Rocky Mountain Research Station

Invasive Species Science Update

Number 4, September 2010

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Production

Publishing Services
USDA Forest Service—RMRS

Upcoming Events: Oct 2010-Dec 2010

Potential Invasive Pests Workshop. October 11-14, 2010, Miami, FL. (http://www.conference.ifas.ufl.edu/TSTAR/)

58th Western International Forest Disease Work Conference. October 4-8, 2010, Valemont, British Columbia, Canada. (http://www.fs.fed.us/foresthealth/technology/wif/)

Entomological Society of America's 58th Annual Meeting. December 12-15, 2010, San Diego, CA. (http://www.entsoc.org/am/fm/2010/index.htm)

Recent Events:

Idaho Weed Conference. February 3-4, 2010, Best Western Burley Inn, Burley, ID. (http://idahoweedcontrol.org/weedconference.html)

Joint Annual Meeting of the Society for Range Management and the Weed Science Society of America. February 7-11, 2010, Sheraton Denver Downtown Hotel, Denver, CO.

2010 Western Society of Weed Science Annual Meeting. March 8-11, 2010, Waikoloa Beach Marriott, Waikoloa, HI. (http://www.wsweedscience.org/default.asp)

Florida Exotic Pest Pest Council (EPPC) 25th Annual Symposium—Changes in Latitude. April 5-8, 2010, The Plantation Golf Resort and Spa, Crystal River, FL. (http://www.fleppc.org/Symposium/2010/)

8th Annual Alabama Invasive Plant Council Conference. April 21, 2010, Auburn University Hotel and Conference Center, Auburn, AL. (http://www.se-eppc.org/alabama/)

2010 Joint Meeting of Southeast Exotic Pest Plant Council and the Southeast Chapter of the Society for Ecological Restoration International—Disturbance and Change, Invasive Plants and Paths to Recovery. May 11-13, 2010, Chattanooga, TN. (http://www.se-eppc.org/2010/)

Weeds Across Borders 2010—Plant Invasions, Policies and Politics. June 1-4, 2010, National Conservation Training Center, Shepherdstown, WV. (http://www.weedcenter.org/wab2010/)

International Symposium on Genetic Biocontrol of Invasive Fish. June 21-24, 2010, Minneapolis, MN. (http://www.seagrant.umn.edu/ais/biocontrol)

High-Five Symposium—The Future of High-Elevation Five-Needle White Pines in Western North America. June 28-30, 2010, The University of Montana Campus, Missoula, MT. (http://www.whitebarkfound.org/images/Date-saver-info.gif)

24th International Congress for Conservation Biology—Conservation for a Changing Planet. July 3-7, 2010, Edmonton, Alberta, Canada. (http://www.conbio.org/activities/meetings/2010/)

Oklahoma Invasive Plant Council 2010 Annual Meeting. July 14, 2010, Oklahoma State University, Oklahoma City, OK. (http://www.ok-invasive-plant-council.org/annualmeeting.html)

From the Newsletter Editors

The fourth issue of *Invasive Species Science Update* has finally arrived. This newsletter has no set publication schedule, but our intent is to deliver invasive species information on a timely basis. The RMRS Invasive Species Working Group (ISWG) has been reorganized and recharged. General information on the ISWG is presented in a publication by Butler and others (2009). In the near future, the ISWG plans to publish a more detailed document to summarize RMRS invasive species research activities related to multiple taxa. This issue presents many exciting research and outreach activities associated with a variety of invasive species. Contact information is provided with each summary for more information. RMRS scientists and professionals are ready and willing to help with your invasive species needs. We are still interested in suggestions for improving this newsletter, especially from managers and other users. Please send your comments directly to Brian or Ned. Thanks to Mee-Sook Kim, who helped establish this newsletter and continues to help in the publication process.

Science Notes

History, Biology, and Management of White Pine Blister Rust

Submitted by Brian Geils, Research Plant Pathologist, Flagstaff, AZ, 928-556-2076, bgeils@fs.fed.us

The August issue of *Forest Pathology* provides a comprehensive synthesis of management strategies and practices to identify, protect, and sustain ecosystems threatened by white pine blister rust.

