

## **Boon or Bust: Wilderness Designation and Local Economies**

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### **Abstract**

Using cross-sectional time series analysis, we find no evidence that wilderness land designations result in positive economic outcomes for local economies. Rather, our results suggest that formal wilderness designations accompany worse economic outcomes, particularly when considering median household income, total tax receipts, and total payroll payments. We further find that diverse motivations lead to wilderness designations. The designations may meet political, environmental, and conservation goals, but our findings suggest that claims that wilderness designations promote economic growth are unfounded. Recognizing that designations impose costs on local economies should inform a consensus-building approach to new wilderness area designations.

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*JEL Codes:* R14, Q24, Q28

*Keywords:* wilderness, land use impacts, rural economics

### **I. Introduction**

In 2008, a supermajority of the Utah State Legislature passed House Joint Resolution 10, which encouraged the United States Congress to not designate any additional federal wilderness areas in Utah. The resolution asserted that Utah relies on public lands for crucial economic activities including “oil and natural gas development,

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mining, outdoor recreation and other multiple uses, rights of way for transportation, waterlines, electric transmission, and telecommunication lines.” The Utah State Legislature claimed that limiting these multiple uses of public lands would result in substantial economic hardship for the state. By passing the resolution, the legislature echoed the belief of many local elected officials and residents that wilderness designations are not good for local economies.<sup>1</sup>

In direct contrast to this view, many people (especially in the environmental community) have alleged that large federal land holdings and protected areas such as wilderness generate economic growth. The Wilderness Society, a conservation organization focused on protecting US wildlands, notes that “designated wilderness areas on public lands generate a range of economic benefits for individuals, communities, and the nation—among them, the attraction and retention of residents and businesses” (2004, p. 1). The Sonoran Institute, a conservation group focused on preserving the natural environment in the North American West, similarly finds that “protected natural places are vital economic assets for those local economies in the West that are prospering the most” (Rasker, van den Noort, and Carter 2004, p. ii). The institute further notes, “Wilderness, National Parks, National Monuments, and other protected public lands, set aside for their wild land characteristics, can and do play an important role in stimulating economic growth—and the more protected, the better” (Rasker, van den Noort, and Carter 2004, p. 1).

This paper investigates the conflicting beliefs regarding the economic impacts of federally designated wilderness through empirical statistical analysis of the economic conditions present in wilderness and nonwilderness counties over time.<sup>2</sup> Using US census

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<sup>1</sup> When we refer to wilderness, we mean areas designated under the Wilderness Act of 1964. We make this distinction to distinguish officially designated wilderness from other types of wildlands that may not have the same level of legal protection.

<sup>2</sup> While the scope of this paper is limited to the economic impacts of wilderness designation, this effort represents the beginning of a more expansive study exploring how wilderness and other federally protected lands impact the economies of rural counties and the quality of life of the individuals who live therein. Through our research, we hope to shed light on a number of important questions identified in existing literature, including whether there are long-term economic benefits from wilderness designation, whether there are population impacts of wilderness designation, and whether wilderness counties offer greater quality of life than nonwilderness counties.

data for all counties across the United States, we study the impact of wilderness by looking for an identifiable difference within the economies of wilderness and nonwilderness counties. We define wilderness counties as counties that contain any portion of a federally designated wilderness area. Such federally designated wilderness includes lands designated pursuant to the Wilderness Act of 1964 and managed by one of four federal agencies: the US Forest Service, the US Fish and Wildlife Service (FWS), the US National Park Service (NPS), and the Bureau of Land Management (BLM).

We do not examine wilderness study areas (WSAs) and other de facto wilderness, such as designated roadless areas inside national forests and property managed to maintain “wilderness characteristics” by the BLM. We also do not consider protected areas designated and managed by states as primitive areas. Our decision to include these areas was based on the variation in both the borders of these areas and the way that they are managed. Often, the boundaries for WSA, de facto wilderness, and primitive areas are not well defined, making their use as a variable a liability.

