Aaron S. Weed, Ph.D.

Northeast Temperate Inventory and Monitoring Network, National Park Service, 54 Elm St, Woodstock, VT, 05091

Email: Aaron_weed@nps.gov Phone: 802-359-3896 Website: https://www.nps.gov/im/netn/index.htm

Professional Experience

2016-Present	Ecologist/Program Manager, Inventory & Monitoring, National Park Service, Woodstock, VT Northeast Temperate Inventory & Monitoring Network (NETN) website
2014-2016	Ecologist, Inventory & Monitoring, National Park Service, Fredericksburg, VA
2015	Postdoctoral Associate, *Dept. of Conservation,* Univ. of Massachusetts, Amherst, MA
2014-2015	Visiting scholar, *Biological Sciences,* Dartmouth College, Hanover, NH
2011-2014	Postdoctoral Associate, *Biological Sciences,* Dartmouth College, Hanover, NH
2010-2011	Postdoctoral Fellow, *PSES Dept,* University of Idaho, Moscow, ID
2005-2010	Ph.D. Research Assistant, *Plant Science Dept.,* University of Rhode Island, Kingston, RI
2006	Biological Control Technician, CABI-Europe Delemont, Switzerland
2004-2005	Forest Entomology Technician, USDA-APHIS, Cape Cod, MA
2003-2004	Survey Entomologist, Waquoit Bay NERR, Falmouth, MA
2001-2003	Extension Assistant, University of Florida, Gainesville, FL
1999-2001	Entomology Research Assistant, University of Maine, Orono, ME (
2000	IPM scout, Univ. of Maine Cooperative Extension, Orono, ME (Jim Dill)
1999	Forest Entomology intern, Maine Forest Service, Augusta, ME (Dick Dearborn)

Education

Ph.D. Environ. Science, University of Rhode Island (2010)

M.S. Entomology, University of Florida (2003)

B.S. Biology, University of Maine (2001)

Peer-reviewed Publications

Links to ResearchGate and Google Scholar profiles

29. Miller, K, Perles, S, Schmit, J., J., Matthews, E., **Weed, A.S.**, Comiskey, J., Marshall, M., Nelson, P., Fisichelli, N. *In Review.* Forests in eastern national parks face widespread regeneration debt. Ecological Applications

28. Stanke, H., Finley, A., Domke, G., **Weed, A.S.**, and MacFarlane, D. 2021. Over half of top tree species in decline in the western United States. Nature Communications 12, 451: https://doi.org/10.1038/s41467-020-20678-z.

27. Trocki, C.L., **Weed, A.S.,** Kozlowski, A. and Broms, K., 2021. Long-Term Coastal Breeding Bird Monitoring in the Boston Harbor Islands, 2007–2019. Northeastern Naturalist, 25(sp9), pp.235-257.

26. Doser, J.W., Finley, A.O., **Weed, A.S.**, Zipkin, E.F. (2021). Integrating automated acoustic vocalization data and point count surveys for efficient estimation of bird abundance. Methods in Ecology and Evolution. https://doi.org/10.1111/2041-210X.13578.

25. Doser, J., **Weed, A.S.**, Zipkin, E., Miller, K. Finley, A. 2021. Trends in bird abundance differ among protected forests but not bird guilds. *Ecological Applications*. https://doi.org/10.1002/eap.2377.