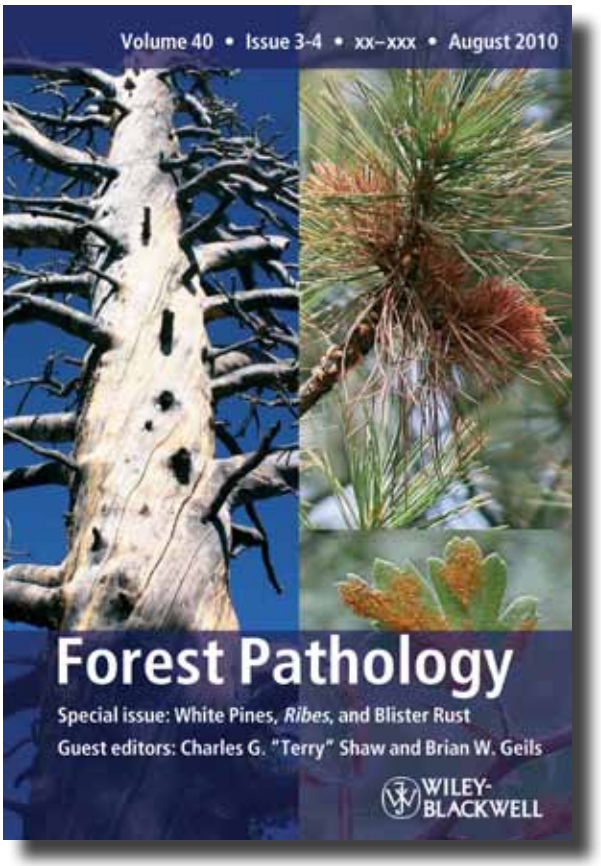

Figure 1—The August 2010 issue of *Forest Pathology* reviews the scientific literature on white pines, *Ribes*, and their associated blister rust fungi.

For more than a century, *Cronartium ribicola* has been one of the most important invasive species in North America. This fungal pathogen alternately infects white pines and *Ribes* (currants and gooseberries) and causes white pine blister rust. Losses from the disease and its control lead to serious reductions in white pines and *Ribes* and have significantly altered the ecology and economy of infested regions. Early controls included quarantines, eradication of introduced commercial and native *Ribes*, biocides, antagonistic fungi, and other cultural and genetic techniques. Several reports published in the last few years have warned of the perils that threaten white pines and have called for their conservation and restoration by active intervention and genetic programs to increase disease resistance. What has been lacking, however, is a critical literature review of the history, biology, and management of white pine blister rust and an assessment of past controls and prospects for new approaches.

Scientists of the RMRS have contributed to publication of a review and synthesis on white pines, *Ribes*, and blister rust in *Forest Pathology* (Shaw 2010). Richard Hunt, Pacific Forestry Centre; Kim Hummer, Agriculture Research Service; and Brian Geils, RMRS, organized preparation of this special issue; Charles G. Shaw, now Pacific Northwest Research Station but formerly RMRS, served as senior journal editor. RMRS scientists contributed to five key articles. Brian Geils reviewed the history and biology of *C. ribicola* (Geils and others 2010) and coauthored the concluding integration article (Hunt and others 2010). Mee-Sook Kim and Ned Klopfenstein compared white pine blister rusts in eastern Asia and described the rusts' implications for North America (Kim and others 2010). Bryce Richardson and Ned Klopfenstein surveyed molecular approaches for investigating host and pathogen phylogenies and interactions (Richardson and others 2010a). Paul Zambino wrote a detailed summary of the *Ribes* and other native hosts in North America (Zambino 2010). Other articles assessed status, threats, and conservation strategies for host species and described cultural and genetic approaches for sustaining populations challenged by invasive forest species. Together, the 12 articles provide an informed synthesis on the ecology and coevolution of the white pine blister rust pathosystem and on the challenges to maintaining productive and resilient white pine ecosystems in an uncertain and changing climate.

