



# Invasive Species Science Update

Number 2, October 2008

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### **Production**

Publishing Services  
USDA Forest Service—RMRS

## Upcoming Events:

### **Minnesota Invasive Species Conference 2008:**

Acting Locally to Protect Our Legendary Lands and Waters  
Duluth Entertainment Convention Center  
October 26-28, 2008  
[www.minnesotaswcs.org](http://www.minnesotaswcs.org)

### **Washington State Weed Association**

58th Annual Weed Conference  
Yakima Convention Center  
November 5-7, 2008  
<http://www.weedconference.org/>

### **The 11th Annual Southwest Vegetation Management Association Conference**

Radisson Woodlands Hotel  
Flagstaff, AZ  
November 12-14, 2008  
<http://www.swvma.org/>

### **2008 Interagency Noxious Weed Symposium**

Oregon Invasive Species Council  
Corvallis, OR  
December 2-4, 2008  
<http://egov.oregon.gov/OISC/>

## RMRS Cross-Program Project Update: Invasive Species

**Objectives** of the Invasive Species Cross-Program project are to

- 1) identify, revise, and provide current tools developed by RMRS scientists for predicting, detecting, and monitoring invasive species;
- 2) develop educational and outreach materials to assist land managers in predicting, detecting, and monitoring invasive species; and
- 3) synthesize RMRS invasive species research activities for marketing, education, and outreach to our stakeholders and customers.

**Currently**, members of this Invasive Species Cross-Program team are spanning across RMRS Science Program Areas. For more information on the new RMRS Science Program areas, visit <http://www.fs.fed.us/rmrs/>. A complete

list of Cross-Program team members and the RMRS Invasive Species Expertise Directory will be published in our next issue.

**Current activities** include the establishment of a website that will serve as a consolidated conduit for delivering RMRS research products on invasive species to our stakeholders and customers. We plan to launch this website within the next 6 months. Also, we are preparing an RMRS Invasive Species Research Visionary White Paper that will describe and synthesize current RMRS research activities on invasive species across multiple taxa. This visionary paper will be targeted to a diverse audience, including the RMRS Leadership Team, WO National Program Leaders, FS scientists, collaborators, and other users.

### **Wildfires and Invasive Plants in American Deserts**

The Grand Sierra Resort and Casino  
Reno, Nevada  
December 9-11, 2008  
<http://www.rangelands.org/deserts/>  
Registration is limited to 300 attendees.

### **61st Annual Conference**

California Weed Science Society  
"Lowering the Boom on Weeds"  
January 12-14, 2009  
Sacramento, CA 95815  
<http://www.cwss.org/conference.htm>

### **Montana Weed Control Association**

52nd Annual Conference  
"Getting it Done in the Real World"  
Billings, MT  
January 13-15, 2009  
<http://www.mtweed.org/annualconference.html>

### **Wyoming Weed Management Association**

3rd Annual Conference  
Casper, WY  
January 20-22, 2009  
<http://www.wyweedmgmt.org/Home/tabid/512/Default.aspx>

### **Idaho Weed Control Association**

8th Annual Idaho Weed Conference  
Nampa, ID  
January 28-29, 2009  
<http://idahoweedcontrol.org/weedconference.html>



# From the Newsletter Editor

Mee-Sook and I received several favorable comments regarding the first issue of the Invasive Species Science Update. In true Government form, the newsletter is now often referenced by the acronym ISSU. So, this is the second issue of ISSU. The staff of RMRS Publishing Services deserves considerable credit for making the first issue of ISSU a success. Mee-Sook and I made a valiant attempt at putting the first issue in an attractive and readable format, but our efforts did not come close

to the quality of the final document that came from Publishing Services. For this issue, the contributions of Carolyn Hull Sieg, Jane Kapler Smith, Dean Pearson, Anna Schoettle, Jose Negron, and Kerry Overton are much appreciated. We are still very interested in receiving suggestions for improving the ISSU, especially from managers. Don't be bashful about sending your comments directly to me or Mee-Sook.

As many may know, Durant McArthur, our Grassland, Shrubland, and Desert Ecosystems Program Manager, is retiring in November. Durant's leadership was instrumental in developing and launching the Cross-Program Project on Invasive Species in 2008 and in helping us maintain momentum into 2009. We greatly appreciate his guidance and support.

