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Persistence among Deep Rural Communities in the Northern Plains, Revisited

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Abstract

This research note revisits the question of rural persistence, which was first brought to light in this journal by Redlin et al. (2010)[1]. We follow Redlin et al's example by employing county-level data and seek to identify small towns that are surviving to explain their persistence. Our effort to replicate their results begins with the collection of the data anew, but we also include two additional states and incorporate a time dimension. By using Census data from 2000 only, Redlin et al. applied a static approach to test their hypothesis. In this study, we collect data from 1990 as well as 2000 to explore the time dimension of rural persistence. Our findings indicate that rural persistence is a dynamic rather than a static process. First, human capital systematically affects rural persistence. Second, changes in human capital affect rural persistence much more significantly than a stock of each measure at an earlier point in time. This result is encouraging; it suggests that no matter a community's starting point in human capital, efforts towards community survival can be successful. Increases in any of our independent variables affect small town persistence more than the initial stock of any of them. Moreover, our results produce differences among the states, specifically Montana and Wyoming from the Dakotas, which indicate that future research efforts in rural persistence

> should explore political structure. Secondly, we suggest a grounded theory approach which develops data from a focused effort on a handful of rural communities.

This research note revisits the question of rural persistence, which was first brought to light in this journal by Redlin et al. (2010). They succeed by turning the traditional research question on its head. Usually, scholars ask what causes rapid depopulation of deep rural areas in the Great Plains. Instead, Rural Persistence Theory pursues the factors that might explain why certain communities remain vigorous (Redlin et al. 2010). Among the many small towns in the Great Plains, most may not survive the severe challenges facing rural areas. Nonetheless, some star communities thrive. We follow the example of Redlin et al. (2010) and seek to identify the survivors and explain their persistence.

Our effort to replicate their results begins with the collection of the data anew, but we also include two additional states and incorporate a time dimension. We investigate and explore the multiple factors that lead some communities to survive while others atrophy. The central point of Rural Persistence Theory is to understand the important drivers in community stability. Redlin et al. (2010) propose an interdisciplinary model that draws on sociological, economic, and political science literature to identify factors that explain rural persistence.

Like them, we acknowledge the importance of economic growth, but we recognize that jobs are just one part of the base for stable, strong communities. The Rural Persistence Theory and its supporting evidence demonstrate that an interdisciplinary approach can help us to understand those practices that lead to sustainability among rural communities. A critical strand of this argument is that dense social networks and vibrant political institutions are key components in the survival of small towns. These place-based phenomena include rural values like strong schools, safe streets, a work ethic, and a sense of individual responsibility.

Redlin et al. (2010) employed a static approach to test their hypothesis. By using Census data from 2000 only, they were unable to investigate the effect of time on community persistence. In our study, we collect data from 1990 as well as 2000 for these deep rural counties to explore the time dimension of rural persistence. By definition, a single snapshot approach does not capture the dynamics of social change in communities. The status and viability in a particular community clearly affects its future direction. To understand community survivability, we specifically incorporate change into our models. In particular, to what extent does the state of affairs in 1990 have on community persistence a decade later? Which explanatory variables explain the change in the dependent variables over time? Thus, our analysis extends and broadens the Redlin et al. (2010) test by examining the change in the dependent variables from 1990 to 2000 in terms of 1990 independent variables, which is an improvement over the static/baseline model of Rural Persistence Theory.

Sample Selection

Following Redlin et al. (2010), we begin our selection of units of analysis with all counties in the states of Montana, and North and South Dakota. We expand the number of observations by including Nebraska and Wyoming counties to broaden the test. However, since Nebraska holds

non-partisan elections for legislative offices, we cannot include one treasured independent variable—the degree of party competition—in our full analysis. We ran the models reported below with the Nebraska counties by excluding the party competition measure. While we do not report the results with Nebraska here, they are substantially and statistically similar to the results reported here.

