

Shifting environmental concern in rural eastern Oregon: the role of demographic and place-based factors

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Abstract Public opinion can impact the success of natural resource management policies and programs. In this case study, we assess the degree to which demographic and place-based factors are associated with changing public opinions on climate change, wolves, renewable energy, and land development regulations in rural northeast Oregon. Based on cross-sectional telephone survey data collected in 2011 and 2014, our observations suggest declining support for eliminating wolves, increased support for renewable energy, and increasingly favorable views of regulations that limit development in rural landscapes. We find that while demographic change and local events contribute to some of the observed shifts in opinion on wolves, exogenous factors acting at state and national levels likely contribute to shifting opinions on climate change, renewable energy, and land use regulations.

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Introduction

Collaborative and community-based natural resource management frameworks recognize that public support and buy-in is crucial for developing and implementing successful environmental policies and programs at multiple scales (Gruber 2010; Measham and Lumbasi 2013). Although national surveys and polls like the General Social Survey and Gallup poll repeat environmental questions to gauge changes in public opinion over time (e.g., Scruggs and Benegal 2012), repeated surveys on environmental perceptions at county or regional scales are notably less common. Exceptions include New Hampshire’s Granite State Poll (GSP 2011–2015) (Hamilton et al. 2015) and some issue-specific studies such as those on transportation (Wang and Chen 2012), energy infrastructure siting (Upham 2009), and wolves (Schanning 2009). Many environmental issues require context-specific management that can be adapted to changes over time (Cash and Moser 2000). For example, in parts of the rural USA where historically resource-based economies are declining, there is an influx of individuals drawn by lifestyle or environmental amenities (*amenity/decline* communities in the typology of Hamilton et al. 2008). Repeated regional surveys might detect environmental attitudes in transition, rather than attitudes at a single snapshot in time, and test the extent to which changes have occurred due to shifting demographic or social-structural components (Vorkinn and Riese 2001; Xiao and Dunlap 2007). Information on changing (or stable) attitudes and their causes should help local decision makers adapt to a shifting sociopolitical climate.

While there is still much debate on how social systems and individual psychology interact to shape values and beliefs surrounding environmental issues, several social-structural variables are well-established predictors of environmental concern (Dietz et al. 2002; Fransson and Garling 1999; Jones and Dunlap 1992). For example, studies indicate that urban residents are more likely than rural residents in the USA to exhibit higher levels of environmental concern (Fransson and Garling 1999). Other research extends these findings, showing that in historically natural resource-dependent rural communities environmental values are shifting along with changing livelihoods and demographics, as “amenity-seeking” urban transplants move to remote rural regions altering the newcomer—old timer mix (Abrams and Bliss 2013; Emmet Jones et al. 2003; Hamilton et al. 2010).

This research brief examines survey data from one such region, northeast Oregon, characterized by an amenity/decline economy where steep declines in resource-based employment (primarily logging) through the 1990s changed local livelihoods and communities substantially (Boag et al. 2015; Hamilton et al. 2014). While the population of the region has been relatively stable since the mid-1990s, people leaving to seek employment in urban areas or other states has tended to be balanced by retirees and second home-owners moving to the area. These newcomers often come from urban areas, do not work in natural resource-related industries, and

are attracted by natural amenities (Gosnell and Abrams 2011). They may bring with them a more *urbanormative* perspective on the environment (Thomas et al. 2011).

Two cross-sectional telephone surveys of northeast Oregon residents, conducted in 2011 and 2014, found signs of shifting public opinions regarding several locally contentious environmental issues—climate change, rules for environmental protection limiting development, the reintroduction of wolves, and renewable energy development (for background and survey methods see Boag et al. 2015; Hamilton et al. 2012, 2014). We posed questions on these issues because they are locally controversial. Wolves reintroduced in western Idaho periodically predate livestock in the area, while wind energy development, property parcelization, and second home-building have accelerated. At the same time, the frequency and severity of wildfires and drought have increased since the late 1990s, all generating heated local debate (Hamilton et al. 2014, 2016; Walker and Hurley 2011). Environmental regulations also contributed to logging industry declines in the early 1990s (Christoffersen 2005). Significantly more respondents in 2014 said environmental rules limiting development had been good for the area (29 vs. 23 %), while fewer supported the elimination of wolves (27 vs. 33 %). The most notable change was a 10-point increase from 2011 to 2014 in support for more renewable energy development (59 vs. 49 %). We saw no statistically significant change in the proportion agreeing that climate change is happening now, caused mainly by human activities (41 vs. 37 %) (Boag et al. 2015). Viewed together, these changes generally suggest a shift in the direction of greater environmental concern among northeast Oregon residents. Below, we analyze demographic and place-based factors as possible explanations.