—Jack Butler

## Science Notes

### Fire Effects on Invasive Species

**“High severity wildfire aids spread of Dalmatian toadflax.”** By Carolyn Hull Sieg, Research Plant Ecologist, Southwest Forest Science Complex, Flagstaff, AZ; (928) 556-2151, [csieg@fs.fed.us](mailto:csieg@fs.fed.us).

Concerns over severe wildfire and non-native species invasion are increasingly common in dry coniferous forests worldwide. Fire occurrence and severity have increased in some forest types with climate and fuel changes in recent decades. Large stand-replacing wildfires can leave behind areas of exposed mineral soil that are quickly colonized by opportunistic plant species. Some of these early colonizers are non-native species—of which a subset can be highly invasive in disturbed environments. Dalmatian toadflax (*Linaria dalmatica*), introduced as an ornamental plant from the Mediterranean region, is becoming prominent along roadsides and other disturbed areas in this region. When the 2001 Leroux Fire burned through an existing population of Dalmatian toadflax, land managers were unsure if they should attempt to control the spread of this species, and if so, how to identify priority treatment areas. This study was designed to explore how fire severity and toadflax plant density influence post-wildfire spread of Dalmatian toadflax in northern Arizona (Dodge and others 2008). We measured toadflax density, cover, and flowering stalks on 327

permanent plots for three years. The plots encompassed four burn severity levels and four toadflax plant density levels. Dalmatian toadflax growth and reproduction were strongly related to burn severity and were greatest in high severity areas. Toadflax plant density increased initially following the fire, especially in lower density plots, and then declined within high density plots after reaching a critical density. Three years after the wildfire, high severity burn areas had lower native plant species richness than low burn severity areas. Thus, in the short term, post-wildfire conditions in severely burned areas tend to favor persistence of Dalmatian toadflax at the expense of native species. Our results indicate that severe fire may facilitate Dalmatian toadflax spread in the first two years after fire, and that control efforts should be focused on high and moderate burn severity areas, with emphasis on patches of low-density populations. Land managers are using this information to develop post-fire management plans following wildfires and pre-fire treatment strategies in areas designated to be prescribed burned. For more information, see Dodge and others 2008 listed in “Publication News” at the end of this newsletter.

**“Fire and Nonnative Invasive Plants delivers comprehensive literature review.”** By Jane Kapler Smith, Ecologist, Fire Sciences Laboratory, Missoula, MT; (406) 329-4805, [jsmith09@fs.fed.us](mailto:jsmith09@fs.fed.us).

*Fire and Nonnative Invasive Plants* reviews current knowledge nation-wide regarding fire effects on nonnative

invasive plant species, effects of nonnative invasives on fire regimes, and use of fire to control these species. This General Technical Report is now available on TreeSearch ([www.treesearch.fs.fed.us/pubs/30622](http://www.treesearch.fs.fed.us/pubs/30622)) and the Rocky Mountain Research Station publications website ([www.fs.fed.us/rm/pubs/rmrs\\_gtr042\\_6.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr042_6.html)). Delivery of hard copies is expected by the end of the year. *Fire and Nonnative Invasive Plants* synthesizes the literature and summarizes emerging issues about fire and invasive plants for all geographic regions of the United States, including Hawaii and Alaska. With 16 chapters and 25 authors, this publication is the only comprehensive treatment of fire and invasives for the United States. Technical Editors are Kristin Zouhar, Jane Kapler Smith, Steve Sutherland (all from RMRS) and Matt Brooks (USGS). Zouhar, Smith, and Sutherland authored or co-authored 9 of the 16 chapters. For more information, see Zouhar and others 2008 listed in “Publication News” at the end of this newsletter.



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**“Effects of fire severity and pre-fire stand treatment on plant community recovery after a large wildfire.”** By Carolyn Hull Sieg, Research Plant Ecologist, Southwest Forest Science Complex, Flagstaff, AZ; (928) 556-2151, csieg@fs.fed.us.