When controlling for other federally held land and other factors impacting economic conditions, our statistical analysis shows that a federal wilderness designation significantly impacts county economic conditions. This effect, however, does not occur in the direction typically argued by conservationists. We find an economically significant negative relationship between the presence of wilderness and median household income and total payroll. Our study suggests that the presence of wilderness in a county decreases the median household income by \$496 and decreases total nonfarm payroll by \$124,200. Thus, there may be some justification for local political elites and residents to be concerned about new wilderness designations.

The paper proceeds as follows: Section 2 provides background on the issues surrounding wilderness. Section 3 provides an introduction to federally designated wilderness and surveys the existing literature on the economic impacts of wilderness. Section 4 lays out our methods and explains the data used. Section 5 presents our results, while section 6 contains our analysis and conclusions.

## **II. Federally Designated Wilderness**

Beginning in the late 1800s, the US government began setting aside portions of federal land under varying degrees of protection. These efforts resulted in the establishment of the National Park System in

1887 with the creation of Yellowstone National Park (now managed by the NPS, which was created in 1916). Additionally, the National Forest programs started in 1891 through the establishment of the Yellowstone Timberland Reserve (now the Shoshone National Forest). Through the creation of Devil's Tower National Monument in 1906 a national monuments system was also created. Then, in 1940, the US Fish and Wildlife Service was created through the merger of the Bureaus of Fisheries and Biological Survey. Six years later, the BLM was created "to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations."<sup>3</sup>

The identified statutory purposes of each of these types of land reservations anticipated some degree of human use. Indeed, the US Forest Service is part of the United States Department of Agriculture because of the efforts of Gifford Pinchot, the first director of the US Forest Service. He wanted to preserve and promote the national forests for the production of timber throughout the United States, something he considered to be an agricultural, not preservationist, activity. The other large land management agencies (the BLM, NPS, and FWS) are all housed in the Department of the Interior.

Although lands managed by the federal agencies received a great deal of protection, some preservationists and conservationists argued that these designations did not sufficiently preserve the wild characteristics found in those lands. These concerns led to early designations of "wilderness" within certain forest reserves. The first of these, created along with the Gila National Forest in New Mexico in 1924, set aside some 700,000 acres to be preserved as wildlands in perpetuity. The setting aside of lands continued, and by the 1930s, over twenty such wilderness areas had been created. Managing these areas was left to regional administrators, who chose in some cases to allow grazing, logging, and road building. Even parts of the Gila Wilderness were opened to broader use in the 1940s and 1950s (Coggins, Wilkinson, and Leshy 1993).

Upon the urging of conservationists and preservationists, Congress turned its attention in 1964 to the issue of preserving wildlands in perpetuity through passing the Wilderness Act, in which Congress defined wilderness as

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<sup>3</sup> US Department of the Interior, Bureau of Land Management website, National page.

an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value (16 USCA § 1131[c]).

Because the Wilderness Act mandated preserving areas “untrammelled by man,” a variety of activities are expressly forbidden within wilderness areas. Roads, road construction, and any mechanized travel are prohibited within wilderness areas. Although mining claims were allowed for the first twenty years after the Wilderness Act passed, mining and mineral exploration are now prohibited within wilderness areas. Even when mining and mineral exploration and extraction were allowed, the controlling agencies granted almost no mineral leases, indicating a general unwillingness of federal administrators to allow mining despite the *de jure* allowance of such leases.

Similarly, while logging was not expressly proscribed by the act's statutory language, the restrictions on mechanized travel, mechanized equipment like chainsaws, and road construction generally preclude large-scale logging activity (Coggins, Wilkinson, and Leshy 1993). A review of the act's legislative history further indicates that Congress intended to prohibit logging activity in wilderness areas with one exception—the Boundary Waters Canoe Area Wilderness in Minnesota. Grazing is expressly allowed in wilderness areas, but administrators are allowed to make “reasonable regulations” regarding their use. Congress has interpreted this rule in at least one instance to mean that livestock grazing may be reduced if necessary to improve range conditions (see generally HR 96-617).