Like Redlin et al. (2010), our objective is to compile a comprehensive data set from deep rural counties with low natural amenities in the northern Great Plains. Using the USDA Beale Codes, counties with a metro area or adjacent to a metro area were excluded from our sample with the following exception: All counties with an urban population of less than 2,500 were included in the sample, regardless of whether they are metro adjacent or not. (Note: Redlin et al. (2010) excluded all metro-adjacent counties, whether they were completely rural or not. We include these rural counties in our analysis, regardless of proximity to a metro area.) In sum, our data set includes all non-metro and non-metro adjacent counties as well as counties with an urban population under 2,500 (whether or not it is metro adjacent).

Since natural amenities like mountains and large waterways draw tourists, retirees and others, we again follow Redlin et al. (2010) and exclude them from our analysis. Drawing on USDA classifications, any county with a score of five or higher on the Natural Amenities Scale were removed from the sample (McGranahan 1999[2], 2004[3]). Effectively, any county with natural amenities at or below the mean score remain in the sample. Following Redlin et al (2010), we also exclude Native American reservation counties since the dynamics of community stability is radically different there. Finally, since counties with a state capitol have a large number of state government employees, who contribute substantially to community persistence, we exclude those counties as well. Figures 1 through 4 map the four states with the observed counties in white. (Note: only Hughes County in South Dakota is marked as a capitol county, because other state capitols were eliminated via another criterion.)

Figure 1 - Montana County Classification

Northern Plains Map Color Coding	
	Metro or Metro Adjacent County
	High Natural Amenity County
	Indian Reservations (over 50% of population)
	State Capitol County
	Deep Rural County (Observed Sample)