Increasing numbers of large wildfires in western U.S. forests in recent decades have raised concerns about long-term ecological consequences. In addition to the loss of timber and increased soil erosion, large wildfires may greatly alter post-fire plant communities. Especially severely burned areas can provide habitat conditions for a number of colonizing species, including some highly invasive non-native species. However, post-fire seeding intended to reduce soil erosion in severely burned areas may also introduce non-native species either intentionally or unintentionally as seed contaminants. Even some annual species, such as wheat, seeded to provide quick but non-lasting cover, may persist for many years. The Rodeo-Chediski Fire is the largest and most severe wildfire on record in the Southwest. It burned approximately 469,000 acres in 2002,

leaving a mosaic pattern of burn severity on approximately 281,000 acres of White Mountain Apache tribal land. We investigated the effect of the pre-fire forest management and fire severity on plant community recovery after the Rodeo-Chediski Fire (Kuenzi and others 2008). We randomly selected 24 study sites within combinations of two levels of fire severity (low and high) and two types of pre-fire forest management practices (treated [cut and burned within 11 years before the fire] and untreated). High severity areas of the fire were seeded with a mixture of mostly native grasses plus wheat. We sampled plant canopy cover and species richness on the four fire severity/treatment combinations two and three years after the fire. We found that severely burned areas, regardless of previous forest treatments, were characterized by high plant canopy cover of mostly colonizing species compared to low severity burn areas. However, cover of non-native plant species was not higher on severely burned areas compared to low severity

areas, and wheat seeded after the fire had mostly disappeared two years later. Non-native species present three years post-burn included a number of grasses seeded both before and after the fire. The remaining non-native species were mostly colonizing species common after disturbances in our region. Some highly invasive non-native species, such as cheatgrass, were present but in low abundance. Whether population levels of particularly invasive species remain at the low levels we observed can only be addressed by continuing to monitor these sites. Land managers are using these results in assessing fire-related impacts, designing post-fire rehabilitation practices, and better understanding how past management practices such as cutting, burning, and seeding, influenced both fire severity and post-fire plant community recovery. For more information, see Kuenzi and others 2008 listed in “Publication News” at the end of this newsletter.

## Biological Control of Invasive Plants

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**“Understanding the side effects of classical biological control.”** By Dean Pearson, Research Ecologist, Forestry Sciences Laboratory, Missoula, MT; (406) 542-4159, dpearson@fs.fed.us.

Classical biological control involves the use of imported natural enemies to suppress or control populations of the target pest species below an economically or ecologically relevant threshold. Biological control is a useful tool for mitigating the impacts of exotic invasive plants; however, its application is not without risk (see Carruthers and D’Antonio 2005, and articles contained in this special issue). Research by me and my colleagues has demonstrated that gallfly biological control agents introduced for spotted knapweed control have several unintended impacts on nontarget species. Our early work found that native deer mice readily consumed gallfly larvae that overwinter in spotted knapweed seedheads and that the superabundance and timing of this exotic food resource can double or triple deer mouse populations (Pearson and others

2000, Ortega and others 2004). Gallfly subsidies to deer mice have since been correlated with a three-fold increase in Sin Nombre hantavirus in deer mouse populations (Pearson and Callaway 2006), a virus that can cause the deadly hantavirus pulmonary syndrome in humans. Most recently, gallfly subsidies to deer mice have been linked to reductions in recruitment of important native forbs through increased predation on seeds (Pearson and Callaway 2008). In this context, biocontrol agents are negatively impacting the very plants they were intended to help (to hear an ESA science podcast of this work, go to <http://www.esa.org/podcast/>). In an effort to mitigate these negative side effects, we show that herbicide treatment of spotted knapweed can return mouse populations to normal levels by removing the biocontrol food resource (Pearson and Fletcher 2008). However, the real solution to avoiding negative side effects lies in preventing them in the first place. Our research shows that even when biocontrol agents are host-

specific (i.e., they do not directly attack unintended species), they can still have substantial nontarget effects through food web interactions (Pearson and Callaway 2003). The solution to this problem is more effective biocontrol agents. Nontarget effects of biological control agents due to food web interactions will likely be biologically unimportant if the agent is not abundant. Successful agents that control the target species will reduce their own populations by eating themselves out of house and home, thus minimizing the potential for nontarget effects (Pearson and Callaway 2005). Consequently, selecting more effective agents both improves weed control and increases safety. For more information, the articles cited above can be found at <http://www.fs.fed.us/rm/wildlife/invasives/> and at Carruthers, R. I.; D’Antonio, C.M. 2005. Special issue introduction—Science and decision making in biological control of weeds: Benefits and risks of biological control. *Biological Control* 35:181-182.