In addition to the prohibitory language found in the statute, the courts have acted to aggressively protect wilderness areas. Courts

have blocked a variety of activities in wilderness areas, including treatment of beetle infestations to maintain forest health.<sup>4</sup> Uses of land surrounding wilderness areas often receive more stringent review. The 10th Circuit Court of Appeals, for instance, upheld an injunction of logging in an area that approached a wilderness area.<sup>5</sup> Wilderness areas often raise review standards under the National Environmental Policy Act (NEPA). Under NEPA, land uses near wilderness areas may be found to have a more “significant” impact than actions near lands not under federal protection. This presumed impact may increase the costs associated with county or state activities occurring near wilderness areas and may change the cost calculus in making governance decisions.

Managing designated wilderness areas remains within the jurisdiction of the original managing agency. Lands designated by Congress as wilderness within national parks, for instance, remain under the jurisdiction of the National Park Service. Similarly, the NPS, the FWS, and the BLM all manage the wilderness lands within their jurisdictions.

Currently, there are 759 wilderness areas in the United States, totaling 109,663,992 acres. The US Forest Service manages over 36 million acres of wilderness. The NPS manages over 44 million acres of wilderness. The FWS manages over 20 million acres, and the BLM manages almost 9 million acres of wilderness. The wilderness areas also dramatically vary in size from the Pelican Island Wilderness in Florida, which occupies a mere six acres, to the 9,078,675 acre Wrangle Island Wilderness in Alaska (Gorte 2010).

Due to the stringent requirements for the characteristics of designated wilderness, the majority of wilderness areas are found within largely rural and lightly populated counties. Indeed, over half of all designated wilderness is in Alaska (Gorte 2010). An additional 13 percent of total designated wilderness is found in rural California. Other states containing large amounts of wilderness include Colorado, Montana, New Mexico, Nevada, Oregon, Utah, and Washington.

### **III. Impact of Federally Designated Wilderness**

As noted in the introduction, many local government officials bemoan the designation of wilderness. They note that the restrictions

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<sup>4</sup> See *Sierra Club v. Lyng*, 662 F. Supp. 40.

<sup>5</sup> *Parker v. United States*, 448 F. 2d 793 cert. denied 405 US 989 (1972).

found in wilderness areas prohibit activities leading to economic growth. They also lament the loss of access for mechanized travel, in part because they believe mechanized recreation generates more local revenue than nonmechanized alternatives. These concerns are often countered by members of the environmental community, who point out the “true” value of wilderness. The value of ecosystem services performed by wilderness are often not accounted for in traditional economic analysis, nor is the amenity value of wilderness that increases the value of property near wilderness areas (see, for example, The Wilderness Society 2004).

Much of the academic literature investigating the impact of wilderness represents a critique of the efficiency of the federal government as land manager (see generally, Anderson, Smith, and Simmons 1999) and the expansive use of the wilderness Designation as a land management tool, in departure from original congressional intent (Osterle 1997). Some research supports at least parts of the claim that wilderness areas harm local economies. There is, for example, evidence of a temporal aspect to the economic impact of protected land designations. Rudzitis and Johnson (2000) note short-term detriment but limited long-term detriment to local economies. Wilderness shuts down access to resources traditionally used for extractive economic activities. These losses may be somewhat offset by an increase in service sector activities, but the service sector jobs generally pay less than the extractive jobs that were lost.

Several studies support the claim that wilderness helps local economies. Power (1991), for example, conducts a case study examining the stringent rules in place protecting the ecosystem surrounding the Greater Yellowstone area. He finds that extraction-based industries have diminished over time and have been replaced by economic activities specifically dependent on preservation, including tourism, permanent relocation to be closer to the natural amenities offered, recreational homes and cabins, and retirement.

Rasker (1994) finds that entrepreneurs often choose to live in areas where there is a high quality of life, including the presence of protected lands. Duffy-Deno (1998) finds no evidence that county-level employment is harmed by the presence of federal wilderness. Rasker (2006) rejects the notion that federal land ownership negatively impacts counties. Using correlation and regression models to investigate how different management of public lands—including wilderness—impacts local counties’ economies, he finds that public

lands are associated with higher personal income tax levels in rural areas.

