Curriculum Vita

David A. Orwig

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Education

The Pennsylvania State University	Ph.D.	Forest Resources	1995
The Pennsylvania State University	M.S.	Ecology	1991
Rochester Institute of Technology	B.S.	Biology	1989

M.S. Thesis Title

Age-structure and composition of successional forests of Spotsylvania Battlefield, Virginia. Major Professor Dr. Marc D. Abrams.

Ph.D. Dissertation title

Community and dendroecological attributes of oak-pine forests in northern Virginia. Major Professor Dr. Marc D. Abrams.

Employment

June 1995 to present.

Forest Ecologist. Harvard Forest, Petersham, MA. Developed integrated research approach to examine forest damage, environmental and ecosystem changes, and related impacts associated with hemlock woolly adelgid outbreaks in southern New England forests. Documented stand-level vegetational changes and analyzed the relationship between landscape features and infestation rates by establishing permanent plots throughout central Connecticut and Massachusetts. Evaluated the composition and vegetation dynamics of ridge-top pine forests and old-growth forests in Massachusetts Forests.

Aug. 1989 to May 1995.

Graduate teaching assistant in Forestry 308, Forest Ecology and graduate research assistant. The Pennsylvania State University. Taught, administered quizzes, and lead discussions in forest ecology field labs for undergraduate students. Research included conducting stand inventories, evaluating fuel loading, recommending silvicultural

prescriptions, and preparing cover maps and forest management plans for the Fredericksburg and Spotsylvania National Military Park, Fredericksburg, Virginia.

Professional organizations

Ecological Society of America
Torrey Botanical Society
The Tree-ring Society
Hemlock Woolly Adelgid (HWA) Working Group

Research grants

2008-2009. Impact of the invasive *Sirex noctilio* on pine stands of the northeastern US and southern Ontario. USDA Federal Lands Forest Health Program, $10,000

2006-2012. Integrated Studies of the Drivers, Dynamics, and Consequences of Landscape Change in New England. NSF LTER IV Grant ($4.9 million). Co-Investigator.

2004. Nutrient Analysis Equipment for Community, Ecosystem, Hydrological, and Physiological Research at Harvard Forest. NSF DBI Mult-user Equipment Grant ($59,640). Co-PI with D.R. Foster, A.M. Ellison, and N.M. Holbrook.

2003. Forest Response to the Decline of a Dominant Species: Ecosystem to Regional Analyses of the Impact of the Hemlock Woolly Adelgid on Northeastern Forests. NSF Ecosystems Grant ($400,000). Co-PI with D.R. Foster and D.B. Kittredge.

2003. Forest Response to the Decline of a Dominant Species: Ecosystem to Regional Analyses of the Impact of the Hemlock Woolly Adelgid on Northeastern Forests. NSF Supplemental Grant ($6,000). Co-PI with D.R. Foster and D.B. Kittredge.

2001. Forest Response to the Introduced Hemlock Woolly Adelgid: Development of Silvicultural Guidelines. USDA ($35,000)

2000- 2006 - The Dynamic New England Landscape: Interactions Among Disturbance, Environmental Change, and Ecosystem Pattern and Process. NSF LTER III Grant ($4.2 million). Co-Investigator.

1998 - Community and Historical Ecology Collaborations for Undergraduates at the Harvard Forest LTER Site: Investigating Mechanisms for Forest Change. NSF Supplemental Grant ($15,000). Co-Investigator.

1997-1999 - Forest Ecosystem response to the introduced hemlock woolly adelgid in southern New England. USDA ($240,000). Co-PI with D.R. Foster.

1996 - Community and historical ecology collaborations for undergraduates at the Harvard Forest LTER site: multi-scale analysis of vegetation dynamics. NSF Supplemental Grant ($27,982). Co-Investigator.

1991-1994 - Woody vegetation and fuel survey for evaluating wildfire hazard in three battlefields of the Fredericksburg National Military Park. U.S. Department of Interior, National Park Service. ($103,209). Research Assistant with M.D. Abrams.

Awards

1992 and 1994- Forest Resources Professional Travel Award, Penn State University.