# Introducing Two New Research Entomologists at the Bozeman Forestry Sciences Laboratory

Durant McArthur, Grassland, Shrubland, and Desert Ecosystem Program Manager, announces the filling of two Research Entomologist positions at the Bozeman Forestry Sciences Laboratory. Sharlene Sing and Justin Runyon started their new jobs on September 2, 2008.

## Sharlene Sing

(M.S., Natural Resource Sciences—McGill University, Montreal QC) focused on biological control of stored products pests with solo or combined predator and parasitoid treatments using individuals drawn from known insecticide-resistant or -susceptible populations. Her doctoral research (Land Resources and Environmental Sciences—Montana State University, Bozeman, MT) investigated



spatial interactions, in terms of relative resource use, of crop and weed hosts by a field crop pest under typical on-farm dryland wheat production conditions. Sharlene joined RMRS as a post-doctoral researcher immediately after completing her doctorate, developing methods for evaluating and optimizing weed biological control on fire affected areas. She worked on similar projects, both with university and state and federal land management agency collaborators, through a 2.5 year appointment as an Assistant Research Professor at MSU—LRES. Her current research focuses on the identification, evaluation and approval of potential new agents for yellow toadflax biocontrol, and on the implications of hybridization

of yellow and Dalmatian toadflax on toadflax biocontrol efficacy. Sharlene can be reached through [ssing@fs.fed.us](mailto:ssing@fs.fed.us), or (406) 994-5143. Select publications include:

- Sing, S. E.; Weaver, D. K.; Nowierski, R. M.; Markin, G. P. 2007. Long-term field evaluation of *Mecinus janthinus* releases against Dalmatian toadflax in Montana (USA). Proceedings of the XII International Symposium on Biological Control of Weeds, April 22-27, 2007. La Grande Motte, France.
- Sing, S. E.; Peterson, R. K. D.; Weaver, D. K.; Hansen, R. W.; Markin, G. P. 2005. A retrospective analysis of known and potential risks associated with exotic toadflax-feeding insects. *Biological Control* 35:276-287.

## Justin Runyon

received his M.S. in Entomology from Montana State University, and his Ph.D. in Entomology from The Pennsylvania State University. Justin held the position of Research Associate at Montana State University for two years after



completing his M.S. Justin's doctoral research, partially supported by a National Science Foundation Dissertation Enhancement Grant, investigated the chemical ecology of interactions involving an invasive parasitic plant (dodder), its host plants, and insect herbivores. This research examined how plants deal with simultaneous attack by disparate organisms, the plant defenses induced by attack from other plants, and the chemical signals underlying plant-plant interactions. Justin can be reached

through [jrunyon@fs.fed.us](mailto:jrunyon@fs.fed.us), or (406) 994-4872. Select publications include:

- Runyon, J. B.; Mescher, M. C.; DeMoraes, C. M. 2008. Parasitism by *Cuscuta pentagona* attenuates host plant defense of insect herbivores. *Plant Physiology*, published online December 28, 2007.
- Runyon, J. B.; Mescher, M. C.; DeMoraes, C. M. 2006. Volatile chemical cues guide host location and host selection by parasitic plants. *Science* 313:1964-1967.

## Outreach Activities

### The High Elevation White Pines

website. Submitted by Anna Schoettle, Research Plant Ecophysiologicalist, Rocky Mountain Research Station, Ft. Collins, CO; (970) 498-1333, [aschoettle@fs.fed.us](mailto:aschoettle@fs.fed.us)

The *High Elevation White Pines* website, now online, provides information on high elevation white pines of western North America, their ecosystems and the factors that threaten them. The five pine species included are: whitebark,

Rocky Mountain bristlecone, Great Basin bristlecone, foxtail and limber pine. Threats that are discussed include white pine blister rust, bark beetles, climate change, fire exclusion, dwarf mistletoe and other natural stressors. This resource has been designed to be accessible to high school and college students as well as the general public. It can also serve as a primer for forestry and conservation professionals. The site provides numerous photographs that can

be downloaded. <http://www.fs.fed.us/rm/highellevationwhitepines/>

Development of the website was a collaborative effort of numerous people, spearheaded by USDA Forest Service Rocky Mountain Research Station. It was developed with funding from the Station's Conservation Education Program. For more information, contact Anna Schoettle.