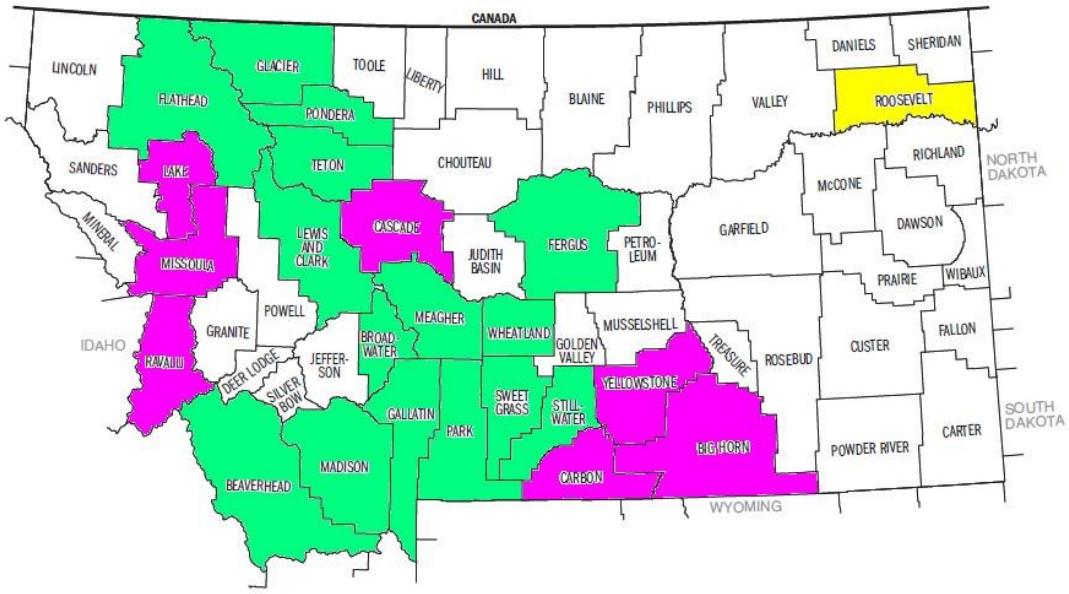


Figure 2 – North Dakota County Classification

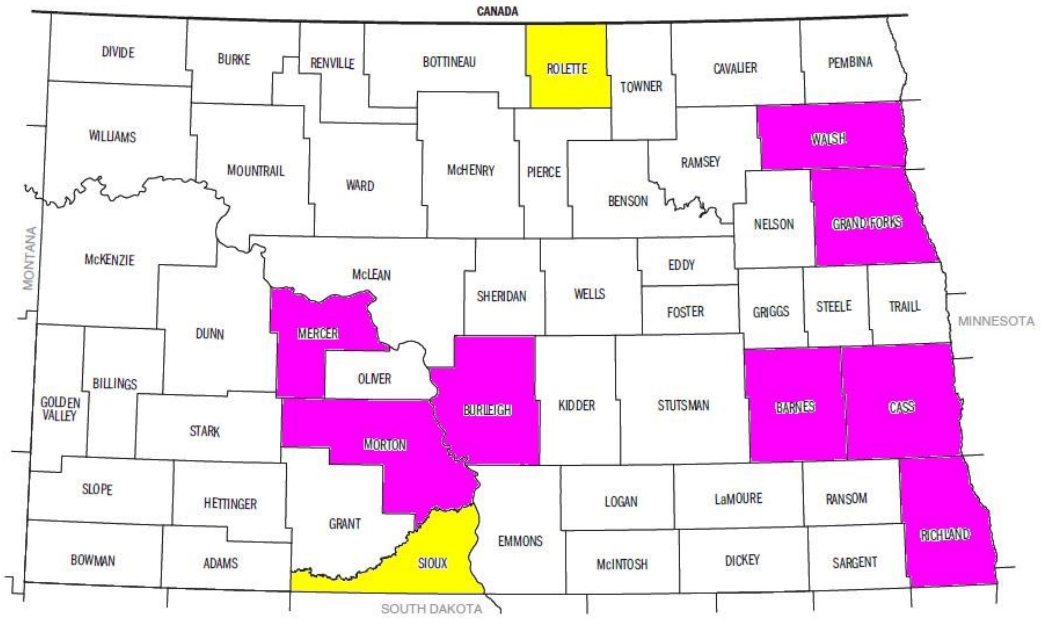