Research interests and experience

My research interests encompass various aspects of forest ecology and ecosystem science, with particular emphasis on dendroecology and the role of land use history and disturbance on forest composition and structure. My doctoral dissertation focused on the responses of co-occurring tree species to various disturbances and included studies of radial growth, ecophysiology, canopy recruitment, and successional dynamics of oak-pine forests in Virginia. I have examined the composition, structure, and radial growth dynamics in many presettlement-origin forests, including northwestern and southeastern Pennsylvania, the southern Appalachians, the Shawangunk mountains of New York, and Wachusett Mountain in Massachusetts. More recently, I have integrated stand, community, landscape, and ecosystem approaches in examining the ecological consequences of invasive insect pests in hemlock forests of southern New England. With these studies, I hope to increase our understanding of forest dynamics and life history strategies in relation to natural and anthropogenic disturbances.

Research presentations (Talks and posters)

1991 Poster presented: Eighth Central Hardwood Forest Conference. The Pennsylvania State University, University Park, PA. "Effect of stand age on forest composition at Spotsylvania Battlefield, Virginia" with M.D. Abrams.

1992 Ecological Society of America. Honolulu, Hawaii. "Land-use history and successional status of mixed oak forests on the Piedmont and Coastal Plain of Virginia", with M.D. Abrams.

1994 International Conference on Tree Rings, Environment, and Humanity: Relationships and Processes. Tucson, Arizona. "Dendroecology and successional dynamics of old-growth oak and pine forests of the eastern United States," with M.D. Abrams.

1994 Poster presented: International Conference on Tree Rings, Environment, and Humanity: Relationships and Processes. Tucson, Arizona. "Dendroecological attributes relating to life

history strategies of mixed oak forests of north-central Virginia," with M.D. Abrams.

1994 Poster presented: Ecological Society of America. Knoxville, Tennessee. "Contrasting radial growth and canopy recruitment patterns in *Liriodendron tulipifera* and *Nyssa sylvatica*: gap obligate versus gap-facultative tree species", with M.D. Abrams.

1996 Poster presented: Ecological Society of America. Providence, Rhode Island. "Forest ecosystem response to hemlock woolly adelgid outbreaks in southern New England", with D.R. Foster.

1997 Poster presented: Eastern U.S. Old-Growth Forests: Pattern, Process, Value, and Management. Clarion, PA. "Stand composition and vegetation dynamics of old-growth forests on Wachusett Mountain, Massachusetts", with D.R. Foster and J. O'Keefe.

1998. Poster presented: Ecological Society of America. Baltimore, Maryland "Hemlock woolly adelgid damage in relation to hemlock distribution across southern New England landscapes", with D.R. Foster.

1999. Ecological Society of America. Spokane, Washington. "Landscape patterns of hemlock woolly adelgid damage in southern New England", with D.R. Foster and D.L. Mausel.

2000. Ecological Society of America. Snowbird, UT. “Ecosystem response to the removal of hemlock from southern New England forests”, with R.C. Cobb, M.L. Kizlinski, S.J. Currie, and D.R. Foster.

2001. North American Forest Insect Work Conference. Edmonton, Alberta, Canada. “Ecosystem to Regional analyses of hemlock woolly adelgid outbreaks in southern New England.”

2002. Hemlock Woolly Adelgid Symposium. East Brunswick, NJ. “Stand dynamics associated with chronic HWA infestations in southern New England.”

2002. Hemlock Woolly Adelgid Symposium. East Brunswick, NJ. “Vegetation response following HWA infestation, hemlock decline, and salvage logging.”

2002. Poster presented: Ecological Society of America. Tuscon, AZ. "Vegetation and disturbance history of a rare dwarf pitch pine community on Mt. Everett, Massachusetts", with G. Motzkin and D.R. Foster.

2003. North American Forest Ecology Workshop. Corvallis, OR. “Forest Response to the decline of a dominant species: ecosystem to regional analyses of hemlock woolly adelgid impacts in New England.

2004. Poster presented: Ecological Society of America. Portland, OR. “Assessing N Availability Through Multiple Resin Extractions Following the Onset of the Hemlock Woolly

Adelgid “, with Sultana S Jefts.

2004. Poster presented: Ecological Society of America. Portland, OR. “Landscape level analyses of hemlock woolly adelgid outbreaks in Massachusetts”, with Nick Povak.

2004. Poster presented: Ecological Society of America. Portland, OR and The 6th Annual Eastern Old-Growth Forest Conference, Moultonborough, NH. “Old-growth forest composition and structure within the Cold River Gorge, Massachusetts”, with Anthony D’Amato.