Figure 2a—High-elevation white pine (*Pinus pumila*) in Japan.

Search for the Evolutionary Origin of the White Pine Blister Rust Pathogen Introduced into North America a Century Ago

Submitted by Bryce Richardson, Research Geneticist, Provo, UT, 801-356-5112, brichardson02@fs.fed.us; Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us; and Ned Klopfenstein, Research Plant Pathologist, Moscow, ID, 208-883-2310, nklopfenstein@fs.fed.us

Since *Cronartium ribicola* was introduced to North America early last century, forest pathologists and geneticists have searched for the evolutionary and geographic source of the invasive pathogen, which causes the disease white pine blister rust. Knowing the source of an invasive pathogen helps to prevent future introductions, determine mechanisms of disease resistance in the host tree populations, identify potential biological control agents, and develop appropriate regulatory practices and methods to predict risks of related species. Because pathogens typically cause only minimal damage in the geographic area of their origin, such areas can provide insights for managing forests to prevent or mitigate impacts. Studies are underway to examine genetic relationships among geographic sources of the stem rust fungi that cause white pine blister rust (Richardson and others 2010b).

Figure 2b—Surveys for white pine blister rust on *Pedicularis* sp. in Japan.

Genetic Conservation of White Pines Threatened by White Pine Blister Rust

Submitted by Bryce Richardson, Research Plant Geneticist, Provo, UT, 801-356-5112, brichardson02@fs.fed.us; Anna Schoettle, Research Plant Physiologist, Fort Collins, CO, 970-498-1333, aschoettle@fs.fed.us; Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us; and Brian Geils, Research Plant Pathologist, 928-556-2076, bgeils@fs.fed.us

Figure 3a—Collection of western white pine samples for analysis of population genetics.

Genetic conservation is an important strategy for sustaining white pines threatened by white pine blister rust and other stressors. RMRS scientists and cooperators are developing and applying molecular and quantitative tools for investigating genetic diversity, correlations among adaptive traits, and disease resistance in several species of white pines. Mee-Sook Kim and others (in press) examined the range-wide genetic diversity of western white pine (*Pinus monticola*) populations across the western United States. In related studies, Bryce Richardson and others (2009) demonstrated that spatial patterns of western white pine derived from molecular and quantitative genetic data were congruent with regional climates. Anna Schoettle and others have developed genetic conservation strategies for limber pine (*P. flexilis*) threatened by white pine blister rust, mountain pine beetle, and climate change (Schoettle and others 2009). In addition to screening families and populations of limber pine and Rocky Mountain bristlecone pine (*P. aristata*) for blister rust resistance and conducting adaptive traits studies, Schoettle and others are completing a range-wide seed collection of Rocky Mountain bristlecone pine. Brian Geils and others are collaborating with Detlev Vogler (Pacific Southwest