Figure 3 – South Dakota County Classification

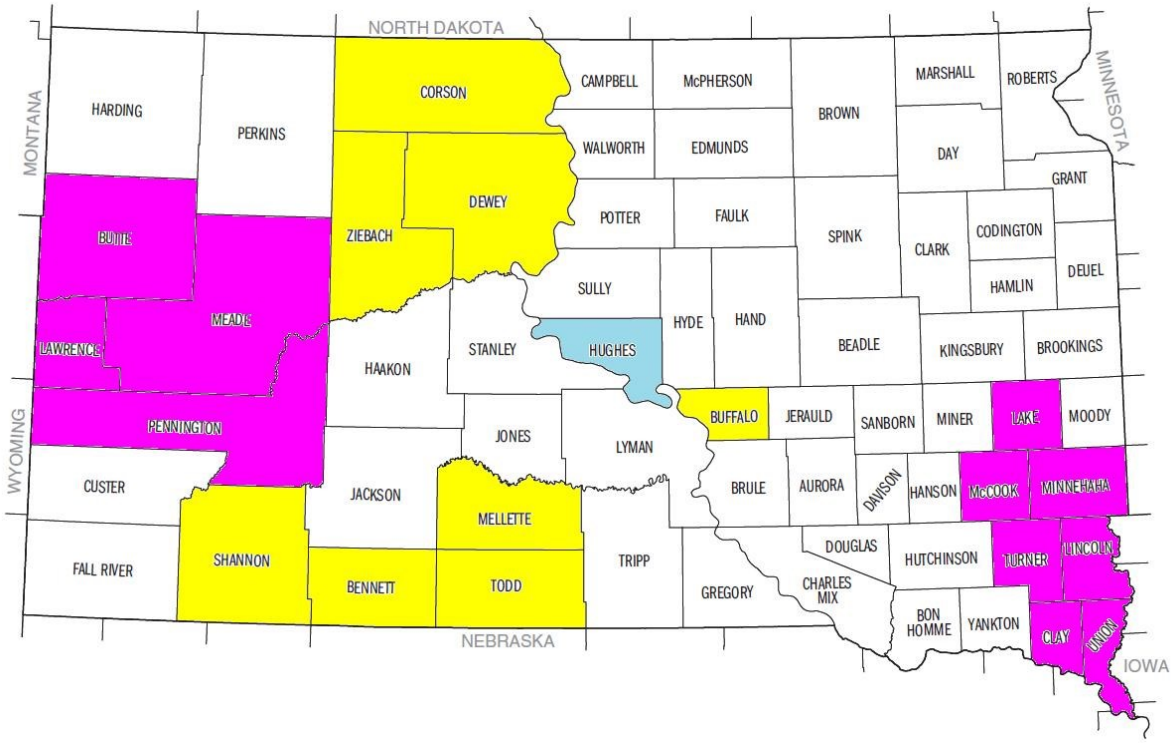
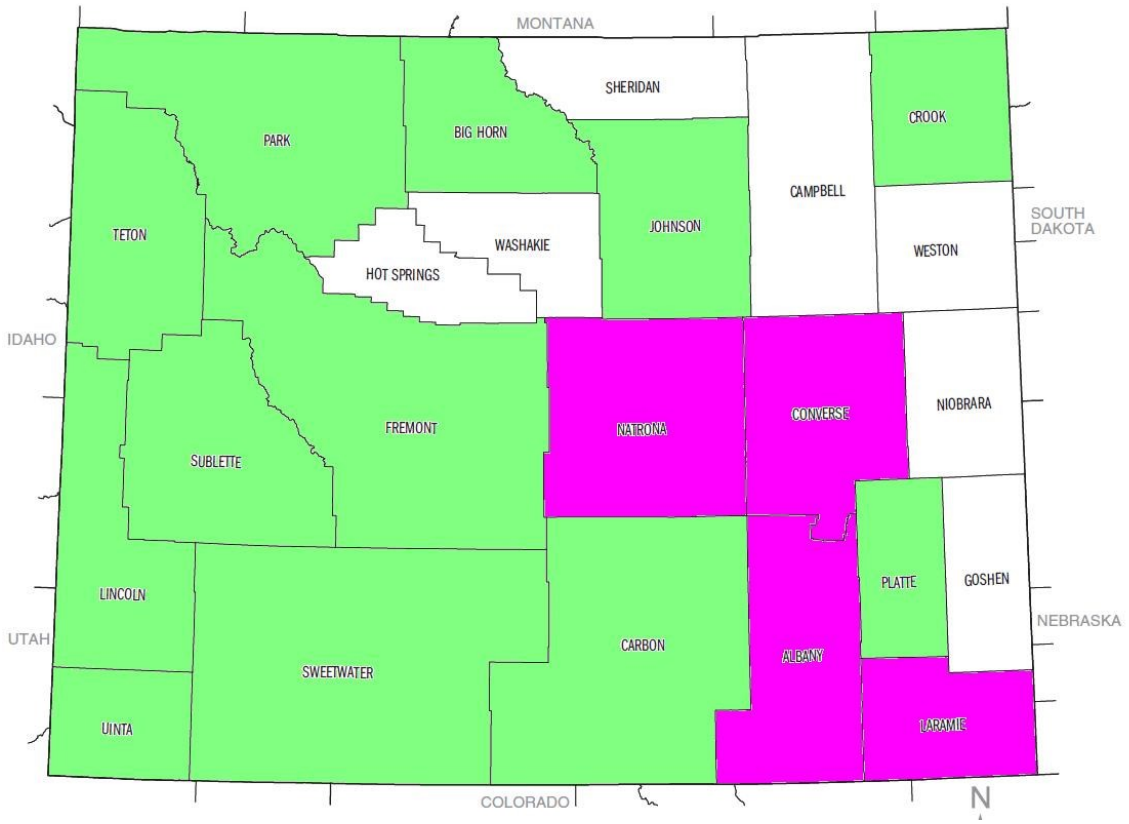