2005. 3rd symposium on hemlock woolly adelgid in the eastern United States. Asheville, NC. “Silvicultural options for managing hemlock forests threatened by hemlock woolly adelgid.” with D.B. Kittredge.

2005. Poster presented: 3rd symposium on hemlock woolly adelgid in the eastern United States. Asheville, NC. “The effects of HWA outbreaks on ecosystem level changes in southern New England”, with Sultana Jefts.

2005. Poster presented: Ecological Society of America. Montreal, Canada. “Changes in Ecosystem Response Associated with Hemlock Woolly Adelgid Infestation and Preemptive Logging in Southern New England”, with H. Lux, S. Jefts, and D.R. Foster.

2005. Poster presented: Ecological Society of America. Montreal, Canada. “Structure and Dynamics of *Tsuga canadensis*-dominated Old-Growth Forests in Western Massachusetts”, with Anthony D’Amato.

2006. Poster presented: 17th U.S. Department of Agriculture interagency research forum on gypsy moth and other invasive species. Annapolis, MD. “Adaptation during northern range expansion in the elongate hemlock scale *Fiorinia externa*”, with E. Preisser, A. Lodge, and J. Elkinton.

2006. Poster presented. Entomological Society of America Annual Meeting. Indianapolis, IN. “Northern range expansion of the invasive hemlock woolly adelgid and elongate hemlock scale”, with E. Preisser, A. Lodge, and J. Elkinton.

2006. Ecological Society of America, Memphis, TN. “Relationships between disturbance dynamics and forest structure in old-growth eastern hemlock forests”, with Anthony D’Amato.

2006. Ecological Society of America, Memphis, TN. “The direct and indirect effects of hemlock woolly adelgid infestation on eastern hemlock forests.”

2006. Ecological Society of America, Memphis, TN. “Range expansion and community impact of the invasive herbivores *Adelges tsugae* and *Fiorinia externa* in New England”, with A. Lodge, E. Preisser, and J. Elkinton.

2007. Poster presented: 18th U.S. Department of Agriculture interagency research forum on

gypsy moth and other invasive species. Annapolis, MD "Production and Evaluation of Eastern Hemlocks (*Tsuga canadensis*) potentially resistant to the Hemlock Woolly Adelgid (*Adelges tsugae*)", with T. Caswell, R. Casagrande, E. Preisser, B. Maynard, and J. Elkinton.

2007. Poster presented: 18th U.S. Department of Agriculture interagency research forum on gypsy moth and other invasive species. Annapolis, MD. "Interactions between the invasive hemlock woolly adelgid and elongate hemlock scale during northern range expansion", with E. Preisser, A. Lodge, and J. Elkinton.

2007. Ecological Society of America, San Jose, CA. "Range expansion and population dynamics of co-occurring invasive herbivores", with E. Preisser, A. Lodge, and J. Elkinton.

2007. Invited Talk, Virginia Polytechnic University, Blacksburg, VA. "Two decades of hemlock woolly adelgid impacts on southern New England Forests."

2007. Connecticut Forest Conservation and Forest Science Forum, Storrs, CT. "Silvicultural options for managing hemlock forests."

2008. Fourth Hemlock Woolly Adelgid Symposium, Hartford, CT. "Ecological and management implications of hemlock logging in Massachusetts."

2008. Poster presented: Fourth Hemlock Woolly Adelgid Symposium, Hartford, CT. "Interactions between invasive herbivores Adelges tsugae and Fiorinia externa, and their impact on eastern hemlock growth and foliar chemistry", with M. Miller-Pierce, and E. Preisser.

2008. Poster presented: Fourth Hemlock Woolly Adelgid Symposium, Hartford, CT. "Evaluating chemical treatments of hemlock woolly adelgid in southern New England", with C. Rollinson.

2008. Poster presented: Fourth Hemlock Woolly Adelgid Symposium, Hartford, CT. "Influence of hemlock woolly adelgid and elongate hemlock scale on leaf-level physiological performance of eastern hemlock", with H. Smith. (poster won 2nd prize).

2008. New England Society of American Foresters Annual Meeting, Saratoga Springs, NY. "Forest management with hemlock woolly adelgid."

2008. Invited talk, University of Massachusetts Natural Resources Conservation Seminar, Amherst, MA. "Hemlock woolly adelgid in New England: what has this pest really done to our forests?"

2008. Invited talk, Eastern Kentucky University, Richmond, KY. "The chronic impacts of hemlock woolly adelgid infestation on eastern hemlock forests."