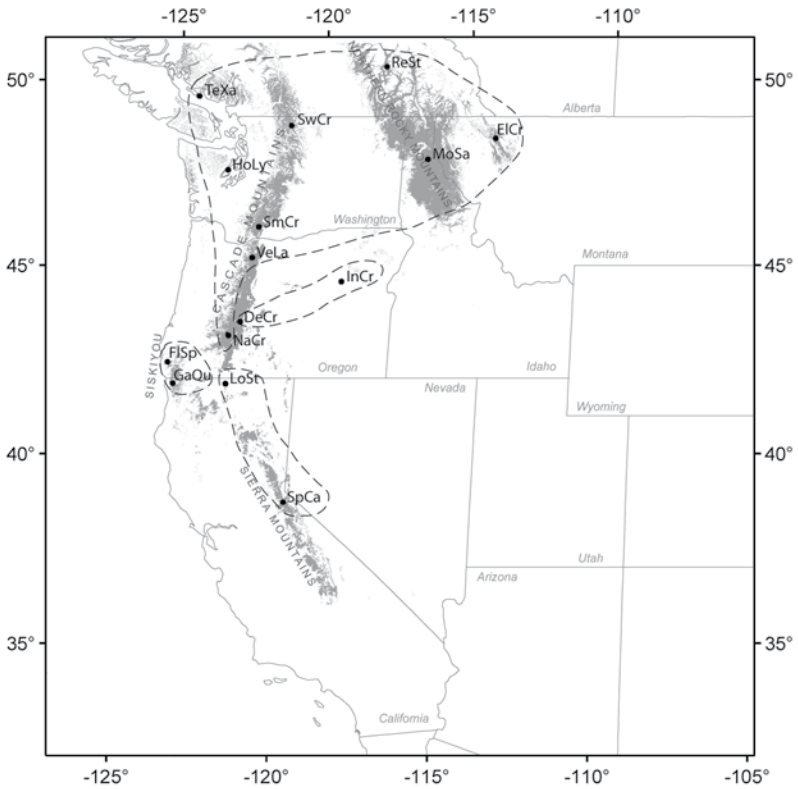

Figure 3b—Grouping of western white pine populations based on genetic marker phenotypes.

Research Station [PSW]) for resistance testing of southwestern white pine (*P. flexilis* var. *reflexa*) and Great Basin bristlecone pine (*P. longaeva*). Testing of these white pines by Annette Delfino-Mix (PSW) has revealed several resistance mechanisms, including a hypersensitive needle reaction and a robust bark reaction. Scientists are investigating whether resistance to the invasive blister rust pathogen resulted from natural selection for resistance to native pathogens.

Progress Toward Predicting Potential Invasive Root-Disease Pathogens

Submitted by Ned Klopfenstein, Research Plant Pathologist, Moscow, ID, 208-883-2310, nklopfenstein@fs.fed.us; John Hanna, Biological Science Laboratory Technician, Moscow, ID, 308-883-2347, jhanna@fs.fed.us; and Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us

Armillaria root disease is caused by fungal pathogens in the genus *Armillaria*. These pathogens have a worldwide distribution and can infect most woody plant species. Although many geographic areas possess native *Armillaria* pathogens, movement of these pathogens to new geographic areas poses an invasive pathogen risk. National and international collaborations with RMRS researchers are providing a framework to address invasive forest pathogens. DNA-based diagnostics are first used to identify *Armillaria* species in specific areas. RMRS scientists have used DNA-based diagnostics to identify *Armillaria* and other pathogens in Mexico (Cannon and others 2008; Kim and others 2010), Hawaii (Hanna and others 2007), and Alaska (Klopfenstein and others 2009b). These surveys will provide baseline information for managing other potentially invasive *Armillaria* pathogens.

Bioclimatic modeling is then applied to identify which areas have a suitable climate for each *Armillaria* pathogen. New approaches are being developed to identify areas with a projected suitable climate for these pathogens under various climate-change scenarios (Klopfenstein and others 2009a). Identifications will become more refined as the present distribution of *Armillaria* species becomes better documented.

Figure 4b—An Armillaria root disease pathogen was collected from willow growing near the Arctic Circle in Alaska.

Genetic Relationships Among Populations of Invasive Guava Rust

Submitted by Amy Ross-Davis, RMRS Collaborator, Moscow, ID, 208-883-2389, arossdavis@fs.fed.us; Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us; and Ned Klopfenstein, Research Plant Pathologist, Moscow, ID, 208-883-2310, nklopfenstein@fs.fed.us

Guava rust (*Puccinia psidii*) has recently generated serious concern in several regions around the world. In Hawaii, guava rust poses a severe threat to trees of the Myrtaceae family that comprise nearly 80 percent of native forests. Because this pathogen also infests eucalypts, its potential damage could spread nearly worldwide. Scientists from Universidade Federal de Viçosa (Viçosa, Brazil), Washington State University, the University of Hawaii, Forest Health Protection—Region 5, and RMRS are examining the population genetic structure of guava rust in Brazil (its putative origin) and other infested countries. The principal goal of this project is to identify which guava rust populations pose specific threat to native forests of Hawaii and eucalypt forests worldwide (Graca and others 2010).

Figure 4a—The southern-most stand of Douglas-fir was surveyed for Armillaria root-disease pathogens in Oaxaca, Mexico.

