



Drier Conditions, More Wildfire, and Heightened Concerns About Forest Management in Eastern Oregon

Joel Hartter, Lawrence C. Hamilton, Mark J. Ducey, Angela E. Boag, Nils D. Christoffersen, Ethan P. Belair, Paul T. Oester, Michael W. Palace, and Forrest R. Stevens

Summary

In eastern Oregon, a semi-arid region dominated by dry forest, warming over the past few decades is affecting the productivity and health of forests that are central to the region's landscapes, economy, and culture. A warmer and drier climate will likely bring more frequent and severe wildfires and increase stress on water availability. The impacts will be significant both for natural resources and human welfare, especially in the Blue Mountains and adjacent communities. Public opinion surveys in this region show that recognition of human-caused climate change is low, but there is a high level of agreement that forest conditions are worsening and that wildfires pose a major risk. Support is high for active forest management (forest thinning, surface fuel reduction) and restoration to reduce the likelihood of dangerous, high-severity wildfires.

Introduction

The Communities and Forests in Oregon (CAFOR) project focuses on conditions and management of forest lands across private and public ownership, and implications for climate change adaptation in seven counties (Baker, Crook, Grant, Umatilla, Union, Wallowa, and Wheeler) in eastern Oregon.¹ This brief examines climate change and forest conditions in eastern Oregon. Local perceptions are characterized in the context of warmer and drier conditions, denser forests on public compared to private lands, and the need for restoration activities to improve forest health. The Blue Mountains of eastern Oregon

KEY FINDINGS



Eastern Oregon is experiencing warmer, drier conditions and increased numbers of wildfires.



Surveys of the Oregon public find that forest health and wildfire threats are widely shared concerns.



The more knowledgeable residents say they are about forest management, the more likely they are to say that forests are becoming less healthy.



Majorities support active forest management (forest thinning, surface fuel reduction) and restoration to reduce the likelihood of high-severity wildfires that would damage forest resources and threaten local communities.

illustrate the broader conversation surrounding public lands and wildfire in the American West. Federal agencies and local communities are grappling with how to achieve the pace and scale of forest restoration necessary given ongoing fuel buildup and lengthening fire seasons amid resource limitations and regulatory processes. In an effort to inform policy development around natural resource management, public attitudes regarding improving forest conditions and mitigating wildfire risk are salient locally, and should be used to rally support for active management on forests of the American West.

Forests in Eastern Oregon

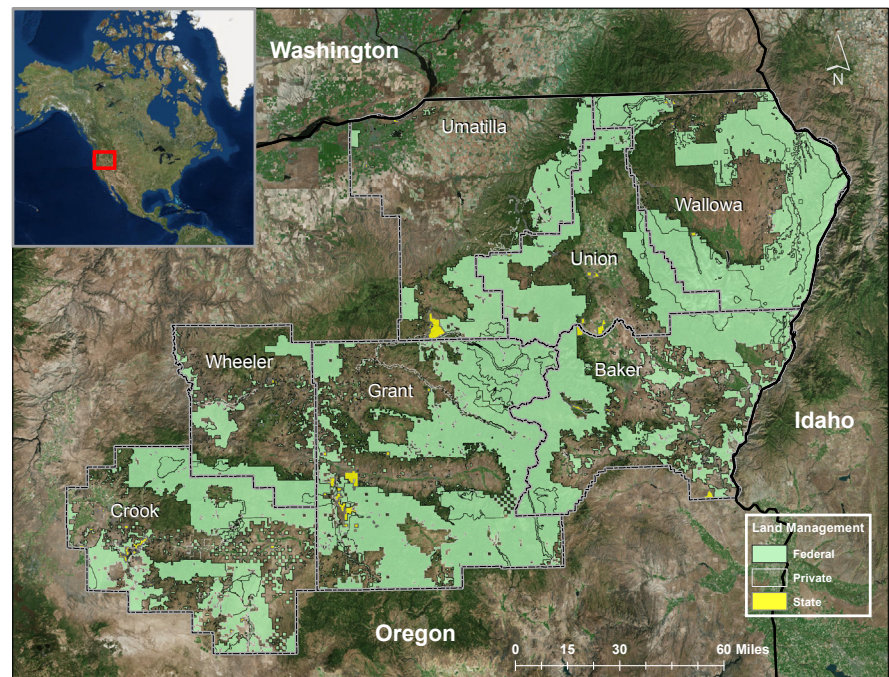
The Inland Northwest spans 170,000 square miles between the Cascade Mountains to the west and the Rocky Mountains to the east. Within it are the Blue Mountains (Figure 1), a 15.3-million-acre terrain of rugged peaks, steep valleys, and plateaus ranging in elevation from 900 feet to more than 9,800. The Cascades create a rain shadow over the Blue Mountains that keeps average annual precipitation to 22.4 inches.