2008. Invited talk, Eastern Kentucky University, Richmond, KY. "Ecosystem impacts resulting from the demise of a foundation species in New England."

2008. Poster presented: Eastern CANUSA Forest Science Conference, Orono, ME. "Effects of *Sirex noctilio* in Pine Stands and Silvicultural Options to Reduce its Impact", with K. Dodds, R. Cooke, G. Dubois, and P. de Groot.

Ad-hoc Reviewer

Bulletin of the Torrey Botanical Society
Canadian Journal of Forest Research
International Journal of Plant Sciences
Ecology
The American Midland Naturalist
Dendrochronologia
Rhodora
Forest Science
Conservation Biology
Oikos
Natural Areas Journal
Journal of Ecology
Biological Invasions
Castanea
Bartonia
Journal of Biogeography
Ecological Applications
Tree Physiology

Non-technical reports and abstracts

1. Orwig, D.A. and M.D. Abrams. 1991. Woody vegetation and fuel survey for evaluating wildfire hazard in Spotsylvania Battlefield. National Park Service Technical report NPS/MAR/NRTR-91/052. Philadelphia, PA.
2. Orwig, D. A. 2004. An evaluation of the western slope forests of Wachusett Mountain. A Report Submitted to the Massachusetts Department of Conservation and Recreation:1-19.
3. Orwig, D. A., and A. W. D'Amato. 2007. Southern New England old growth forests: how much is left and can they help inform management decisions? News Quarterly, New England Society of American Foresters **68(4)**:10-11.
4. Orwig, D.A. 2008. Ecological and managagement implications of hemlock logging in Massachusetts. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). pp 112-113. USDA Forest Service, Morgantown, WV.
5. Orwig, D.A. 2008. Eastern Hemlock: Irreplaceable Habitat. Massachusetts Sierran Summer: 3, 5.
6. Preisser, E., J. Elkinton, K. Abell, M. Miller-Pierce, and D. Orwig. 2008. Interactions between hemlock woolly adelgid and elongate hemlock scale in New England hemlock forests. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). Pp. 212-213. USDA Forest Service, Morgantown, WV.
7. Miller-Pierce, M., E. Preisser, and D. Orwig. 2008. Interactions between invasive herbivores: *Adelges tsugae*, *Fiorinia externa*, and their impact on eastern hemlock growth and foliar chemistry. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). Pp. 259-260. USDA Forest Service, Morgantown, WV.

8. Orwig, D.A. 2009. Eleven years of old-growth dynamics within Wachusett Mountain State Reservation. A report submitted to Wachusett Mountain Associates.

Refereed publications and technical reports

1. Seischab, F.K. and D. Orwig. 1991. Catastrophic disturbances in the presettlement forests of western New York. **Bull. Torrey Bot. Club** 118: 117-122.

2. Orwig, D.A. and M.D. Abrams. 1993. Temperate forests of the eastern United States. *In* S.K. Majumdar, E.W. Miller, D.E. Baker, E.K Brown, J.R. Pratt, and R.F. Schmalz, eds., Conservation and Resource Management. Pennsylvania Academy of Science. pp. 97-116.

3. Orwig, D.A. and M.D. Abrams. 1994. Land-use history (1720 - 1992), composition, and dynamics of oak-pine forests within the Piedmont and Coastal Plain of northern Virginia. **Can. J. For. Res.** 24: 1216-1225.

4. Mikan, C.J., D.A. Orwig, and M.D. Abrams. 1994. Composition, structure and successional dynamics of a pre-European settlement dry oak forest in southeastern Pennsylvania. **Bull. Torrey Bot. Club** 121: 13-23.

5. Orwig, D.A. and M.D. Abrams. 1994. Contrasting radial growth and canopy recruitment patterns in *Liriodendron tulipifera* and *Nyssa sylvatica*: gap obligate versus gap-facultative tree species. **Can. J. For. Res.** 24: 2141-2149.

6. Abrams, M.D. and D.A. Orwig. 1994. Temperate Hardwoods. *In* Encyclopedia of Agricultural Sciences. Academic Press, Inc. pp. 289-302.

7. Abrams, M.D., D.A. Orwig, and T. DeMeo. 1995. Dendroecology and successional dynamics of a presettlement-origin white pine-mixed oak forest in the southern Appalachians. **Journal of Ecology**. 83:123-133.