Figure 4 – Wyoming County Classification



Model

Rural Persistence Theory hypothesizes a model of this form:

Rural Persistence = f(time, trade and commerce, population density, human capital, political structure)

Rural persistence is measured by per capita income and percent civilian labor force. Per capita income represents the wages and salaries that local residents earn. The percent civilian labor force, which is working members from the age of 16 to 64, reflects the proportion of the county that is employed. The statistical model is:

$$Y = B_0 + B_1 x_1 + B_2 x_2 + B_3 x_3 + B_4 x_4 + B_5 x_5 + u$$

Where Y is the dependent variables representing rural persistence: income and labor force. The independent variables, $x_{1\text{-}5}$, are:

x_1= time (1990 = 0, 2000 = 1)

x_2=trade and commerce (retail trade per capita)

x_3=population density (population per square mile)

x_4= human capital (highest education levels, high school diploma and Bachelor's degree)

x_5=political structure (voter turnout and party competition)

The model also includes a set of dummy variables representing the various states in the sample using South Dakota as the base.

We undertake OLS regression analysis in two sets of models for each dependent variable. That is, we first present the analysis for income and labor force (separately), controlling for time as a dummy variable. Each county appears twice in this baseline analysis, once with its 1990 values for both independent and dependent variables and again using the 2000 values for all variables.

The purpose of this baseline model is to create a dynamic model, where both the independent and dependent variables change over time.

In the second step, we explicitly model the change in each dependent variable on the 1990 independent variables. The purpose of these stock, or change, models is to explore the effects of an initial stock of each variable on rural persistence over time. For these stock models, Y is the 2000 value of the dependent variable less its 1990 value. For example, for the per capita income stock model, the dependent variable is per capita income in 2000 for each county minus that county's 1990 per capita income. Tables 1 and 2 show the descriptive statistics for the baseline model and the stock models, respectively.

Table 1 - Descriptive Statistics, Baseline Model

	N	Minimum	Maximum	Mean	Std. Deviation
Civilian Labor Force (Proportion)	258	.487	.709	.578	.036
Per Capita Income (Dollars)	258	$6,947	$20,300	$12,871	$3,314
High School as Highest Education Level (Proportion)	258	.151	.333	.247	.033
Bachelor as Highest Education Level (Proportion)	258	.046	.130	.081	.019
Retail Trade per Capita (Thousands Dollars)	252	-	$20.0	$6.0	$3.8
Population per Square Mile	258	.30	48.20	5.99	7.97
Voter Turnout/Total Population	258	.132	.642	.473	.069
Party Competition	258	.000	.918	.539	.204

Table 2 - Descriptive Statistics, Change Model

	N	Minimum	Maximum	Mean	Std. Deviation
Change in Civilian Labor Force (Proportion)	129	-708	4060	130	687
Change in Per Capita Income (Dollars)	129	$2,231	$9,541	$5,900	$1,387
High School as Highest Education Level (Proportion)	129	.151	.319	.240	3.25
Bachelor as Highest Education Level (Proportion)	129	.046	.112	.070	1.418
Retail Trade per Capita (Thousands Dollars)	129	$0.3	$47.3	$6.0	$7.7
Population per Square Mile	129	.245	14.276	4.452	2.521
Voter Turnout/Total Population	129	.292	.622	.467	7.106
Party Competition	129	.000	.918	.539	2.081

Results

Tables 3 and 4 present the results of this analysis for the baseline models for each dependent variable. For the per capita income model, the adjusted R^2 is a healthy 0.88. Each of the hypothesized coefficients in this model are statistically significant and in the predicted directions, holding everything else constant. This suggests that human capital, as measured by our social, economic, and political variables, significantly affects rural persistence.

For the baseline model with percent civilian labor force as the dependent variable, the adjusted R^2 is lower, but still a satisfactory 0.48. This suggests a change in each of the independent variables affects rural persistence. Most of the coefficients here are significant and in the hypothesized direction. However, for two important independent variables (party competition and retail trade), their effect on labor force is not statistically significant.