## New Invasives Alert!



Sickleweed (Apiaceae: *Falcaria vulgaris* Bernh.) is native to the European part of the former Soviet Union, the Caucasus, Western Siberia, and Central Asia where the species is sometimes described as a weed infesting perennial grasslands, cultivated fields, and roadsides ([http://www.agroatlas.spb.ru/weeds/Falcaria\\_vulgaris\\_en.htm](http://www.agroatlas.spb.ru/weeds/Falcaria_vulgaris_en.htm)). In the United States, sickleweed has been recorded in 16 states (<http://plants.usda.gov>) including SD, WY, NE, KS, and OK. Sickleweed was first recorded in South Dakota in 1964 but has only recently become invasive. It now infests about 2500 acres of the Ft. Pierre National Grasslands (FPNG) in South Dakota where it forms a dense monoculture adversely impacting diversity and productivity. More recently, infestations have been found on the Wall Ranger District of the Buffalo Gap National Grasslands. Efforts by managers to control sickleweed have centered on using herbicides (Dupont™, Telar® XP @ ¼ oz./acre). Scientists at the Forest and Grassland Research Laboratory in Rapid City,

SD, are working with FPNG managers to monitor the landscape efficacy and secondary impacts of the herbicide. Permanent plots were established and evaluated pre- (late spring) and post-treatment (early summer) for 2007 and 2008. Post-treatment evaluations for 2007 showed a 100% top-kill; however, sickleweed recovered by the late spring of 2008 but at much lower densities with lower foliar cover and plot frequency values, suggesting that successive treatments may be required.

Sickleweed is biannual but is able to develop as a perennial. Individual plants are typically 30-60 cm tall



with a white flowered, compound umbel inflorescence. Leaf segments are linear or linear lanceolate with gristly acuminate denticles along the edges. Very little is known about the general biology and ecology of sickleweed. RMRS scientist Jack Butler is collaborating with South Dakota State University Professor of Biology Gary Larson and Graduate Student Brian Korman to determine the abundance, distribution, and ecological impact of sickleweed on the FPNG. They will also be evaluating the germination requirements of sickleweed and its response to clipping treatments. For more information, contact Jack Butler ([jackbutler@fs.fed.us](mailto:jackbutler@fs.fed.us)), Gary Larson ([Gary\\_Larson@sdstate.edu](mailto:Gary_Larson@sdstate.edu)) or Brian Korman ([bkorman@jacks.sdstate.edu](mailto:bkorman@jacks.sdstate.edu)).

### Outreach Activities cont.

**Invasive Bark Beetles, Forest Insect & Disease Leaflet 176**, by J.C. Lee, R.A. Haack, J.F. Negron, J.J. Witcosky, and S.J. Seybold. Submitted by Jose Negron, Research Entomologist, Rocky Mountain Research Station, Ft. Collins, CO; (970) 498-1252, [jnegron@fs.fed.us](mailto:jnegron@fs.fed.us) [http://na.fs.fed.us/pubs/fidls/invasive\\_bark\\_beetles/inv\\_bark\\_beetles.pdf](http://na.fs.fed.us/pubs/fidls/invasive_bark_beetles/inv_bark_beetles.pdf)

**Aquatic Invasive Species Newsletter**—Nutshell, US Environmental Protection Agency, Region 10. Submitted by Kerry Overton, Fisheries Tech Transfer Specialist, Aquatic Sciences Laboratory, Boise, ID; (208) 373-4357. <http://yosemite.epa.gov/r10/ECOCOMM.NSF/Invasive+Species/Document-Library>

**Newsletter of the Pacific Northwest Aquatic Monitoring Partnership.** Submitted by Kerry Overton. [http://www.pnamp.org/web/workgroups/AIS/documents/General/2008\\_0908PNAMPPursuitsInvasivesNewsletter.pdf](http://www.pnamp.org/web/workgroups/AIS/documents/General/2008_0908PNAMPPursuitsInvasivesNewsletter.pdf)

**Minnesota Invasive Species Conference 2008: Acting Locally to Protect Our Legendary Lands and Waters.** October 26-28, 2008, Duluth Entertainment Convention Center.