We hypothesize that large numbers of urban “amenity” owners moving to the region in the time between surveys contributed to the observed shifts. We also hypothesize that the changes in opinion on wolves will show inter-county differences due to the localized and county-specific nature of wolf-rancher conflict. However, we expect opinion shifts on climate change and renewable energy will not vary by county, but rather track shifts at the state and national levels due to exogenous factors like political rhetoric and media coverage (Brulle et al. 2012).

Survey methods and questions

We conducted telephone surveys in 2011 and 2014 as part of the ongoing Communities and Forests in Oregon (CAFOR) research project, which seeks to understand the socioenvironmental connections between communities, forests, and natural resource management issues in eastern Oregon (Hartert et al. 2014). The survey questions assessed local perceptions of forest management and environmental policies, as well as local land use priorities. The 2011 survey took place in Wallowa, Union, and Baker counties. For the 2014 survey, our focus expanded to include four additional Oregon counties (Boag et al. 2015; Hamilton et al. 2012). Here, we focus just on the three counties common to both surveys (Baker, Union, Wallowa; combined population below 50,000). Almost half the land area is managed by the federal government, including the Malheur, Umatilla, and Wallowa-Whitman National Forests, as well as the Hells Canyon National

Recreation Area and the Eagle Cap Wilderness. The much-publicized occupation of the Malheur Wildlife Refuge in winter 2016 highlights the controversial nature of natural resource management in eastern Oregon and the western USA generally (Feuer 2016). This region has experienced economic declines and demographic change, including an aging population, typical of many rural areas in the USA. Union and Wallowa county's populations shrank slightly from 2011 to 2014, while Baker County's population increased marginally (Table 1) (US Census 2014). The median age of Baker and Wallowa county residents is approximately 10 years older than Oregon's median age, while Union county has the same median age as the state (39 years). Median incomes in these three counties are below the national median household income of \$51,939, and the percent of college graduates, ranging from 20 to 22.5 %, is also below the national average of 32 % (US Census 2014).

The CAFOR surveys were initially designed to explore public perceptions of forest conditions, management, and wildfire risk, and how these relate to other areas of environmental concern. Trained personnel at the University of New Hampshire Survey Center conducted 1585 telephone interviews in these three counties in 2011, and 802 more (along with additional interviews in four other counties) in 2014. Calls were made to randomly selected mobile and landline numbers, achieving response rates of 48 % (2011) and 33 % (2014) as calculated by AAPOR definition 4 (AAPOR 2006). Individual adults were randomly selected in each household, with callbacks as needed. The calls lasted 10 to 15 min each, all completed between August and October of 2011 or 2014. In both years, we deliberately oversampled the population of forest landowners (owning 10 or more acres of forest) in order to better understand their views. Probability weights are applied to all analyses to adjust for bias involving number of people in a household, deliberate oversampling of forest landowners, county population, and to better match regional demographics (Boag et al. 2015).

We compared the social-structural data collected by the telephone surveys in 2011 and 2014 using design-based *F* tests (Rao and Scott 1984) to identify potentially significant demographic changes between samples from these 2 years, which in turn might contribute to shifts in public opinion. The environmental questions asked in both surveys (Table 2) were framed in a policy context. Some represent general topics covered on other surveys in other resource-dependent rural regions (such as environmental protection and climate change) (Hamilton et al. 2014). Others (such as the reintroduction of wolves) are salient, politically charged issues in eastern Oregon.