In recent decades, the region has experienced reduced forest vigor and increased mortality of trees due to wildfire, insects, and disease. At the same time, fire exclusion and low levels of active management (for example, reduced timber harvests) have led to denser forests—particularly those on public lands.

Changing Climate, Wildfires, and Forests

Our analysis of climate data, shown in Figure 2, finds a clear pattern of summer warming correlated with the rise of fires. Panel (a) shows summer temperatures in eastern Oregon rising in the step-pause-step pattern that is a signature of modern climate change—although the pattern is more pronounced in the eastern Oregon case. Panels (b) and (c) show that this warming has recently been accompanied by increasing dryness and drought. Panel (d) depicts the regional frequency of wildfires greater than 100 acres, together with a second line showing predictions based on a statistical model that takes into account climate, number of small lightning ignitions, and other factors such as increased fuel load,

FIGURE 1. STUDY REGION—SEVEN COUNTIES IN THE BLUE MOUNTAIN PROVINCE IN EASTERN OREGON

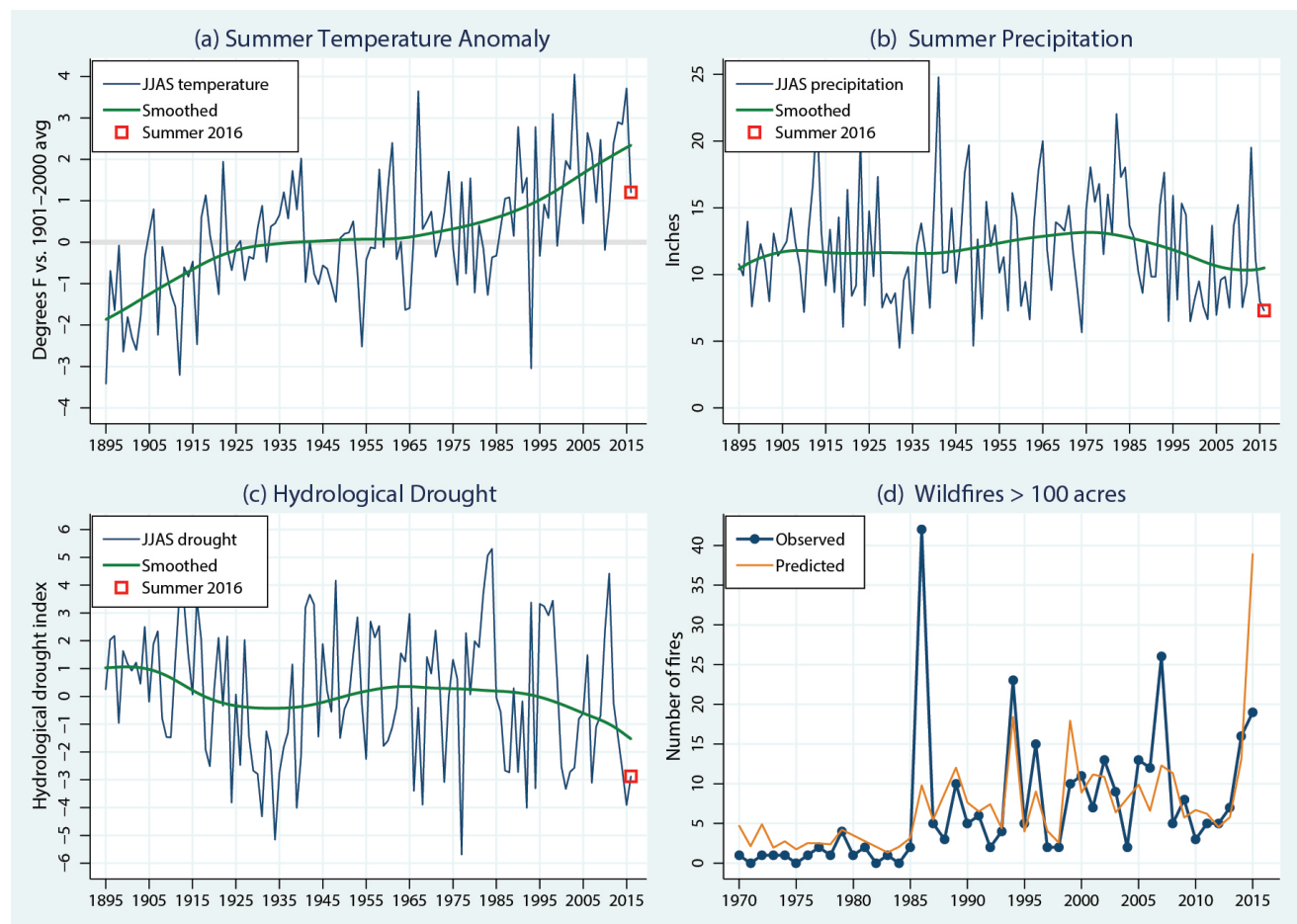


Source: ESRI, U.S. Forest Service

less active management, and more human-caused fire ignitions. What is important is that actual, observed fire frequency can be approximated (or predicted) by combining fire season temperature and rainfall, and lightning. At the same time, fire exclusion and low levels of active management (for example, reduced timber harvests) have led to denser forests—particularly those on public lands.