24. Miller, K, McGill, B. **Weed, A.,** Seirup, C., Comiskey, J., Matthews, E., Perles, S, Schmit, J. 2020. Long-term trends indicate that invasive plants are pervasive and increasing in eastern national parks. Ecological Applications. https://doi.org/10.1002/eap.2239.
23. Stanke, Hunter, Andrew O. Finley, **A. S. Weed**, Brian F. Walters, and Grant M. Domke. 2020. rFIA: An R package for estimation of forest attributes with the US Forest Inventory and Analysis database. Environmental Modelling & Software 127: 104664.
22. Hinz, H.L., Bourchier, R. S., Schaffner, U., Schwarzländer, M., **Weed, A.S.** 2019., Reply and Comment on Havens and colleagues (2019), BioScience, 69 (11): 853.
21. Bentz BJ, Jönsson AM, Schroeder M, **Weed A**, Wilcke RAI, and Larsson K. 2019. *Ips typographus* and *Dendroctonus ponderosae* Models Project Thermal Suitability for Intra-and Inter-Continental Establishment in a Changing Climate. Front. For. Glob. Change 2:1. doi: 10.3389/ffgc.2019.00001
20. Lombardo, J.A., **Weed, A.S.,** Aoki, C.F., Sullivan, B.T. and Ayres, M.P. 2018. Temperature promotes phenological synchrony in structured populations of a forest insect pest. Oecologia. 10.1007/s00442-018-4164-9.
19. Miller, K, M., McGill, B.J., Mitchell, B. R., Comiskey, J.A., Dieffenbach, F., Matthews, E. A., Perles, S., Schmit, J.P., and **Weed, A.S.** Eastern national parks protect greater tree species diversity than unprotected matrix forests. 2018 Forest Ecology and Management 414: 74-84.
18. Weed, A.S., Milan, J. and Schwarzlaender, M. 2018. Analyses of nine years of citizen-based biological control monitoring of Dalmatian toadflax, *Linaria dalmatica* (Plantaginaceae) in Idaho, USA. BioControl 63: 449-460.
17. Marini, L., Økland, B., Jönsson, A. M., Bentz, B., Carroll, A., Forster, B., Grégoire, J.-C., Hurling, R., Nageleisen, L. M., Netherer, S., Ravn, H. P., **Weed, A**. and Schroeder, M. 2016. Climate drivers of bark beetle outbreak dynamics in Norway spruce forests. Ecography. doi:10.1111/ecog.02769
16. Weed, A.S., M. P. Ayres, Liebhold, A.M., and Billings, R. F. 2017. Spatio-temporal dynamics of a tree-killing beetle and its predator. Ecography 40: 221-234. Featured in Special Issue: *Fragmentation*
15. Weed, A.S., Elkinton, J.S., and Lany, N.K. 2016. Density-Dependent Recruitment and Diapause in the Spring-Feeding Generation of Hemlock Woolly Adelgid (Hemiptera: Adelgidae) in Western North America. Environmental Entomology: DOI: 10.1093/ee/nvw107.
14. Miller, K, M., Dieffenbach, F., Campbell, J.P., Cass, W. C., Comiskey, J.A., Matthews, E. A., McGill, B.J., Mitchell, B. R., Perles, S. J., Sanders, S., Schmit, J.P., Smith, S., and **Weed, A.S.** 2016. National Parks in the eastern United States harbor important older forest structure compared with matrix forests. Ecosphere. DOI: 10.1002/ecs2.1404.
13. Ladin, Z., Higgins, C., Schmit, J.P., Sanders, G., Johnson, M.J., **Weed, A.S.,** et al. 2016. Using regional bird community dynamics to evaluate ecological integrity within national parks. Ecosphere. DOI: 10.1002/ecs2.1464.
12. Kolb, T.E., Fettig, C. J., Bentz, B.J., Stewart, J. E., **Weed, A.S.,** Hicke, J.A., Ayres, M.P. 2016. Observed and anticipated impacts of drought on forests insects and diseases in the United States. Forest Ecology and Management. DOI: 10.1016/j.foreco.2016.04.051.
11. Weed, A.S., Bentz, B.J., M. P. Ayres, and Holmes, T. P. 2015. Geographically variable response of *Dendroctonus ponderosae* to winter warming in the western United States. Landscape Ecology. 30:1075-1093.
10. Young, J., **Weed, A.S.** 2014. *Hypena opulenta* (Erebidae): a European species for the biological control of invasive swallow-worts (*Vincetoxicum* spp.) in North America. Journal of the Lepidopterist's Society 68:162–166.

9. Weed, A.S., Schwarzlaender, M. 2014. Density-dependence, precipitation and herbivory by a biological control agent influence landscape dynamics of the invasive plant *Linaria dalmatica.* Journal of Applied Ecology 51:825-834.

8. Weed, A.S., Ayres, M.P., Hicke, J.A. 2013. Consequences of climate change for biotic disturbances in North American forests. Ecological Monographs 84: 441-470.