Table 1 2014 American Community Survey estimates for demographic variables in Wallowa, Union, and Baker counties (2013 for median HH income and education) (US Census 2014)

	Population	Pop. Change 2011-2014 (%)	Median age (years)	Median household income (2013 USD)	Percent college graduate or higher (2013) [%]
Baker	16,018	+0.11	48.4	\$40,348	20.5
Union	25,652	-0.76	39.2	\$41,784	21.5
Wallowa	6814	-2.57	52.4	\$40,204	22.3

Table 2 Environmental questions carried on both the 2011 and 2014 surveys

Question	Collapsed binary response
<i>Climate</i> Which of the following three statements do you personally believe? That climate change is happening now, caused mainly by human activities; that climate change is happening now, but caused mainly by natural forces; that climate change is not happening now	Coded 1 now/human, 0 otherwise
<i>Rules</i> Have conservation or environmental rules that restrict development generally been a good thing for this area, a bad thing, or have they had no effect here?	Coded 1 environmental rules good, 0 otherwise
<i>Renewables</i> For the future of this country, which do you think should be a higher priority: increased exploration and drilling for oil or increased use of renewable energy sources such as wind and solar?	Coded 1 renewable energy, 0 otherwise
<i>Wolves</i> Which of the following four statements about wolves in eastern Oregon comes closest to your personal beliefs? That wolves should be eliminated from eastern Oregon; that limited hunting of wolves should be allowed; that wolves should not be hunted, but landowners compensated for losses; that wolves should be hunted and no landowner compensation is needed	Coded 1 eliminate, 0 otherwise

Models

To assess effects of demographic change, we ran weighted logit regressions of responses to environmental questions on sex, income, age, education, political party affiliation, forest ownership, newcomer status (moved to the area within last 10 years), year-round versus part-time seasonal residence, and year as independent variables. We also included an education-by-party interaction term; many previous studies have found such interactions important regarding views on climate change and other environmental issues (e.g., Hamilton et al. 2010, 2014). Finally, we assessed place effects by including county of residence, as some of the issues are more salient in specific communities. For example, wolves receive significant attention in Wallowa County due to its proximity to their home range in Idaho, potential for a resident wolf population, and frequent livestock predation (Wallowa County Chieftain 2014).

This regression design tests whether the 2011–2014 shift in environmental views remains significant after we control for individual demographic variables and indicators for place (county-specific dynamics). If *year* remains a significant predictor after adjusting for individual characteristics, that would suggest that non-demographic influences such as state or national-level events, rhetoric, and/or media coverage may play a role. Data were analyzed using STATA 13.1 (StataCorp 2013).

Results and discussion

Comparing demographic characteristics of respondents in 2011 and 2014, the significant changes were in mean age and proportion of seasonal residents (see Supplementary Information Table 1). Mean age declined from 52 in 2011 to 48 in

2014. Proportion of seasonal residents (who spend part of the year living elsewhere) increased significantly from 3.7 to 8.7 %, but the overall proportion of newcomers (arriving in the county within the last 10 years) showed virtually no change (27.2–27.7 %). This finding contradicted our hypothesis that newcomers from urban centers moving to the region contributed to the observed increase in environmental concern between 2011 and 2014. We investigated those who comprised the higher proportion of seasonal residents in 2014 and found that the increase was partially due to a significant increase from 1.2 to 3.2 % in the proportion of respondents who were seasonal residents and also newcomers (i.e., more newcomers lived in the region seasonally in 2014 compared to 2011). We tested the inclusion of a seasonal \times newcomer interaction term; however, it did not improve any of the four models (Wald tests, $p > 0.05$). We also observed nonsignificant shifts in political party identification. The proportion of self-identified Democrats declined by approximately 5 % from 2011 to 2014, corresponding with a 4 % drop in the number of registered Democrats in these three counties over the same period (State of Oregon 2015). In turn, the proportion of self-reported Independents rose by approximately 4 %.

Table 3 shows results from regression of the four environmental questions (defined in Table 2) carried on both surveys. We found no significant differences between cell phone and landline respondents. While demographic variables significantly affect responses to all four questions, year of survey (2011 or 2014) also has significant net effects on three of them: views about environmental regulations, renewable energy, and climate change. These year effects, net of individual characteristics, suggest that macro-social exogenous factors contributed to the shift in local opinions. Such exogenous factors could include economic forces, media coverage, or changing political narratives from party leaders. Indeed, research has tied the decline in national concern about climate change from 2009–2011 to the economic collapse of 2008 (Scruggs and Benegal 2012), and the more recent recovery might conversely be contributing to increased acceptance and concern. Another study characterizes a Climate Change Threat Index (2002–2010) among the American public, which increases with the amount climate change coverage in the media (Brulle et al. 2012). Determining which of these factors may have contributed to the observed interannual shifts in opinion would require a more detailed survey addressing a broad array of topics, such as media consumption and economic confidence, which was beyond the scope of this study.