8. Abrams, M.D. and D.A. Orwig. 1995. Community and radial growth dynamics of a 320 year-old pitch pine rock outcrop community in southeastern New York. **Oecologia**. 101:353-360.

9. Orwig, D.A. and M.D. Abrams 1995. Dendroecological and ecophysiological analysis of gap environments in mixed-oak understories of northern Virginia. **Functional Ecology** 9:799-806.

10. Abrams, M.D. and D.A. Orwig. 1996. A review of dendroecology and successional dynamics of old-growth and second-growth oak and pine forests in the eastern United States. Radiocarbon *In* Tree rings, environment, and humanity (eds. J.S. Dean, D.M.

Meko, and T.W. Swetnam) **RADIOCARBON** 1996, pp. 343-352.

11. Abrams, M.D. and D.A. Orwig. 1996. A 300-year history of disturbance and canopy recruitment for co-occurring white pine and hemlock on the Allegheny Plateau, U.S.A. **Journal of Ecology** 84:353-363.

12. Foster, D.R., D.A. Orwig, and J.S. McLachlan. 1996. Ecological and conservation insights from reconstructive studies of temperate old-growth forests. **Trends in Ecology and Evolution** 11:419-424.

13. Abrams, M.D., D.A. Orwig, and M.J. Dockry. 1997. Dendroecology and successional status of two contrasting old-growth oak forests in the Blue Ridge Mountains, U.S.A. **Can. J. For. Res.** 27:994-1002.

14. Orwig, D.A. and M.D. Abrams. 1997. Variation of radial growth responses to drought among species, site, and canopy strata. **Trees** 11:474-484.

15. Orwig, D.A. and D.R. Foster. 1998a. Forest response to the introduced hemlock woolly adelgid in southern New England, USA. **J. Torrey Bot. Soc**. 125:59-72.

16. Orwig, D. A. and D. R. Foster. 1998b. Ecosystem response to an imported pathogen: the hemlock woolly adelgid. **Arnoldia** 58: 41-44.

17. Orwig, D.A. and M.D. Abrams. 1999. Impacts of early selective logging on the dendroecology of an old-growth, bottomland hemlock-white pine-northern hardwood forest on the Allegheny Plateau. **J. Torrey Bot. Soc**. 126: 234-244.

18. Orwig, D.A. and D.R. Foster. 2000. Stand, landscape, and ecosystem analyses of hemlock woolly adelgid outbreaks in southern New England: an overview. *In* Sustainable Management of Hemlock Ecosystems in Eastern North America. Symposium Proceedings USDA GTR-NE 267.

19. Yorks, T.E., J.C. Jenkins, D.J. Leopold, D.J. Raynal, and D.A. Orwig. 2000. Influences of eastern hemlock mortality on nutrient cycling. *In* Sustainable Management of Hemlock Ecosystems in Eastern North America. Symposium Proceedings USDA GTR-NE 267.

20. Orwig, D.A., C.V. Cogbill, D.R. Foster, and J.F. O'Keefe. 2001. Variations in old-growth structure and definitions: Development and dynamics of forests on Wachusett Mountain, Massachusetts. **Ecological Applications** 11:437-452.

21. Motzkin, G., D.A. Orwig, and D.R. Foster. 2002. History and dynamics of a ridgetop pitch pine community: Mount Everett, Massachusetts. Harvard Forest Paper Number 25.

22. Orwig, D.A. 2002a. Stand dynamics associated with chronic hemlock woolly adelgid infestations in southern New England. *In* Proceedings: Hemlock Woolly Adelgid in the Eastern United States Symposium. (eds. R.C. Reardon, B.P. Onken, and J. Lashomb) pp. 36-46. New Jersey Agricultural Experiment Station Publication, New Brunswick, NJ.

23. Orwig, D.A. and M.L. Kizlinski. 2002. Vegetation response following hemlock woolly adelgid infestation, hemlock decline, and hemlock salvage logging. *In* Proceedings: Hemlock Woolly Adelgid in the Eastern United States Symposium. (eds. R.C. Reardon, B.P. Onken, and J. Lashomb) pp. 106-117. New Jersey Agricultural Experiment Station Publication, New Brunswick, NJ.

24. Orwig, D.A. 2002b. Ecosystem to regional impacts of introduced pests and pathogens- historical context, questions, and issues. **Journal of Biogeography** 29: 1471-1474.