7. Hazelhurst, A.M., **Weed A.S.,** Tewksbury, L., Casagrande R.A. 2012. Host Specificity of *Hypena opulenta*; a Potential Biological Control Agent of *Vincetoxicum* in North America. Environmental Entomology 41: 841-848.

6. Weed A.S., Casagrande, R.A. 2011. Evaluation of host range and larval feeding impact of *Chrysolina aurichalcea asclepiadis* (Villa): considerations for biological control of *Vincetoxicum* in North America. Environmental Entomology. 40(6): 1427-1436.

5. Weed, A.S., Gassmann, A. Casagrande, R.A. 2011. Effects of leaf and root herbivory by potential insect biological control agents on the performance of invasive *Vincetoxicum* spp. Biological Control 56: 50-58.

4. Weed, A.S., Casagrande, R.A., A. Gassmann, and A. Leroux. 2011. Performance of potential European biological control agents of *Vincetoxicum* spp. with notes on their distribution. Journal of Applied Entomology 135(9): 700-713.

3. Weed, A.S. 2010. Benefits of larval group feeding by *Chrysolina a. asclepiadis* on *Vincetoxicum*: improved host location or feeding facilitation? Entomologia Experimentalis et Applicata 137: 220-228.

2. Weed, A.S., Casagrande, R.A. 2010. Biology and larval feeding impact of *Hypena opulenta* (Christoph) (Lepidoptera: Noctuidae): a potential biological control agent for *Vincetoxicum nigrum* and *V. rossicum*. Biological Control 53: 214-222.

1. Weed, A.S., Frank, J.H. 2005. Oviposition behavior of *Pheropsophus aequinoctialis* L. (Coleoptera: Carabidae): a natural enemy of *Scapteriscus* mole crickets (Orthoptera: Gryllotalpidae). Journal of Insect Behavior 15: 707-723.

Book Chapters and Technical Reports

6. Miller KM and Weed AS. 2017. Freshwater wetland monitoring in Acadia National Park: Northeast Temperate Network 2011-2016 summary report. Natural Resource Report. NPS/NETN/NRR—2017/1418. National Park Service. Fort Collins, Colorado

5. Weed, A.S, Ayres, M.P, and Bentz, B.J. 2015. Population dynamics of bark beetles. pp. 157-176, *In* Bark Beetles: Biology and Ecology of Native and Invasive species, F.E. Vega and R.W. Hofstetter (eds.). Elsevier.

4. Kolb, T.E., Fetting, C.J., Bentz, B.J., Stewart, J.E., **Weed, A.S.**, Hicke, J.A., Ayres, M.P. 2015. Chapter 6. Insects and Pathogens. National Drought Synthesis: a comprehensive science synthesis for the U.S. forest sector. USFS Gen. Tech. Report.

3. Ayres, M.P., Hicke, J.A., Kerns, B.K., McKenzie, D., Littell, J.S., Band, L.E., Luce, C.H., **Weed, A.S.**, and Raymond, C.L. 2014. Chapter 4: Disturbance Regimes and Stressors, *In* Climate Change and United States Forests, Advances in Global Change Research, D.L. Peterson et al. (eds.) , pp. 55-92 Springer.

2. Ayres, M.P., Hicke, J. A. and **A.S. Weed**. 2012. Section 3.3.3. Insect and Diseases. *In Section 2.* Effects of variability and change on forest ecosystems: a comprehensive science synthesis for the U.S. forest sector. Vose, James M.; Peterson, David L.; Patel-Weynand, Toral (eds.) Gen. Tech. Rep. PNW-GTR-870. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 265 p.

1. Bourchier, R.S., **Weed, A.S.**, R. Casagrande, A. Gassmann, S. Smith, and N. Cappuccino. 2013. *Vincetoxicum nigrum (L.) Moench, V. rossicum (Kleopow) Barbar., dog strangling vine (Asclepiadaceae).* pp. 402-407, *In* Biological Control Programmes in Canada 2001-2012, P. Mason and D. Gillespie (eds.). CABI Publishing, UK.

