood from the Lower Peninsula into the Upper Peninsula, and has banned ash firewood from any state campground facility.

Life Cycle

EAB generally has a one year life cycle, but may require two years in colder regions. The adult EAB emerges from ash trees in May and June, leaving D-shaped exit holes in the bark. From mid-May to mid-August adults feed on ash tree leaves, mate and the females lay eggs (individually) in the bark crevices. The female can lay 60-90 eggs during her lifetime; adults live about 3-4 weeks. Eggs hatch 7-10 days after being laid and the larvae tunnel into the bark from May to August. Larvae begin feeding and tunneling in the cambium under the bark creating s-shaped galleries from August to October. The larvae overwinter under the bark and begin pupating in early April.

How EAB Damages Ash Trees

EAB kills ash trees by feeding and tunneling in the cambium, the layer of living material just under the bark that transports food and water throughout the tree. Extensive feeding in the cambium disrupts the flow of food and water which eventually girdles and kills the tree.

Firewood Use Recommendations for Pictured Rocks National Lakeshore

To reduce the potential for EAB to become established in the lakeshore, we will prohibit the import of all ash firewood effective May 1, 2006. A ban on importing ash firewood into the lakeshore is consistent with the State of Michigan Department of Agriculture and Department of Natural Resources policy.

Additionally, all imported firewood shall be burned on site. Burning all imported firewood on site will further reduce the potential of exotic insect invasions and eliminate the possibility of transferring invasive insects to other areas. This restriction is similar to that used at Tahquamenon Falls State Park.

Specific Actions Relative to Proposed Firewood Restrictions

Public Relations

1. Develop and submit news release for Munising News and Mining Journal - March 2006. (Specific employee assigned task)
2. Contact TV-6 and broadcast the policy - mid May 2006. (Specific employee assigned task)
3. Develop new signs for campgrounds - February 2006. (Specific employee assigned task)
4. Post new signs at campgrounds - April 2006. (Specific employee assigned task)
5. Inform staff at Visitor Information Center and Grand Sable Visitor Center and provide literature to distribute as necessary - May 2006. (Specific employee assigned task)
6. Place EAB notice on Lakeshore website - June 7, 2005. (Specific employee assigned task)
7. Include EAB notice in next year's interagency newspaper – February 2006
8. Collaborate with Hiawatha National Forest. (Share information on our new policy with their staff and see if they wish to jointly apply the campaign.)
9. Inform campground hosts and provide them literature to distribute to campers when they begin work - June 2006. (Specific employee assigned task) Inform seasonal rangers and provide literature to distribute to campers regarding new policy – May 2006.
10. Briefly inform campers of EAB and firewood policy during all interpretive presentations - July 2006. Specific employee assigned task)
11. Inform all staff at seasonal orientation - June 2006. . (Specific employee assigned task)
12. Inform individuals selling firewood in Munising and Grand Marais. (Specific employee assigned task) regarding lakeshore firewood policy. Obtain and create list of contact information - September-October 2005. . (Specific employee assigned task)

Continued… Pictured Rocks 2006 Emerald Ash Borer Management Strategy

Law Enforcement

1. Visually inspect firewood at campgrounds and other areas (e.g., Sand Point) during routine patrols/fee collection – year round. (Specific employee assigned task)

2. Incorporate change in firewood use in Superintendent's Compendium - January 2006. (Specific employee assigned task)

3. Assign fee schedule for not complying with new policy - January 2006. (Specific employee assigned task)

Appendix V. Regional Firewood Management Efforts

Northeast, National Capital, Southeast and Midwest Regions

The Northeast, National Capital, Southeast, and Midwest Regions of the NPS prepared the "Rapid Response to Insects, Disease, Abiotic Impacts; Procedures to Protect Forest Integrity In Units of the Nationals Park System within Eastern Forests 2010." This document provides guidance to managers of national park system units in the eastern United States on how to respond to nonnative forest insect pests and pathogens invasions. The Integrated Pest Management and rapid response information provided in this document addresses forest resource threats found in natural settings or involve character-defining features within a cultural landscape. This document can be found at: http://www.georgewright.org/1103akerson.pdf with more information at http://www.nps.gov/nero/ipm/.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NP 909/124836, June 2014

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