Climate change will impact the Blue Mountains in significant ways. In the northwest United States, the annual average temperature increased by approximately 1.26°F from 1901 to 2012,² and by the 2080s temperatures in the Blue Mountains specifically are projected to increase an average 6°F in winter and 9°F in summer—the height of the wildfire season. Despite

15 percent more precipitation projected in winter, more of this precipitation will fall as rain, resulting in a 69–72 percent decrease in April 1 snowpack and 90 percent snowmelt occurring 23–25 days earlier than the historical trend. In addition, summers precipitation will decline by 17 percent, resulting in drier conditions in summer and fall.³ These increases in temperature combined with changes in the timing and amount of precipitation, as well as earlier snowmelt, will likely lead to reduced soil moisture in summer and early fall, further stressing trees and increasing fire risk during the fire season.

FIGURE 2. EASTERN OREGON FIRE SEASON (JUNE, JULY, AUGUST, SEPTEMBER) CLIMATE AND WILDFIRES

Note: Negative values indicate dryness or drought; positive values indicate wetter conditions. **Source:** NOAA, U.S. Forest Service Fire Statistics System (FIRESTAT); see J. Hartter et al., “Does It Matter If People Think Climate Change Is Human Caused?,” *Climate Services* (in press) and L.C. Hamilton et al., “Wildfire, climate and perceptions in northeast Oregon,” *Regional Environmental Change* 16: 1819–1832 (2016).