Media Coverage of Research

14. Vermont Public Radio "The Beating Heart Of The Park's Ecosystems" (August 9, 2021)

13. Summit Count Voice, Warming temps not the only factor in beetle outbreaks (April 6, 2015)

12. ScienceBlogs, "Pine Beetle-Caused Forest Death, And Climate Change" (March 30, 2015)

11. DesertNews, "Warming winters not sole culprit for bark beetle epidemic" (March 30, 2015)

10. Yale- Environment 360, "Warming winters not main cause of pine beetle outbreaks, study says" (March 30, 2015)

9. USDA USFS South Research Station CompassLive: "Rising Temperatures Permit Expansion of Southern Pine Beetle Into New Jersey" (Tuesday Jan. 7 2014)

8. On air live interview with WNYC Brian Leher (Tuesday Dec. 3 2013)

7. Front page of NY Times: "In New Jersey Pines, Trouble Arrives on Six Legs", (Sunday Dec. 1, 2013)

6. Washington Post: "Climate change affecting North American forests, researchers find" (Tuesday, Oct. 15, 2013)

5. ClimateWire: "Disease, insect threats linked to climate change more dramatic than expected" (Thursday, Oct. 17, 2013)

4. Science Daily: "Climate Change Creates Complicated Consequences for North America's Forests" (Oct. 15 2013)

3. Dartmouth D: "Climate change has upside, prof. finds" (Friday Oct. 18, 2013)

2. Ottawa Citizen: "Agriculture Canada releases moth to eat invasive 'dog-strangling vine'" (Tuesday, Oct. 1 2013)

1. Providence Journal" "At URI, it takes a Weed to attack a weed" (Sunday Sept. 29, 2013)

Electronic Publications

3. Frank, J.H., Fasulo, T.R., Short, D.E., **Weed, A.S.** 2010. MCRICKET: Alternative methods of mole cricket control. IFAS, University of Florida, Computer Series SW-089, A CD-ROM. (http://entnemdept.ufl.edu/fasulo/molecrickets)

2. Weed, A.S., Fasulo, T.R. 2003. Enemies of Mole Crickets Computer Tutorial. UF/IFAS Bug Tutorials. SW-170. A CD-ROM.

1. Weed A.S., Fasulo, T.R. 2003. Mole Crickets Computer Tutorial. UF/IFAS Bug Tutorials. SW- 168. A CD-ROM.

Other peer-reviewed articles and reports

5. Weed, A.S. 2010. Biology and ecology of European natural enemies of swallow-worts (*Vincetoxicum*) and the potential for biological control. PhD dissertation, Dept. Plant Sciences, University of Rhode Island, 196 pp.

4. Weed, A.S. 2005. Comparison of aboveground arthropod diversity within pitch pine and scrub oak barrens habitats on Nantucket Island with emphasis on the beetle fauna. Report submitted to Nantucket Biodiversity Survey, 52 pp.

3. Weed, A.S. and Mello, M. 2005. Summary report of pitfall trapping studies conducted on Nantucket Island in 2004 and 2005. Report prepared for the Nantucket Land Council, 24 pp.

2. Weed, A.S. 2003. A survey of benthic macroinvertebrates of the coastal, low gradient freshwater streams of Cape Cod. Monitoring stream habitat condition and the effects of long-term restoration activities. Waquoit Bay National Estuarine Research Reserve, Falmouth, MA. Technical Report, 31 p.

1. Weed, A.S. 2003. Reproductive strategy of *Pheropsophus aequinoctialis* L.: Fecundity, fertility, oviposition behavior; and influence of mole cricket egg chamber depth on larval survival. MS thesis, University of Florida, Gainesville, FL. 65 p.

Student research mentoring

2021 Pooja, Panwar, PhD dissertation. Dartmouth College, **Bird Acoustics**

2020 Sara Wisner, MS thesis. **Utilizing Climate Change Refugia for Climate Change Adaptation and Management in the Northeast**. University of Massachusetts Amherst, Northeast Climate Adaptation Science Center.

2018 Hunter Stanke, MS thesis. **Unlocking the forest inventory and analysis database: Applications to nation-wide forest health monitoring.** Michigan State University

2017 Isabel Mullin, Senior thesis project. **Scale-dependent effects of landuse types on water quality within northeastern National Parks.** University of York, UK intern.