This first annual statewide conference on invasive species will be held in Duluth, MN, to encourage exchanges of information on topics relating to both aquatic and terrestrial invasive species. The conference is designed to strengthen awareness of invasive species issues, as well as promoting prevention and management activities. If you're a researcher, land manager, natural resource professional, university staff person, landscaper, nursery manager, agricultural or forestry employee, environmental specialist, lake association member, or agency and non-governmental organization member, this conference is for you! On Sunday, the pre-conference workshops are designed for private landowners and service providers. Again both aquatic

and terrestrial invasive species will be covered with the emphasis on practical prevention and management practices. Home, cabin and woodland owners interested in protecting their tree and forest resources, service providers and educators working with private landowners, tree care advisors, master gardeners, foresters and arborists will want to take advantage of the offering. Conference hosts include the Minnesota Invasive Species Council, Minnesota Chapter of the Soil and Water Conservation Society, and Minnesota Sea Grant. For more information, visit [www.minnesotaswcs.org](http://www.minnesotaswcs.org).



# Ask The Expert



**Q:** What is the difference between a noxious weed and an invasive species?  
Submitted by Sarah Harrleson, Biological Sciences Technician, Forest and Grassland Research Laboratory, Rapid City, SD.

**A:** Noxious weeds are legally defined in section 403 of the Plant Protection Act U.S.C. 7702(10) as “any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health,

or the environment.” Federal, state, and local government agencies have developed lists of noxious weeds, often with specific legal mandates for controlling them. Invasive species, on the other hand, are defined more generically by Executive Order 13112 as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” Conceptually, all noxious weeds are invasive; however, not all invasive plants are legally defined as noxious weeds. Executive Order 13112 does provide language for addressing invasive plants before they can cause economic or environmental harm or harm to human health, i.e., before they meet the legal definition of a noxious weed. A good place to start for finding information on noxious weeds and/or invasive plants in your area is the USDA Plants Database: <http://plants.usda.gov/java/noxiousDriver>.

Please submit your “Ask the Expert” questions to Mee-Sook ([mkim@fs.fed.us](mailto:mkim@fs.fed.us)).

## PUBLICATION NEWS

Belote, R. T.; Jones, R. H.; Hood, S.

M.; Wender, B. W. 2008. Diversity-invasibility across an experimental disturbance gradient in Appalachian forests. *Ecology* 89:183-192.

Dodge, R. S.; Fulé, P. Z.; Sieg, C. H. 2008. Dalmatian toadflax (*Linaria dalmatica*) response to wildfire in a southwestern USA forest. *Ecoscience* 15:213-222.

Ferguson, D. E.; Craig, C. L.; Schneider, K. Z. 2007. Spotted Knapweed (*Centaurea biebersteinii* DC) Response to Forest Wildfires on the Bitterroot National Forest, Montana. *Northwest Science* 81(2):138-146.

Kuenzi, A. M.; Fulé, P. Z.; Sieg, C. H. 2008. Effects of fire severity and pre-fire stand treatment on plant community recovery after a large wildfire. *Forest Ecology and Management* 255:855-865.

Pearson, D. E.; Callaway, R. M. 2008. Weed biocontrol insects reduce native plant recruitment through second-order apparent competition. *Ecological Applications* 18:1489-1500.

Samuel, L. W.; Kirby, D. R.; Norland, J. E.; Anderson, G. E. 2008. Leafy spurge suppression by flea beetles in the Little Missouri Drainage Basin, USA. *Rangeland Ecology and Management* 61:437-443.

Schoettle, A. W.; Burns, K. S.; Costello, S.; Witcosky, J.; Howell, B.; Connor, J. 2008. A race against beetles: Conservation of limber pine. *Nutcracker Notes* 14:11-12.

Schoettle, A. W.; Sniezko, R. A.; Burns, K. S.; Freeman, F. 2007. Preparing the landscape for invasion – Early intervention approaches for threatened high elevation white pine ecosystems. In: Goheen, E. M.; Sniezko, R. A., tech. coords. Proceedings of the conference Whitebark Pine: A Pacific Coast Perspective; 2006 August 27-31; Ashland, OR. R6-NR-FHP-2007-01. Portland, OR: Forest Service, US Department of Agriculture, Forest Service, Pacific Northwest Region: 72-75.

Zouhar, K.; Smith, J. K.; Sutherland, S.; Brooks, M. L. 2008. Wildland fire in ecosystems: fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 355 p.

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