Holmes and Hecox (2004) similarly find a positive relationship between economic growth and publicly designated lands. Through studying 113 rural counties, 43 percent of which contain public lands, the authors find a significant, positive correlation between the percent of land designated as wilderness and population, income, and employment growth. They also find that growth of investment income and nonfarm self-employment income are correlated with the presence of wilderness. Lorah and Southwick (2003) similarly find positive impacts of protected lands. Using county level data, the authors calculate the proportion of protected lands occurring within fifty miles of the center of the county. Applying this metric, the researchers find that the protection of these lands is positively correlated with high population growth, high employment, and income growth.

Population dynamics and personal perceptions of wilderness represent another line inquiry that may have a direct impact on county economics. The perception of wilderness as a draw to move to or remain in a given area may create diverse economic opportunities and growth. Although Duffy-Deno (1998) finds no significant relationship between federally designated wilderness and population, a variety of studies find a positive relationship. Rudzitis and Johansen (1991) use a survey of 2,670 residents of wilderness counties to measure public opinion regarding public lands, including wilderness lands. Fifty-three percent of respondents indicated they moved to an area at least partially because of the presence of wildlands, 81 percent felt wilderness was important, and 65 percent were against mineral or energy development in such areas. This finding indicates that wilderness may create conditions that create economic opportunities in addition to extractive uses. Shumway and Otterstrom (2001) similarly find migration patterns toward counties with protected areas.

#### **IV. Methods and Data**

The academic debate about the effects of wilderness on local economies reaches the same conclusions as the arguments between local politicians and environmental groups—there are many claims but conflicting evidence. We address the local impacts of wilderness designation using a different and, we believe, better methodology than those employed previously. We begin on neutral ground with

the null hypothesis that wilderness designation has no impact on county economic conditions.

We model three different economic indicators using the same cross-sectional time series model with random effects. The dataset includes observations for all counties in the United States in 1988, 1994, and 2000, combining data from the US Census Bureau, the Bureau of Labor Statistics, and the National Atlas. While specifying the model, we included fixed effects by state.

Our study represents a departure from previous work in several ways. First we use longitudinal statistical analysis to identify the dynamic economic conditions found within counties. This approach provides more information regarding actual conditions and may identify changes occurring over time in wilderness counties compared to nonwilderness counties. This approach seems particularly useful for understanding the long-term economic impacts of wilderness. If the declaration of wilderness may result in short-term negative economic impacts from lost extractive resource opportunities, longitudinal analysis seems to be the best way to identify these claims. If, as claimed, these short-term losses are made up over the long term by economic transitions to different activities, longitudinal analysis is again preferable for understanding these dynamics.

Much existing work on the economic impact of wilderness has relied on cross-sectional data and in doing so provides a snapshot of the correlative effects of wilderness and economic development. This approach, however, fails to capture and model effectively the lag that often exists in predicting economic outcomes. Approaches of this sort, while useful, fail to adequately address the dynamic nature of the economic response to wilderness area designations and cannot control for fixed, unobserved variables, such as the state regulatory climate.

Second, we focus on only officially designated wilderness, not public lands in general. As may be noted from the discussion above, many researchers include wilderness within a broader category of protected lands or public lands generally. This approach may confuse the true impact of wilderness and fail to provide meaningful information regarding variable impacts of different land designations. Nonwilderness portions of national parks, for instance, may be quite different in terms of economic impact from travel tourism than stand-alone wilderness within the Forest Service system, which may not have the same ability to attract travel tourists.

We include data for all public lands in each county as control variables to ensure that the effects of wilderness are discretely modeled. This approach is a significant improvement, as it teases out the partial effect of each type of land protection regime in the United States. Further, it is likely that given the variation in rules associated with land protection, lumping all protected classes together muddles the effect of any particular designation. We collected these data from the US National Atlas. Table 1 provides summary statistics for each major federal land designation and all federal lands combined. Thirteen percent of American counties contain wilderness. On average, a county contains roughly 12.6 percent federal land. There is significant variability in this figure, with the majority of federal land located in the American West and Alaska. The Forest Service, the BLM, and tribal lands comprise the largest proportion of county lands, on average.