2011 Tessa Scott, Senior thesis project. **Interactive effects of (*Mecinus janthiniformis*) herbivory and varying soil resource conditions on the performance of Dalmatian toadflax, (*Linaria dalmatica*)**, University of Idaho. Poster received 1st place in student competition at the Entomological Society of America's Pacific Branch meeting, Portland, OR.

2011 Jess Inskeep, Senior thesis project. **Explaining spatio-temporal patterns of impact to Dalmatian toadflax (*Linaria dalmatica*) by the stem-mining weevil *Mecinus janthiniformis*: Effects of host quality and attack intensity on weevil population growth**, University of Idaho. Poster received 1st place in student competition at the 2012 Entomological Society of America's annual meeting, Knoxville, TN.

2009 Alex Hazlehurt, **Impact of *Chrysolina a. asclepiadis* on two swallow-worts *Vincetoxicum* spp.**, University of Rhode Island.

2008 Kyler Sperry, **Host specificity of *Chrysolina a. asclepiadis:* a potential biocontrol agent of two swallow-worts *Vincetoxicum* spp.**, University of Rhode Island.

2008 Antionette Jones, **Adult preference of *Chrysolina a. asclepiadis*: a biological control candidate of swallow-worts (*Vincetoxicum*)**

2008 Lauren Paetznick, **Mass-gain of *Hypena opulenta* on swallow-worts,** University of Rhode Island.

2007 Ali Traver, **Development of *Hypena opulenta* (Lepidoptera: Noctuidae) on two swallow-worts *Vincetoxicum* spp.**, University of Rhode Island. Poster received 1st place in student poster competition at the Entomological Society of America's Eastern Branch meeting, Harrisburg, PA

Grantsmanship

2022 Bird Macrosystems (co-PI) with MSU, NFS – **Funded $750,000**

2021 Northeast regional coastal bird dynamics – not funded

2016 Eastern Forest regeneration dynamics, US NPS - **Funded $89,000**

2014 HWA population dynamics, USDA Forest Service – **Funded $145,000**

2013 Fire-bark beetle dynamics, USDA Forest Service – **Funded $85,000**

2013 Swallow-wort biological control, USDA Cooperative Agreement- **Funded $90,000**

2012 Swallow-wort biological control, Northeastern Regional IPM Program –**Funded $30,000**

2011 Biological control across landscapes, USDA NRI- University of Idaho- not funded

2009 Swallow-wort biological control, Northeastern Regional IPM Program-**Funded $25,000**

2008 Swallow-wort biological control, Northeastern Regional IPM Program –**Funded $50,000**

2007 Swallow-wort biological control, USDA Cooperative Agreement- **Funded $20,000**

Invited Seminars

2017 Annual meeting of the Eastern Branch of the Entomological Society of America, Newport, RI

2017 Dept. of Environmental Sciences, Dartmouth College, Hanover, NH

2016 Dept. of Forest and Rangeland Stewardship, Colorado State University, Fort Collins, CO

2016 Cold Regions Research lab, Army Corp., Hanover, NH

2014 University of New Hampshire's Biology Seminar Series, Durham, NH

2014 Eastern Branch of the Entomological Society of America, Williamsburg, VA

2013 Dept. of Envir. Science, College at Brockport, SUNY, Brockport, NY

2013 University of Georgia, Entomology Department, Athens, GA

2013 Pacific Branch of the Entomological Society of America, Stateline, NV

2013 Department of Plant and Soil Sciences, University of Vermont

2012 USDA-Interagency Research Forum on Invasive Species, Annapolis, MD.

2011 Idaho Weed Conference, Boise, ID.

Clearwater Management Weed Clinic, Orofino and Lewiston, ID.

2010 Northern Rockies Invasive Plant Council conference.

2009 Cambridge Entomology Society, MCZ Harvard University

USDA Interagency Research Forum on Invasive Species, Annapolis, MD.

2008 Canadian Invasive Species Symposium, Ottawa, Canada.

2007 Invasive plants on the horizon and more presented by Invasive Plant Council of New York State, Albany, NY

Specialized Skills and Training

Taxonomic

- General insect taxonomy and species-level identification of beetle taxa

Quantitative analysis

- Generalized linear and mixed models, uni- and multivariate techniques, non-parametric methods, time series analysis, and spatial statistics.