As noted above, there are two significant differences in the demographics of our 2011 and 2014 samples. The 2014 group is slightly younger and contains more seasonal residents. In general, age predicts support for renewable energy: younger respondents express greater support. Seasonal residents are less likely to agree that environmental rules limiting development have been good for their community, and more likely to say that wolves should be eliminated from eastern Oregon. This finding was unexpected. A similar study in Alberta found that hunters had more negative views of wolves (Sponarski et al. 2013), and hunting may be a driver of owning a seasonal residence in this region, but we did not ask about hunting in our survey. As we hypothesized, there are county-to-county differences in views about wolves. Residents of Wallowa County, where most of the wolf-rancher conflict

Table 3 Weighted logit regression of environmental views on individual background factors, county of residence, and survey year

Predictor	Dependent variable			
	Rules	Renewables	Wolves	Climate
Individual				
Female	-0.192	0.066	-0.419**	0.098
Age in years	-0.002	-0.013*	0.006	-0.010
Income	0.064	-0.035	0.028	-0.073
Education	0.340***	0.154*	-0.382***	0.196*
Party	-0.404	-0.883***	0.302	-0.122
Education×Party	-0.091	-0.034	0.127	-0.378***
Own forest	0.117	-0.002	-0.067	-0.019
Newcomer	0.246	0.415*	-0.940***	0.443*
Seasonal resident	-0.791*	0.123	0.937**	-0.439
County				
Baker	-0.364	-0.124	-0.690***	0.117
Union	-0.214	-0.274	-0.538**	0.176
Wallowa
Year (1 = 2014)	0.467**	0.374*	-0.310	0.409*
Intercept	-1.750**	0.717	0.410	-0.492
Estimation sample	1736	1736	1736	1736

Coefficients and tests are from weighted logit regression models

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

occurs (ODFW 2014; Wallowa County Chieftain 2014), were much more likely to say wolves should be eliminated. That opinions about wolves are affected particularly by location makes sense given what we know about the distribution of the wolves themselves; however, this result contrasts with a study in rural Minnesota showing no impact of proximity on attitudes toward wolves (Chavez et al. 2005).

Although the proportion of newcomers did not increase significantly between survey years, newcomers generally display greater environmental concern. Newcomers more often support renewable energy development, more often agree that climate change is happening and human-caused, and less often favor eliminating the wolves. While political party (coded -1 for self-identified Democrats, 0 for Independents and +1 for Republicans) is the most important predictor of support for renewable energy development over increased oil exploration and drilling (Democrats are much more likely to support renewables), party affiliation does not dominate the other predictors on all questions. We find education to be the most consistent factor predicting environment-related views. Those who completed college or a post-graduate degree are more likely to say environmental rules limiting

development have been good for the community, wind and solar development should be prioritized over oil extraction, wolves should not be eliminated, and climate change is occurring and is human-caused.

Conclusions

Comparing 2011 and 2014 survey data from three rural northeast Oregon counties that have changing demographics alongside relatively stagnant economies, we observed significant shifts in views on environment-related issues. Demographic change partially explains these changes, but after controlling for survey respondent demographic characteristics (notably, a younger respondent pool and more seasonal residents), we still see a significant shift in some views. Responses concerning the reintroduced population of wolves, an issue with high local salience, vary with individual background characteristics and county of residence but did not change between years once we controlled for demographics. Three environmental issues with state and national salience, on the other hand—renewable energy, environmental regulations, and climate change—exhibit 2011-to-2014 shifts that remain significant even when we control for individual demographic characteristics and county. We infer that these shifts reflect non-demographic social change, whether influenced by regional dynamics or broader, state- and national-level exogenous factors.

Our analysis focuses on demographic variables and place. Interestingly, political affiliation generally did not predict views, though education level predicted views on all four issues. Other studies have argued for the importance of social-psychological variables affecting environmental concern (e.g., Nisbet et al. 2008; Schultz 2005). To some degree, these correlate with place and demographic factors, making it challenging to interpret their separate effects. More research is needed to understand how individual psychology and cultural identity interact with social structure and place to change beliefs. Panel studies could be helpful to follow stability and change of environmental concern within individuals.

Although we see a clear change on some issues from 2011 to 2014, we recognize that two time points do not define a trend. Changes could continue in the same directions, or alternatively could level off or reverse. Subsequent surveys of this region are needed for a longer-term perspective. Similarly, repeated surveys in other rural regions of the USA would add information about how widely, and under what conditions, such multi-issue changes in environmental opinion occur.