Table 3 – OLS Per Capita Income, Baseline Model

Coefficients				
Model	**B**	**Std. Error**	**t-statistic**	**P-value**
Intercept	2399.244	936.415	2.562	0.011
Percent of total population with High School as highest Education Level	10077.158	2703.125	3.728	0.000
Percent of total population with a Bachelor's Degree as highest Education Level	37802.420	5509.470	6.861	0.000
Population per Square Mile	27.297	10.946	2.494	0.013
Retail Trade per Capita (Thousand Dollars)	94.919	24.075	3.943	0.000
Voter Turnout/Total Population	2553.877	1209.671	2.111	0.036
Party Competition	786.791	394.842	1.993	0.047
Time	4657.692	199.580	23.338	0.000
Montana	87.596	201.529	0.435	0.664
North Dakota	338.074	206.051	1.641	0.102
Wyoming	1993.735	348.393	5.723	0.000

Table 4 – OLS Percent Civilian Labor Force, Baseline Model

Coefficients				
Model	**B**	**Std. Error**	**t-statistic**	**P-value**
Intercept	0.495	0.021	23.497	0.000
Percent of total population with High School as highest Education Level	0.179	0.061	2.946	0.004
Percent of total population with a Bachelor's Degree as highest Education Level	0.568	0.124	4.584	0.000
Population per Square Mile	0.001	0.000	5.029	0.000
Retail Trade per Capita (Thousand Dollars)	0.000	0.001	0.197	0.844
Voter Turnout/Total Population	-0.072	0.027	-2.654	0.008
Party Competition	0.002	0.009	0.270	0.788
Time	0.005	0.004	1.076	0.283
Montana	0.037	0.005	8.158	0.000
North Dakota	0.006	0.005	1.391	0.166
Wyoming	0.049	0.008	6.196	0.000

Tables 5 and 6 present the OLS regression analysis for the initial stock model, i.e., where the dependent variable is the difference between the 1990 and 2000 scores and the independent variables are at the level of 1990 values. For the stock model with per capita income as the dependent variable, the adjusted R^2 is low at 0.27; this model explains a much smaller portion of the explained variance than the baseline models above. It suggests that population density and percent high school graduates affect the growth of each community. For the stock model with labor force as the dependent variable, the adjusted R^2 is a respectable 0.47, explaining nearly half of the total variance. Like the previous stock model, only two of the coefficients reach significance at acceptable levels. Population density and percent voter turnout fit with expectations and percent college degrees just misses the .05 level of significance.

We now turn our attention to the dummy variables for the states in all four models. We note that the North Dakota dummy is not statistically significance in any of the four models. This suggests that in terms of unexplained variance, no systematic differences exist between North Dakota and South Dakota, the base state. However, the Wyoming dummy is statistically significant in three of the four models, and the Montana dummy is significant in two models. The Wyoming results may be an artifact of the data, as our dataset includes only seven Wyoming counties. The small number of cases may skew these results for Wyoming. However, Montana has 33 counties in our data set, so we offer a substantive interpretation based on differences in state political structure below.

Table 5 – OLS Per Capita Income, Stock Model

Coefficients				
Model	B	Std. Error	t-statistic	P-value
Intercept	811.849	1422.741	0.571	0.569
Percent of total population with High School as highest Education Level	11051.400	3974.067	2.781	0.006
Percent of total population with a Bachelor's Degree as highest Education Level	9318.312	8414.162	1.107	0.270
Population per Square Mile	45.815	17.401	2.633	0.010
Retail Trade per Capita (Thousand Dollars)	-15.738	50.350	-0.313	0.755
Voter Turnout/Total Population	2882.531	1755.703	1.642	0.103
Party Competition	808.085	560.596	1.441	0.152
Montana	-1373.727	295.839	-4.643	0.000
North Dakota	459.700	301.162	1.526	0.130
Wyoming	-170.154	511.868	-0.332	0.740