25. Cobb, R.C. and D.A. Orwig. 2002. Impact of hemlock woolly adelgid on decomposition: an overview. *In* Proceedings: Hemlock Woolly Adelgid in the Eastern United States Symposium. (eds. R.C. Reardon, B.P. Onken, and J. Lashomb) pp. 317-322. New Jersey Agricultural Experiment Station Publication, New Brunswick, NJ.

26. Foster, D.R., S. Clayden, D.A. Orwig, B. Hall, and S. Barry. 2002. Oak, chestnut and fire: climatic and cultural controls of long-term forest dynamics in New England, USA. **Journal of Biogeography** 29: 1359-1379.

27. Orwig, D.A., D.R. Foster, and D.L. Mausel. 2002. Landscape Patterns of Hemlock Decline in New England Due to the Introduced Hemlock Woolly Adelgid. **Journal of Biogeography** 29: 1475-1487.

28. Tingley, M.W., D.A. Orwig, G. Motzkin, D.R. Foster, and R. Field. 2002. Avian response to removal of a forest dominant: consequences of hemlock woolly adelgid infestations. **Journal of Biogeography** 29: 1505-1516.

29. Kizlinski, M.L., D.A. Orwig, R.C. Cobb, and D.R. Foster. 2002. Direct and indirect ecosystem consequences of an invasive pest on forests dominated by eastern hemlock. **Journal of Biogeography** 29: 1489-1503.

30. Motzkin, G., D.A. Orwig, and D.R. Foster. 2002. Vegetation and disturbance history of a rare dwarf pitch pine community on Mount Everett, Massachusetts. **Journal of Biogeography** 29: 1455-1467.

31. Foster, D. G. Motzkin, J. O'Keefe, E. Boose, D. Orwig, J. Fuller, and B. Hall. 2004. The environmental and human history of New England. *In* Forests in Time: The environmental consequences of 1,000 years of change in New England. Pp. 43-100.

Yale University Press, New Haven, CT.

32. Foster, D., D. Kittredge, B. Donahue, G. Motzkin, D. Orwig, A. Ellison, B. Hall, B. Colburn, and A. D'Amato. 2005. Wildlands and Woodlands: A vision for the forests of Massachusetts. Harvard Forest, Petersham, MA.

33. Stadler, B. T. Müller, D. Orwig, and R. Cobb. 2005. Hemlock woolly adelgid in New England forests: canopy impacts transforming ecosystem processes and landscapes. **Ecosystems** 8: 233-247.

34. Orwig, D.A. and D.B. Kittredge. 2005a. Silvicultural options for managing hemlock forests threatened by hemlock woolly adelgid. In: Reardon, R. and B. Onken (Eds). Proceedings of the 3rd symposium on hemlock woolly adelgid in the eastern United States. USDA Forest Service, Newtown, PA. pp. 212-217.

35. Orwig, D.A. and D.B. Kittredge. 2005b. Silvicultural options for managing hemlock forests threatened by hemlock woolly adelgid. Umass extension fact sheet. Amherst, MA.

36. Jefts, S. and D. Orwig. 2005. The effects of HWA outbreaks on ecosystem level changes in southern New England. In: Reardon, R. and B. Onken (Eds). Proceedings of the 3rd symposium on hemlock woolly adelgid in the eastern United States. USDA Forest Service, Newtown, PA. pp. 305-306.

37. Ellison, A.M., M.S. Bank, B.D. Clinton, E.A. Colburn, K. Elliott, C.R. Ford, D.R. Foster, B.D. Kloeppel, J.D. Knoepp, G.M. Lovett, J. Mohan, D.A. Orwig, N.L. Rodenhouse, W.V. Sobczak, K.A. Stinson, J.K. Stone, C.M. Swan, J. Thompson, B. Von Holle, and J.R. Webster. 2005. Loss of foundation species: consequences for the structure and dynamics of forested ecosystems. **Frontiers in Ecology and the Environment** 3(9):479-486.

38. Foster. D.R. and D.A. Orwig. 2006. Pre-emptive and salvage harvesting of New England forests: when doing nothing is a viable alternative. **Conservation Biology** 20:959-970.

39. Stadler, B., T. Muller, and D. Orwig. 2006. The ecology of energy and nutrient fluxes in hemlock forests invaded by the hemlock woolly adelgid. **Ecology** 87:1792-1804.