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References

- Abrams, J., & Bliss, J. C. (2013). Amenity landownership, land use change, and the re-creation of “working landscapes”. *Society & Natural Resources*, 26(7), 845–859. doi:10.1080/08941920.2012.719587.
- American Association for Public Opinion Research (AAPOR). (2006). *Standard definitions: Final disposition of case codes and outcome rates* (4th ed.). Lenexa, KS: American Association for Public Opinion Research.
- Boag, A. E., Hartter, J., Hamilton, L. C., Stevens, F. R., Ducey, M. J., Palace, M. W., Christoffersen, N., & Oester, P. T. (2015). *Forest views: Shifting attitudes toward the environment in Northeast Oregon*. Durham, NH: Carsey School of Public Policy. <http://scholars.unh.edu/carsey/238/>.
- Brulle, R. J., Carmichael, J., & Jenkins, J. C. (2012). Shifting public opinion on climate change: An empirical assessment of factors influencing concern over climate change in the US, 2002–2010. *Climatic Change*, 114(2), 169–188. doi:10.1007/s10584-012-0403-y.
- Cash, D. W., & Moser, S. C. (2000). Linking global and local scales: designing dynamic assessment and management processes. *Global Environmental Change*, 10(2), 109–120. doi:10.1016/S0959-3780(00)00017-0.
- Chavez, A. S., Gese, E. M., & Krannich, R. S. (2005). Attitudes of rural landowners toward wolves in northwestern Minnesota. *Wildlife Society Bulletin*, 33(2), 517–527. doi:10.2193/0091-7648(2005)33[517:AORLTW]2.0.CO;2.
- Christoffersen, N. (2005). Willowa resources: Gaining access and adding value to natural resources on public lands. In *Natural resources as community assets: Lessons from two continents* (pp. 147–180). <http://sandcounty.net/assets>.
- Dietz, T., Kalof, L., & Stern, P. C. (2002). Gender, values, and environmentalism. *Social Science Quarterly*, 83(1), 353–364. doi:10.1111/1540-6237.00088.
- Emmet Jones, R., Mark Fly, J., Talley, J., & Ken Cordell, H. (2003). Green migration into rural America: The new frontier of environmentalism? *Society & Natural Resources*, 16, 221–238. doi:10.1080/08941920309159.
- Feuer, A. (2016). The ideological roots of the oregon standoff. http://www.nytimes.com/2016/01/10/opinion/sunday/the-ideological-roots-of-the-oregon-standoff.html?_r=0.
- Fransson, N., & Garling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, 19(4), 369–382. doi:10.1006/jevp.1999.0141.
- Gosnell, H., & Abrams, J. (2011). Amenity migration: Diverse conceptualizations of drivers, socioeconomic dimensions, and emerging challenges. *GeoJournal*, 76(4), 303–322. doi:10.1007/s10708-009-9295-4.
- Gruber, J. S. (2010). *Key principles of community-based natural resource management : A synthesis and interpretation of identified effective approaches for managing the commons*. doi:10.1007/s00267-008-9235-y.
- Hamilton, L. C., Colocousis, C. R., & Duncan, C. M. (2010). Place effects on environmental views. *Rural Sociology*, 75, 326–347. doi:10.1111/j.1549-0831.2010.00013.x.
- Hamilton, L. C., Hamilton, L. R., Duncan, C. M., & Colocousis, C. R. (2008). *Place matters: Challenges and opportunities in four rural Americas*. Durham, NH: Carsey Institute. <http://scholars.unh.edu/carsey/41/>.
- Hamilton, L. C., Hartter, J., Keim, B. D. Boag, A. E., Palace, M. W., Stevens, F. R., & Ducey, M. J. (2016). Wildfire, climate, and perceptions in Northeast Oregon. *Regional Environmental Change*, 16, 1819–1832. doi:10.1007/s10113-015-0914-y.
- Hamilton, L. C., Hartter, J., Lemcke-Stampone, M., Moore, D. W., & Safford, T. G. (2015). Tracking public beliefs about anthropogenic climate change. *PLOS ONE*, 10(9), e0138208. doi:10.1371/journal.pone.0138208.
- Hamilton, L. C., Hartter, J., Safford, T. G., & Stevens, F. R. (2014). Rural environmental concern: Effects of position, partisanship and place. *Rural Sociology*, 79(2), 257–281. doi:10.1111/ruso.12023.
- Hamilton, L. C., Hartter, J., Stevens, F., Congalton, R. G., Ducey, M., Campbell, M., Maynard, D., & Staunton, M. (2012). *Forest views: Shifting attitudes toward the environment in northeast Oregon*. Durham, NH: Carsey Institute. <http://scholars.unh.edu/carsey/162/>.