Modeling/Statistical Training

- 5 graduate level courses in statistics
- Occupancy Modeling course, December 2014
- Spatial statistics course, Washington State University, 2010
- ESRI geodatabase and spatial analysis online workshops
- R software workshop, McCall, Idaho, 11-12 Sept. 2010
- Time series analysis, uni- and multivariate and non-parametric statistics, population modeling, mixed effects and nonlinear modeling

Software

- Statistical: R, SAS, JMP, and MATLAB
- Spatial modeling: ArcGIS, SADIE, and BioSIM

Teaching Experience

2009 Instructor, ***University of Rhode Island***. Course: Introductory Entomology laboratory

2007-2008 Lecturer, ***University of Rhode Island***. Courses: Insects, Humans, and Disease and Biological Control

2008 Teaching Assistant, ***University of Rhode Island***. Course: Introductory Plant biology

2002 Teaching assistant, ***University of Florida***. Courses Introductory Entomology

Recent Meeting Presentations

2022 National Park Service's Inventory and Monitoring Annual Science Training, *rFIA: Unlock the USFS Forest Inventory and Analysis Database to Support Forest Monitoring in and Around Your Park*

2022 National Park Service's Inventory and Monitoring Annual Science Training, *Coupling acoustic recorders with point counts for land bird monitoring*

2020 Forest Ecosystem Monitoring Cooperative annual meeting, Burlington, VT. *Community trends in forest bird abundance within northeastern National Parks.*

2019 Forest Ecosystem Monitoring Cooperative annual meeting, Burlington, VT. *Trends in invasive plants in eastern National Parks.*

2018 Forest Ecosystem Monitoring Cooperative annual meeting, Burlington, VT. *Long-term forest health monitoring in eastern National Parks.*

2017 Boston Harbor Islands Science Symposium, Boston, MA *Long-term monitoring programs in Boston Harbor Islands NRA*.

2015 IUFRO, Bariloche, Argentina. *Spatio-temporal dynamics of southern pine beetle Dendroctonus frontalis and its predator Thanasimus dubius.*

2015 USDA-Interagency Research Forum on Invasive Species, Annapolis, MD. *Effects of host resistance and predation on the population dynamics of the hemlock wooly adelgid in the western US.*

2013 Entomological Society of America's Annual Meeting, Austin, TX. *Geographic variation the population dynamics of the southern pine beetle and its clerid predator.*

2013 IUFRO, Banff, Canada. *Comparative analysis of climate on forest insect population dynamics.*

2013 Pacific Branch of the Entomological Society of America, *Density-dependence, precipitation and herbivory by a biological control agent influence landscape dynamics of the invasive plant Linaria dalmatica.*

2012 Entomological Society of America's Annual Meeting, Knoxville, TN. *Consequences of climate change for biotic disturbances in North American forests.*

Awards

2008 and 2009 - URI graduate assistants travel award, University of Rhode Island

2007 - Cedric C Jennings Scholarship, University of Rhode Island

- URI graduate assistants travel award, University of Rhode Island

2001 - Entomology award, University of Maine

Service

2017- 2020 Chair of Tunbridge VT Conservation Commission

2017- 2019 Speaker, Woodstock District Middle Schools' Web of Science instructor

2014 Organizer: "Consequences of changing trophic interactions on forest insect population dynamics" at 2014 IUFRO World Congress, Salt Lake City, UT USA, Oct 5-11.

2012 Organizer: "Linkages Between Climate Change And Global Insect Pestilence: From Theory to Practice", at the Entomological Society of America's annual meeting in Knoxville, TN, from 11-14 November.

Article Reviewer for: Agricultural and Forest Entomology, Biological Control, Biological Invasions, Biological Reviews, Biocontrol and Science Technology, Bioscience, Canadian Journal of Botany, Ecology, Ecological Applications, Ecosphere, Entomologia Experimentalis et Applicata, Environmental Entomology, Forest Ecology and Management, International Journal of Pest Management, Journal of Applied Ecology, Journal of Forestry, Journal of Insect Science, Pest Management Science, PLOS One, and Population Ecology.

Professional Memberships

AAAS, Ecological Society of America, Entomological Society of America, International Union of Forest Research Organization