40. Cobb. R.C, D.A. Orwig, and S. Currie. 2006. Decomposition of green foliage in eastern hemlock forests of southern New England impacted by hemlock woolly adelgid populations. **Canadian Journal of Forest Research** 36:1-11.

41. D'Amato, A.W., D.A. Orwig, and D.R. Foster. 2006. New estimates of Massachusetts old-growth forests: useful data for regional conservation and forest

reserve planning. **Northeastern Naturalist** 13: 495-506.

42. Pederson. N., A.W. D'Amato, and D.A. Orwig. 2006. Central hardwood natural history from dendrochronology: maximum ages of rarely studied species. In: (Buckley, D.S. and W.K. Clatterbuck Eds.) Proceedings of the 15th Central Hardwood Forest Conference, Knoxville, TN. USDA For. Serv. So. Res. Stn. Asheville, NC. Pp. 695-701.

43. Preisser, E., A. Lodge, D. Orwig, and J. Elkinton. 2008. Range expansion and population dynamics of co-occurring invasive herbivores. **Biological Invasions** 10: 201-213.

44. Orwig, D.A., R.C. Cobb, A.W. D'Amato, M.L. Kizlinski, and D.R. Foster. 2008. Multi-year ecosystem response to hemlock woolly adelgid infestation in southern New England Forests. **Canadian Journal of Forest Research** 38: 834-843.

45. D'Amato, A.W., and D.A. Orwig. 2008. Stand and landscape-level disturbance dynamics in old-growth forest ecosystems in western Massachusetts. **Ecological Monographs** 78: 507-522.

46. D'Amato, A.W., D.A. Orwig, and D.R. Foster. 2008. The influence of successional processes and disturbance dynamics on the structure of old-growth and second-growth *Tsuga canadensis* forests. **Ecological Applications** 18: 1182-1199.

47. Cobb, R.C., and D.A. Orwig. 2008. Changes in decomposition dynamics in hemlock forests impacted by hemlock woolly adelgid: restoration and conservation of hemlock ecosystem function. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). pp 157-167. USDA Forest Service, Morgantown, WV.

48. Rollinson, C.R., and D.A. Orwig. 2008. Evaluating chemical treatments of hemlock woolly adelgid in southern New England. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). pp 293-300. USDA Forest Service, Morgantown, WV.

49. Smith, H.S., and D.A. Orwig. 2008. Influence of hemlock woolly adelgid and elongate hemlock scale on leaf-level physiological performance of eastern hemlock. *In* Proceedings: Fourth Symposium on hemlock woolly adelgid in the eastern United States (eds. B. Onken and R. Reardon). pp 308-316. USDA Forest Service, Morgantown, WV.

50. Dukes, J.S., J. Pontius, D. Orwig, J.R. Garnas, V.L. Rodgers, N. Brazee, B. Cooke, K.A. Theoharides, E.E. Strange, R. Harrington, J. Ehrenfeld, J. Gurevitch, M. Lerdau, K. Stinson, R. Wick, and M. Ayres. 2009. Responses of insect pests, pathogens, and invasive plant species to climate change in the forests of Northeastern North

America: What can we predict? **Canadian Journal of Forest Research 39: 1-18**.

51. D'Amato, A.W., D.A. Orwig, and D.R. Foster. Understory Vegetation in Old-Growth and Second-Growth *Tsuga canadensis* Forests in Western Massachusetts. **Forest Ecology and Management 257: 1043-1052.**

52. Albani, M., P.R. Moorcroft, A. M. Ellison, D. A. Orwig and D. R. Foster. 2008. Predicting the impact of hemlock woolly adelgid on carbon dynamics of Eastern U.S. forests. Submitted to **Canadian Journal of Forest Research**.

53. Motzkin, G., D.A. Orwig, and D.R. Foster. 2009. Dwarf pitch pine communities in the Southern Taconics: Race Mountain, Bear Mountain, and "Hill 1914." Harvard Forest Paper Number 29.

54. Dodds, K.J., P. de Groot, and D.A. Orwig. 2009. The impact of Sirex notilio in Pinus resinosa and Pinus sylvestris stands in north central North America. Submitted to **Canadian Journal of Forest Research**.

55. D'Amato, A.W., D.A. Orwig, J.L. Butler, and D.R. Foster. 2009. Influences of successional status and forest composition on nitrogen retention in western Massachusetts forest ecosystems. Submitted to **Forest Ecology and Management**.

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