Figure 4c—Surveys for Armillaria root disease in Hawaii.

Figure 5a—Invasive guava rust (*Puccinia psidii*) infecting rose apple (*Syzigium jambos*) in Hawaii. Photo by Forest Starr and Kim Starr; http://hear.org.

Figure 5b—Widespread mortality of rose apple caused by guava rust in Hawaii. Photo by Forest Starr and Kim Starr; http://hear.org.

New Pest Alert: The Green Alder Sawfly

Submitted by Justin Runyon, Research Entomologist, Bozeman, MT, 406-994-4872, jrunyon@fs.fed.us

A new invasive insect, the green alder sawfly (*Monsoma pulveratum*), was positively identified for the first time in the United States from collections made in Alaska in 2009. Subsequently, the sawfly was found in Washington State along the Columbia River. The green alder sawfly is native to Eurasia and North Africa, where it feeds on European black alder.

When discovered in Alaska, the sawflies were defoliating thin-leaf alder. Adults emerge early in the spring (they are active by early April in Washington State and mid-May in Alaska) and lay eggs into newly expanding alder leaves. The green larvae emerge within two weeks and begin feeding; larvae are capable of completely defoliating thin-leaf alder. The potential impact and spread of this sawfly is not known, but it poses a potential threat to riparian areas throughout the western United States.

Sawflies are related to bees and wasps (Hymenoptera), but they can be distinguished by the broad connection between the thorax and abdomen and the caterpillar-like larvae. The common name, *sawfly*, is derived from the ovipositor that resembles a saw blade and is used by females to "saw" into plants in order to lay eggs. If you see this insect, please contact your State or Federal forest health specialist. For more information see: http://www.fs.fed.us/r10/spf/fhp/pubs/MonsomaPestAlert.pdf.

Figure 6a—Green alder sawfly (*Monsoma pulveratum*) larva.

Figure 6b—Green alder sawfly adult. Photos courtesy of Ken Zogas, USDA Forest Service, Region 10.

Fuel Treatments Alter Native Plant Composition and Increase Non-Native Plant Cover

Submitted by Suzanne Owen, Research Associate, RMRS/NAU, Flagstaff, AZ, 928-556-2193, suzanneowen@fs.fed.us or Suzanne.Neal@nau.edu

Slash-pile burning and mechanical mastication are commonly prescribed fuel treatments for wildfire mitigation. Researchers from Flagstaff, AZ, and Spain recently published an article in *Forest Ecology and Management* that compared effects of the treatments on understory plant composition in Colorado pinyon-juniper woodlands (Owen and others 2009). Results showed that slash-pile burns had a different plant community composition compared to untreated areas. Pile burns were dominated by exotic plant species and had approximately six times less understory plant abundance and richness than untreated areas. Pile burns mainly consisted of exposed mineral soil, even 3.5 years post-treatment, and were surrounded by a ring of non-native musk thistle (*Carduus nutans*). No differences in plant cover or composition were observed between mastication-treated areas and untreated areas 6 months after treatment. Mastication areas 3.5 years after treatment had more plant cover and richness than untreated areas or pile burns,

Figure 7—*Carduus nutans* (musk thistle) is found growing along the perimeter of slash pile burns.

although non-native cheatgrass (*Bromus tectorum*) cover was also greater.

Mastication is the preferred short-term method because it causes fewer disturbances to understory plant communities than pile burning; however, long-term impacts of mastication warrant further study as this practice could increase the cover of cheatgrass, an especially problematic exotic species. Results suggest that the manner in which woody debris is treated following tree thinning has an important influence on native plant biodiversity.

New Publications Highlight Invasive Weed Research

Submitted by Dean Pearson, Research Ecologist, Missoula, MT, 406-542-4159, dpearson@fs.fed.us

New papers by Pearson, Ortega, and other team members include information on the ecology and management of invasive weeds, the effects of persistence and retreatment intervals on residual herbicide impact, the politics of funding biocontrol research, and the effects of invasive weeds on native predator-prey communities.