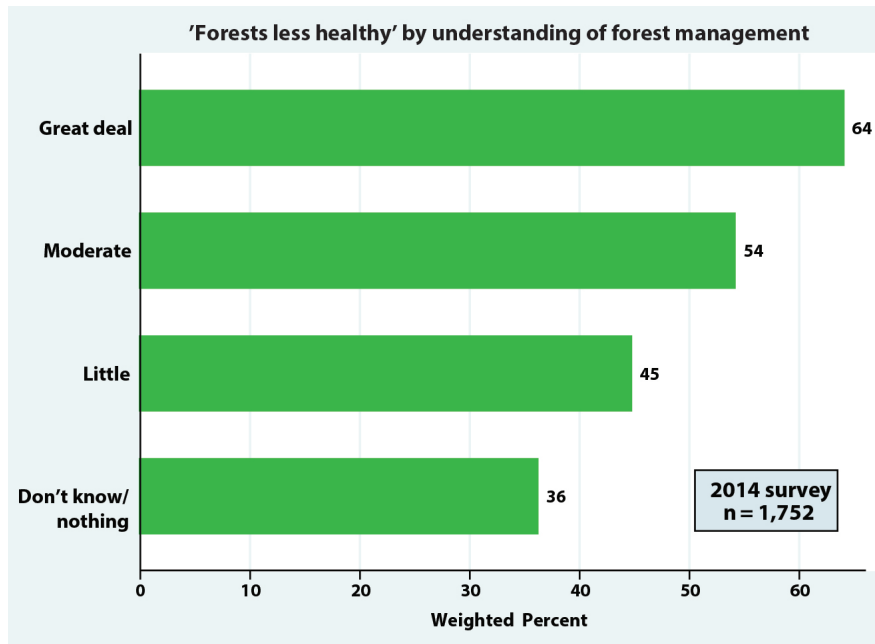
Perceptions of Forest Health

The CAFOR project conducted a general-public telephone survey comprising 1,585 interviews in Wallowa, Union, and Baker counties in 2011,⁴ 1,752 interviews in these three counties plus Crook, Wheeler, Umatilla, and Grant in 2014,⁵ and an additional 651 interviews in all seven counties in 2015.⁶ A mail survey of 454 non-commercial owners of 10 acres or more of forest in Baker, Union, and Wallowa counties was conducted in fall 2012.⁷

In the 2011 and 2014 telephone surveys, we asked respondents their opinions about forest conditions. From both surveys, residents expressed concern regarding the health of regional forests, although they did not necessarily attribute perceived threats to climate change. Sixty-two percent of forest owners in the 2012 survey said there is a high risk of wildfire occurring on public lands (that is, national forests), but only 40 percent considered the risk high on private lands. In the 2014 survey of the general public, more than half said that forests now are

less healthy than they were 20 years ago, and these negative assessments were most common among people claiming the most knowledge about forest management (Figure 3).

FIGURE 3. PERCENTAGE WHO SAY THAT FORESTS ARE LESS HEALTHY NOW THAN 20 YEARS AGO, BY SELF-ASSESSED KNOWLEDGE OF FOREST MANAGEMENT; DATA FROM 2014 TELEPHONE SURVEY OF 7 COUNTIES IN EASTERN OREGON (BAKER, CROOK, GRANT, UMATILLA, UNION, WALLOWA, WHEELER)



Source: CAFOR survey, August/September 2014

Forest Conditions and More Wildfires

Analysis of inventory data supports residents' perceptions of declining forest conditions in the Blue Mountains. Many plots in the Blue Mountains, both public and private, also exceed forest density management guidelines in place to minimize the risk of pest damage and wildfire. However, because of less timber harvesting on public lands than on private, public forests tend to have greater amounts of woody fuels on the ground as well as higher densities of live and dead standing trees (Figure 4). The poor health of these forests will likely be exacerbated by a warming climate, thus further increasing the risk of catastrophic wildfire.

Public Support for Active Management

Public opinion about climate change is deeply divided in eastern Oregon along partisan lines, as it is elsewhere in the United States. Indeed, compared with nationwide perceptions, fewer people in eastern Oregon believe that human activities are changing the climate,⁸ though there is widespread concern and agreement in this region about wildfire threats.⁹ Most people think that forests, particularly those on public lands, are susceptible to a serious risk for wildfire and that the problem needs addressing: 58 percent of respondents in the 2014 general public telephone survey and 89 percent of forest owners in the 2012 mail survey supported active

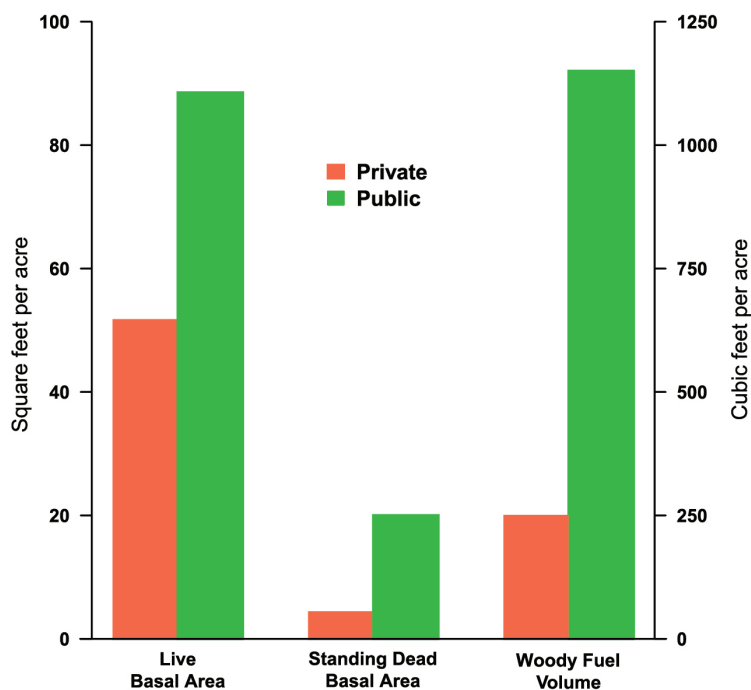
forest management (forest thinning, surface fuel reduction) and restoration to reduce the likelihood of high-intensity wildfires.