Table 6 – OLS Percent Civilian Labor Force, Stock Model

Coefficients				
Model	B	Std. Error	t-statistic	P-value
Intercept	185.205	601.822	0.308	0.759
Percent of total population with High School as highest Education Level	155.910	1681.039	0.093	0.926
Percent of total population with a Bachelor's Degree as highest Education Level	7002.129	3559.209	1.967	0.051
Population per Square Mile	41.650	7.361	5.658	0.000
Retail Trade per Capita (Thousand Dollars)	-12.671	21.298	-0.595	0.553
Voter Turnout/Total Population	-1827.775	742.666	-2.461	0.015
Party Competition	130.080	237.133	0.549	0.584
Montana	130.674	125.141	1.044	0.299
North Dakota	-233.574	127.392	-1.834	0.069
Wyoming	929.314	216.521	4.292	0.000

Discussion

Our findings indicate that rural persistence is a dynamic rather than a static process. First, human capital—as measured by economic, social, and political variables—systematically affects rural persistence. Second, changes in human capital affect rural persistence much more significantly than a stock (or initial amount) of each measure at one point in time. This result is encouraging; it suggests that no matter a community's starting point in human capital, efforts towards community survival can be successful. Increases in any of these measures affect small town persistence more than the initial stock of any of them.

We offer two proposals to further this line of research. First, future research should further investigate differences in rural persistence among the states. Our findings suggest that at least Montana and perhaps Wyoming as well differ from the Dakotas. Political scientists have long recognized that state governing regimes (i.e., political institutions and structure) vary significantly and that these produce difference policy environments. Our findings indicate that some states' institutions and policies appear to matter in terms of rural persistence. Two profitable courses present themselves as possible avenues of discovery: political culture and state legislation. While the Northern Plains states are broadly similar in terms of political culture, each state has a unique political history and power structure that may explain differences in rural community persistence. Secondly, individual states offer a wide variety of differing legislation and funding to support, develop, or hamper rural community development efforts. The relationship between state policies and rural community development has largely been ignored by scholars. Two recent studies have examined community development policies as part of a broader analysis of policy variability among the states (Jacoby and Schneider 2001[4]; Tavits 2006[5]).

Second, the likeliest potential for a deeper understanding of rural persistence is a different methodology than used here. We suggest a grounded theory approach which develops data from a focused effort on a handful of rural communities. Our research confirms that Redlin et al.'s (2010) results can be used to select particularly persistent and frail communities. The goal would be to understand variation in a wider range of factors between the two kinds of communities. We can imagine a qualitative data collection effort with community power mapping coupled to intensive interviews among community leaders. This kind of effort should lead to a stronger platform of "best practices" that exist in persistent small towns.

End Notes: Anderson, Amber, George Langelett, Gary Aguiar, Brian Shuler, and Meredith Redlin. "Persistence among Deep Rural Communities in the Northern Plains, Revisited." *Online Journal of Rural Research & Policy* (8.4, 2013).

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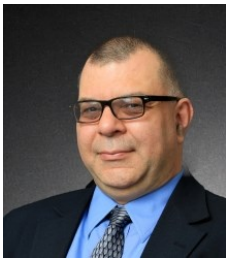

Gary Aguiar, a professor of political science at South Dakota State University since 1999, teaches courses in U.S. Politics. His research interests explore the connections between people, place, and politics, with a particular interest in rural and small-towns in the Great Plains. His book, Government in the Countryside, is the first book on rural politics in the U.S. in a quarter century.

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Meredith Redlin (back to top)

Meredith Redlin is a professor in the Department of Sociology and Rural Studies at South Dakota University. Her teaching and research focus on issues of diversity in community development and environmental studies. Past and present articles and book chapters address the life narratives of rural gay men in the U.S. and France, Hispanic civic participation in a Midwestern small town, and population persistence in deep rural counties. Future research will examine women's participation in energy development and employment in the northern Great Plains.