- Pearson and Ortega (2009) describe the issues of weed ecology and management based on their extensive study of the spotted knapweed invasion in western Montana.
- Pearson (2009a) describes issues related to the ecology and management of biological invasions on oceanic islands.
- Crone and others (2009) quantify side effects of a broadleaf herbicide treatment for spotted knapweed on native arrowleaf balsamroot demography.
- Maron and others (2010) describe how funding affects research on biocontrol of weeds.
- Pearson (2009b) examines the subtle but extensive and complex effects of invasive weeds on higher trophic levels of native species by simply changing vegetation architecture.

Figure 8a—Field trip to Chilbadlo Island. From left: Dr. Hee-Young Chae, Director of the Korean National Park Research Institute; Dr. Jong Min Kim, Senior Researcher at the Korean National Institute of Environmental Research; Dr. Chung Il Choi, Vice-Chair, UNESCO Man and the Biosphere Programme; and Dean Pearson, Research Ecologist, RMRS.

Figure 8b—Korean scientists assess Swinhoe's storm-petrels killed by the invasive Japanese chaff flower (*Achyranthes japonica*) on Chilbaldo Island.

Invasive Weeds Trap and Kill Birds on Islands in South Korea

Submitted by Dean Pearson, Research Ecologist, Missoula, MT, 406-542-4159, dpearson@fs.fed.us

Although native to East Asia, Japan, and some large islands around Japan, Japanese chaff flower is invasive on several seabird islands off the coast of Korea. The plant kills petrels by ensnaring them within entangling seedheads. Adults are trapped when they return to their burrows to feed their young, which soon parish for lack of parental care. The plants also appear to reduce habitat for burrows.

Research Ecologist Dean Pearson, Missoula, recently gave the keynote address to the 3rd International Symposium on Migratory Birds in Mokpo, South Korea. In his presentation titled *Seabirds in Danger: Invasive Species and Conservation of Island Ecosystems*, he described the unique attributes of island ecosystems that influence invasiveness and invasive species management. The symposium speakers from the United States, Russia, Spain, New Zealand, Australia, Japan, and South Korea toured the island biosphere reserve of Shinan County. They also consulted with South Korean scientists and the Korea National Park Service employees who are establishing invasive species management programs to protect diverse and fragile island ecosystems.

Combining Soil Disturbance Monitoring with Invasive Species Monitoring

Submitted by Deb Page-Dumroese, Research Soil Scientist, Moscow, ID, 208-883-2339, ddumroese@fs.fed.us

With revision of the Forest Soil Disturbance Monitoring Protocol (Page-Dumroese and others 2009a and 2009b), the presence of invasive species can now be more efficiently recorded during field surveys. At the request of the National

Figure 9—A researcher prepares to collect soil monitoring data.

Forest System, field forms used by summer crews and soil scientists now provide a check for presence/absence of invasive species and an entry for specific names. More information is available at: http://forest.moscowfsl.wsu.edu/smp/solo/InfoPath/monitoring/documents.php.

USDA Forest Service Delineates Future Invasive Species Research Opportunities and Priorities

Submitted by Ned Klopfenstein, Research Plant Pathologist, Moscow, ID, 208-883-2310, nklopfenstein@fs.fed.us; Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us; Carolyn Hull Sieg, Research Plant Ecologist, Flagstaff, AZ, 928-556-2151, csieg@fs.fed.us; and Deborah Finch, Research Wildlife Biologist, Albuquerque, NM, 505-724-3671, dfinch@fs.fed.us

In 2006, the USDA Forest Service Research and Development Invasive Species Strategic Program Area obtained input from a formal peer review of diverse user groups in order to develop long-term planning for the program. The Invasive Species Strategy was revised to reflect this guidance, and research efforts were prioritized to address the future challenges to managers. As a result of this process, a publication series was produced (Dix and Britton 2010) that includes 12 visionary papers developed to address future invasive species research issues and priorities. RMRS scientists contributed to papers on overarching priorities (Britton and others 2010), terrestrial animals (Finch and others 2010), plant pathogens (Klopfenstein and others 2010), aquatic invasive species (Adams and others 2010), impacts of invasive species on water (McCormick and others 2010), and invasive plants (Sieg and others 2010).