Conclusions and Policy Implications

Forests continue to be an important part of the heritage of western lands, and their management is a crucial issue of our time. As eastern Oregon experiences warmer and drier conditions, the changing patterns in the timing of precipitation are significant. Reduced winter snowfall and increases in early spring rainfall will decrease the duration of water availability in forests and grasslands over the year, which will mean that water will not be stored in the high country long into the summer. Water will fill streams and be transported away from forests (which are already dense), leaving less water available during the warmest months. At the same time, dense stands in these forests intercept more rainfall, exacerbating moisture stress for trees and increasing the presence of pests and incidence of disease as well as reducing soil recharge and runoff.

Without active management to alleviate this growing risk, the social, economic, and ecological costs will be severe. About three-fifths of respondents to our 2014 and 2015 surveys consider active management on forests a high priority. Further, concern and knowledge about changing forest conditions, rather than economic gains, appear to be driving the motivation for increasing levels of management activities on both public and private lands. The treatments needed and proposed, supported by public sentiment, are restoration treatments.

FIGURE 4. FOREST STAND DENSITY, STRUCTURE, AND FUELS BY OWNERSHIP TYPE



Note: Basal area is a measure of forest density that represents the cross-sectional area of trees on a given acre of land. **Source:** U.S. Forest Service Forest Inventory and Analysis (FIA)

The commercial value in removing small-diameter timber and other built-up fuels is relatively small, so the economic return of implementing these treatments (that is, paying for assessment, logistics, and the treatments themselves) are likely not high. However, investing in restoration now could provide economic benefits in the future as well as protect the forest from loss from insects, disease, and fire. Added benefits to restoration include retaining local jobs and milling infrastructure, essential to retaining future management options and keeping restoration costs down.

There is much concern regarding wildfires in the Blue Mountains¹⁰ and across the Inland Northwest.¹¹ Active forest management in public and private lands has strong public support in the region, and forest restoration

treatments are critical to the resilience of human communities as well as ecosystems. However, the costs of active management in both private forests and federal lands are high, constraining timely action. Other limitations for active management on public lands include funding constraints and forest projects (for example, restoration harvests or commercial harvests) that are under litigation. Barriers that hamper mitigation treatments such as overly cumbersome smoke management rules should be reviewed and updated to reflect the current social and ecological context. Cooperation is needed among landowners (for example, marketing forest products, sharing equipment costs, and creating a cohesive wildfire mitigation strategy across ownership boundaries), yielding an “all lands approach.” Engaging private forest owners who

are not actively managing their lands and developing new partnerships to support active management on public lands are essential to addressing the threats confronting the Blue Mountains and the Inland Northwest.

Endnotes

1. A key aim of CAFOR is to provide an integrated social and biophysical assessment of vulnerability and adaptation to climate change.
2. J.T. Abatzoglou, D.E. Rupp, and P.W. Mote, “Seasonal Climate Variability and Change in the Pacific Northwest of the United States,” *Journal of Climate* 27 (2014): 2125–42.
3. G. Mauger and N. Mantua, “Climate Change Projections for USFS Lands in Oregon and Washington” (Seattle: Climate Impacts Group, University of Washington College of the Environment, 2011), http://cses.washington.edu/picea/USFS_ORWA/pub/USFS_ImpactsReport_DRAFT_GMauger.pdf.
4. L.C. Hamilton, J. Hartter, F. Stevens, R.G. Congalton, M. Ducey, M. Campbell, D. Maynard, and M. Staunton, “Forest Views: Shifting Attitudes Toward the Environment in Northeast Oregon” (Durham, NH: Carsey Institute, 2012), <http://scholars.unh.edu/carsey/162/>; L.C. Hamilton, J. Hartter, T.G. Safford, and F.R. Stevens, “Rural Environmental Concern: Effects of Position, Partisanship and Place,” *Rural Sociology* 79, no. 2 (2014): 257–81, doi: 10.1111/ruso.12023.
5. A.E. Boag, J. Hartter, L.C. Hamilton, F.R. Stevens, M.J. Ducey, M.W. Palace, N. Christoffersen, and P.T. Oester, “Forest Views: Shifting Attitudes Toward the Environment in Northeast Oregon” (Durham, NH: Carsey School of Public Policy, 2015), <http://scholars.unh.edu/carsey/238/>; A.E. Boag, L.C. Hamilton, J. Hartter, F.R. Stevens, M.W. Palace, and M.J. Ducey, “Shifting Environmental Concern in Rural Eastern Oregon: The Role of Demographic and Place-Based Factors,” *Population and Environment* (2016), doi: 10.1007/s11111-016-0261-z; L.C. Hamilton, J. Hartter, B.D.