- Hartter, J., Stevens, F. R., Hamilton, L. C., Oester, P. T., Congalton, R. G., Ducey, M. J., & Crowley, M. (2014). *Forest management and wildfire risks in inland Northwest*. Durham, NH: Carsey Institute. <http://scholars.unh.edu/carsey/211/>.
- Jones, R. E., & Dunlap, R. E. (1992). The social bases of environmental concern: Have they changed over time? *Rural Sociology*, 57(1), 28–47. doi:10.1111/j.1549-0831.1992.tb00455.x.
- Measham, T. G., & Lumbasi, J. A. (2013). Success factors for community-based natural resource management (CBNRM): Lessons from Kenya and Australia. *Environmental Management*, 52(3), 649–659. doi:10.1007/s00267-013-0114-9.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. (2008). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 27(1), 1–26. doi:10.1177/0013916506295574.
- Oregon Department of Fish and Wildlife (ODFW). (2014). *2014 Depredation Investigations*. http://www.dfw.state.or.us/Wolves/depredation_investigations_2014.asp.
- Rao, J. N. K., & Scott, A. J. (1984). On Chi squared tests for multiway contingency tables with cell proportions estimated from survey data. *The Annals of Statistics*, 12(1), 46–60. doi:10.1214/aos/1176346391.
- Schanning, K. (2009). Human dimensions: Public opinion research concerning wolves in the Great Lakes States of Michigan, Minnesota, and Wisconsin. In *Recovery of gray wolves in the Great Lakes Region of the United States* (pp. 251–265). doi:10.1007/978-0-387-85952-1.
- Schultz, P. W. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of Cross-Cultural Psychology*, 36(4), 457–475. doi:10.1177/0022022105275962.
- Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change*, 22(2), 505–515. doi:10.1016/j.gloenvcha.2012.01.002.
- Sponarski, C. C., Semeniuk, C., Glikman, J. A., Bath, A. J., & Musiani, M. (2013). Heterogeneity among rural resident attitudes toward wolves. *Human Dimensions of Wildlife*, 18(4), 239–248. doi:10.1080/10871209.2013.792022.
- StataCorp. (2013). *Stata statistical software: Release 13*. College Station, TX: StataCorp LP.
- State of Oregon. (2015). *Election statistics: Voter registrations and election participation*. <http://sos.oregon.gov/elections/Pages/electionsstatistics.aspx>.
- Thomas, A. R., Lowe, B., Fulkerson, G., & Smith, P. (2011). *critical rural theory: Structure, space, culture*. New York: Lexington Books.
- Upham, P. (2009). Applying environmental-behaviour concepts to renewable energy siting controversy: Reflections on a longitudinal bioenergy case study. *Energy Policy*, 37(11), 4273–4283. doi:10.1016/j.enpol.2009.05.027.
- US Census Bureau (2010–2014). *American community survey 5-year estimates*.
- Vorkinn, M., & Riese, H. (2001). Environmental concern in a local context: The significance of place attachment. *Environment and Behavior*, 33(2), 249–263. doi:10.1177/00139160121972972.
- Wallowa County Chieftain. (2014). *Area ranchers' wolf woes continue Ranchers in Northeast Oregon*. <http://www.wallowa.com/wolves/20141231/area-ranchers-wolf-woes-continue>.
- Walker, P. A., & Hurley, P. T. (2011). *Planning paradise: Politics and visioning of land use in Oregon*. University of Arizona Press.
- Wang, T., & Chen, C. (2012). Attitudes, mode switching behavior, and the built environment: A longitudinal study in the Puget Sound Region. *Transportation Research Part A: Policy and Practice*, 46(10), 1594–1607. doi:10.1016/j.tra.2012.08.001.
- Xiao, S., & Dunlap, R. (2007). Validating a comprehensive model of environmental concern cross-nationally. *Social Science Quarterly*, 88(2), 471–493.