Review of Non-Native Invasive Species' Impacts on U.S. Forests

Submitted by Mee-Sook Kim, RMRS Collaborator, Seoul, South Korea, mkim@fs.fed.us

Several authors from Federal and State institutions produced a collaborative review on impacts of non-native invasive species on U.S. forests (Moser and others 2009). This review addresses ecological, economic, and social impacts of invasive species such as pathogens, insects, plants, and aquatic organisms in forests. Recommendations for policy and management are provided.

Technology Transfer & Outreach Activities

Additions to the Fire Effects Information System Website

Submitted by Jane Kapler Smith, Ecologist, Missoula, MT, 406-329-4805, jsmith09@fs.fed.us; and Corey Gucker, Biological Science Technician, Missoula, MT, 406-829-6898, cgucker@fs.fed.us

The Fire Effects Information System (FEIS) provides concise, in-depth reviews of the available scientific literature regarding basic biology and fire ecology of more than 1100 plant and animal species. Managers use FEIS in planning for post-fire rehabilitation, fire use in ecosystem maintenance and restoration, and other management. With support from Forest Service Fire and Aviation Management and the Department of Interior, FEIS writers and editors continually update and add to the system. A project that is underway and is supported by the Joint Fire Science Program involves reviewing species identified by eastern U.S. land managers as invasive in their area. Invasive species reviews in FEIS:

- summarize ecological and botanical principles that apply to fire effects on plant invasion;
- summarize available information on invasive plant responses to fire;
- describe how plant invasions can alter fuels and, in some cases, fire regimes; and
- describe if/how fire may be used to manage invasive species.

FEIS provides reviews of over 160 invasive plant species (see the list at http://www.fs.fed.us/database/feis/plants/weed/weedpage.html). By January 2011, the close of the "eastern weeds" project, reviews of 30 to 40 additional invasive plant species will be completed. Invasive species reviewed since January 2008 include:

Aegopodium podagraria	goatweed
Albizia julibrissin	mimosa
Ampelopsis brevipedunculata	porcelainberry
Berberis thunbergii	Japanese barberry
Berberis vulgaris	common barberry
Cirsium palustre	marsh thistle
Coronilla varia	crownvetch
Cynanchum louiseae	black swallow-wort
Cynanchum rossicum	pale swallow-wort
Dioscorea alata	water yam
Dioscorea bulbifera	air yam
Dioscorea pentaphylla	fiveleaf yam
Dioscorea polystachya (*D. oppositifolia*)	Chinese yam
Dioscorea sansibarensis	Zanzibar yam
Dipsacus fullonum	common teasel
Dipsacus laciniatus	cut-leaved teasel
Eragrostis curvula	weeping lovegrass
Euonymus alatus	winged burning bush
Euonymus fortunei	wintercreeper
Frangula alnus	glossy buckthorn
Glechoma hederacea	ground-ivy
Heracleum mantegazzianum	giant hogweed
Holcus lanatus	common velvetgrass
Iris pseudacorus	pale-yellow iris
Isatis tinctoria	dyer's woad
Melia azedarach	chinaberry
Melilotus alba	white sweetclover
Melilotus officinalis	yellow sweetclover
Morus alba	white mulberry
Nandina domestica	sacred bamboo
Paederia foetida	skunkvine
Paulownia tomentosa	princesstree
Phragmites australis	common reed
Phyllostachys aurea	golden bamboo
Polygonum × bohemicum	Bohemian knotweed
Polygonum cuspidatum	Japanese knotweed
Polygonum perfoliatum	mile-a-minute
Polygonum sachalinense	giant knotweed
Robinia pseudoacacia	black locust
Rubus phoenicolasius	wineberry
Solanum dulcamara	bittersweet nightshade
Solanum viarum	tropical soda apple
Tanacetum vulgare	common tansy
Tragopogon dubius	yellow salsify
Typha latifolia	broadleaf cattail
Verbascum thapsus	common mullein
Vinca major	bigleaf periwinkle
Vinca minor	common periwinkle
Wisteria floribunda	Japanese wisteria
Wisteria sinensis	Chinese wisteria