Keim, A.E. Boag, M.W. Palace, F.R. Stevens, and M.J. Ducey, "Wildfire, Climate, and Perceptions in Northeast Oregon," *Regional Environmental Change* 16 (2016): 1819–32, doi: 10.1007/s10113-015-0914-y.

7. J. Hartter, F.R. Stevens, L.C. Hamilton, P.T. Oester, R.G. Congalton, M.J. Ducey, and M. Crowley, "Forest Management and Wildfire Risks in Inland Northwest" (Durham, NH: Carsey Institute, 2014), <http://scholars.unh.edu/carsey/211/>; J. Hartter, F.R. Stevens, L.C. Hamilton, R.G. Congalton, M.J. Ducey, and P.T. Oester, "Modeling Associations Between Public Understanding, Engagement and Forest Conditions in the Inland Northwest, USA," *PLOS ONE* 10, no. 2 (2015): e0117975, doi: 10.1371/journal.pone.0117975.

8. See Hamilton et al. (2012) for results of the 2011 telephone survey.

9. Hamilton et al. (2014).

10. J. Hartter, F.R. Stevens, L.C. Hamilton, R.G. Congalton, M.J. Ducey, and P.T. Oester, "Perceptions of Wildfire Risk in the Inland Northwest, USA: A Model of Public Understanding and Engagement," *PLOS ONE* (2015), doi: 10.1371/journal.pone.0117975.

11. American Forest Foundation, "Western Water Threatened by Wildfire: It's Not Just a Public Lands Issue" (Washington DC: American Forest Foundation, 2016), https://www.forestfoundation.org/stuff/contentmgr/files/1/3d98bbe1b03a0bdf4c726534d438b0ab/misc/final_fire_report.pdf.

About the Authors

Joel Hartter is an associate professor in the Environmental Studies Program, University of Colorado, Boulder, and a faculty fellow at the Carsey School of Public Policy, University of New Hampshire, Durham. Questions about this report can be addressed to joel.hartter@colorado.edu.

Lawrence C. Hamilton is a professor in the Department of Sociology and a senior faculty fellow in the Carsey School of Public Policy, University of New Hampshire, Durham.

Mark J. Ducey is a professor in the Department of Natural Resources and the Environment and a senior faculty fellow at the Carsey School of Public Policy, University of New Hampshire, Durham.

Angela E. Boag is a PhD candidate in the Environmental Studies Program, University of Colorado, Boulder.

Nils D. Christoffersen is the executive director of Wallowa Resources, Enterprise, Oregon.

Ethan P. Belair is postdoctoral research associate in the Department of Natural Resources and the Environment, University of New Hampshire, Durham.

Paul T. Oester is an extension forester in the College of Forestry, Oregon State University, La Grande.

Michael W. Palace is an associate professor in the Department of Earth Sciences and a research associate professor at the Earth Systems Research Center, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, Durham.

Forrest R. Stevens is an assistant professor in the Department of Geosciences, University of Louisville, Louisville, Kentucky.

Acknowledgments

The Communities and Forests in Oregon (CAFOR) Project is conducted in cooperation with the Carsey School of Public Policy and supported by the U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) Competitive Grant No. 2014-68002-21782. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily represent the views of NIFA or the USDA.



University of New Hampshire
Carsey School of Public Policy

The Carsey School of Public Policy at the University of New Hampshire is nationally recognized for its research, policy education, and engagement. The school takes on the pressing issues of the twenty-first century, striving for innovative, responsive, and equitable solutions.

Huddleston Hall • 73 Main Street • Durham, NH 03824
(603) 862-2821

TTY USERS: DIAL 7-1-1 OR 1-800-735-2964 (RELAY N.H.)

carsey.unh.edu