New Website for Invasive Aquatic Species in Region 4

Submitted by Emily Leavitt, Biological Science Aid, Region 4, Boise, ID, 208-373-4345, emilyleavitt@fs.fed.us

The RMRS Boise Aquatic Sciences Lab has established the following website for invasive aquatic species: http://www.fs.fed.us/rm/boise/research/techtrans/invasive_species.shtml. It contains relevant publications and briefing papers for diverse topics relating to invasive aquatic species.

Bridger to Bangtail Coalition—B2BC Weed Hike

Submitted by Jennie Birdsall, Botanist, Bozeman, MT, 404-994-4853, jbirdsall@fs.fed.us

The hike, conducted in July 2009, hosted Bozeman, MT, residents who were interested in weed control. Many of the weeds common to the area were located, and a variety of control methods were discussed, including biological controls (insects), spraying, pulling, mowing, and cultivating. Property owner/hosts Gary and Pauline Sager have applied some of these techniques over the past 4 to 5 years, so it was possible to see the impact of the applied weed control methods. Jennie's (fig. 10a) background includes over 15 years of field experience in researching weed control for the Forest Service and other Federal agencies, which allowed her to provide a long-term perspective on weed control.

Figure 10a—RMRS Botanist Jennie Birdsall led a hike for the B2BC Community Education and Awareness Speaker Series.

Figure 10b—The kids enjoyed the hike and were very interested to learn new things about plants and insects.

Invasive Species Working Group: Research Summary and Expertise Directory Available

The RMRS ISWG recently published a Research Summary and Expertise Directory that is devoted to facilitating information delivery to diverse user groups (Butler and others 2009). This publication contains summaries of taxa-specific invasive species research for plants, plant pathogens, insects, aquatic species, and terrestrial vertebrates. In addition, this publication contains an RMRS Invasive Species Expertise Directory that lists scientists, their contact information, and their areas of expertise.

Copies available from: Richard Schneider, RMRS Publications, rschneider@fs.fed.us; or at http://www.treesearch.fs.fed.us/pubs/34540.

Ask The Expert

Q: Will climate change influence invasive species?

Submitted by John Hanna, Biological Technician, USDA Forest Service, Moscow, ID

A: Climate is a fundamental factor that determines the distribution of most species, so climate change will affect invasive species. A climate-habitat matching approach provides a simple approximation to the expected potential distribution of an invasive species. First, the climate of the geographic area where a species presently survives is characterized; then, a climate model projects where this suitable-climate space could potentially occur under a specified climate scenario. Several factors contribute to the uncertainty of such predictions. Climate and biological systems are complex and highly interactive (see Kliejunas and others 2009). In addition to climate, invasive species are affected by such ecological contingencies as the availability of colonization sites (for example, hosts for parasites), competition, interference, and barriers to dispersal. Over time, biogeographical processes (evolution, migration, and metapopulation dynamics) are also important. Many factors are affected by climate differently than the invasive species of interest. Change will occur, but it is difficult to predict what changes will occur with certainty.

Please submit your "Ask the Expert" questions to Brian (bgeils@fs.fed.us) or Ned (nklopfenstein@fs.fed.us).

Publication News

Adams, S.B.; Burnett, K.M.; Bisson, P.; Harvey, B.; Nislow, K.H.; Rieman, B.E.; Rinne, J. 2010. **The role of the Forest Service in aquatic invasive species research.** In: Dix, M.E.; Britton, K., eds. A dynamic invasive species research vision: Opportunities and priorities 2009-29. Gen. Tech. Report WO-79. Washington, DC: U.S. Department of Agriculture, Forest Service, Research and Development: 55-66.

Bateman, H.L.; Chung-MacCoubrey, A.; Snell, H.L.; Finch, D.M. 2009. **Abundance and species richness of snakes along the Middle Rio Grande riparian forest in New Mexico.** Herpetological Conservation and Biology 4(1): 1-8.

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