**Table 1. Federal Land Summary Statistics**

<b>Land designation</b>	<b>Mean</b>
Wilderness (dummy)	0.130
All federal land (%)	12.613
Bureau of Land Management (BLM) (%)	1.988
Bureau of Reclamation (BoR) (%)	0.045
Department of Defense (DoD) (%)	0.900
US Forest Service (FS) (%)	6.993
Fish and Wildlife Service (FWS) (%)	0.627
National Park Service (NPS) (%)	0.730
Tribal lands (Tribal) (%)	1.149
Tennessee Valley Authority (TVA) (%)	0.099
Other federal lands (other) (%)	0.081

*Source:* Authors' calculations based on US National Atlas data.

A third departure from others' work is that we focus our analysis on all counties in the United States rather than focusing on only public land states in the West. We examine all counties for two primary reasons. First, by casting a broader net, we expand the scope of investigation and examine whether there are indeed differences between economic dynamics in wilderness and nonwilderness counties, while avoiding regional economic phenomena that may be present in the West. The Western United States has been undergoing a demographic transformation with significant population and land use transformations throughout the past two decades. A demographic shift triggered by a land designation is likely to be lost

in the broader demographic dynamics in the West. By examining all of the United States, we hope to avoid those Western-specific phenomena.

Further, many wilderness areas exist outside of the West. The Charles C. Deem Wilderness Area, for instance, was carved out of the Hoosier National Forest in Indiana. The Citico Creek Wilderness is in Tennessee, and the Dolly Sods Wilderness is in West Virginia. Nearly every state contains at least some federally designated wilderness. As we observed earlier, wilderness designation has most often been investigated as a primarily western phenomenon, and most studies that have investigated these questions severely limit the observations included in the data to a specific region or state. We reject both approaches for theoretic and methodological reasons. Using a limited, nonrandom sample of the United States will necessarily paint a different picture of the effects of wilderness than will a sample that is either random or draws on the full population of US counties. Many conflicting results found by other authors can be directly attributed to how they define the universe of their study.

The most appropriate universe is the full United States county population, and the proper reference group for evaluating the effect of wilderness is not nonwilderness Western counties. The west's large urban centers are likely to be in nonwilderness counties, making them difficult to compare with the lower-populated wilderness counties. Thus, comparing all nonwilderness counties across the country paints a better picture of the effects of wilderness.

We have selected three uniformly applicable variables as proxies for county economic conditions: average household income, total payroll, and total tax receipts. The US Census Bureau gathers average household income and total tax receipt data. The Bureau of Labor Statistics gathers total payroll figures.

Average household income is calculated by dividing the sum of all income of the residents over age eighteen in each household by number of households. Average household income has the advantage of specifically addressing how individual households on average are affected by wilderness designations in these counties. It has the disadvantage of being self-reported to the Census Bureau and, accordingly, may not be as valid as a more direct measure.

Total nonfarm payroll is a broader metric that captures those under age eighteen and commuters who may live outside a county but work within it. Further, it measures the economic situation of individuals rather than households. Another approach would have

been to use total receipts. We selected total payroll rather than total receipts on the assumption that payroll dollars are more likely to be spent in the geographic area than are total receipts, which may include corporate profits that leave the area. Total payroll is not a perfect proxy because it does not capture capital investment, the payroll of county residents who work outside the county, or, most importantly, retirees who do not receive payroll income.

County tax receipts is a measure that has at least two advantages over the others measures. First, the data are largely complete; local governments are required by state and federal statute to correctly report tax receipts. These requirements provide some confidence in the data that self-reporting does not provide. Second, tax receipts represent all taxable transactions in the county, providing a useful metric of economic activity. Tax receipts, however, are not a perfect proxy, as there are significant institutional differences across states, regions, and often counties themselves as to how, when, and why taxes may be collected.

Although none of our dependent variables is a perfect proxy for economic conditions, taken together, they paint a more complete picture of the economic situation than any single available indicator. We expect that the presence of wilderness should have similar effects on each variable. If wilderness represents an economic drag on a county's economy, it should have a negative effect on income, payroll, and tax receipts. Similarly, wilderness as an economic boon should reflect itself in incomes, payroll, and tax receipts. Table 2 presents the summary statistics of our economic indicators. We see monotonic increases in the averages of each variable. Total payroll and tax receipts show significant increases from 1994 to 2000. This is a characteristic of the root BLS data.

To test our hypothesis, we use a dummy variable to indicate the presence or absence of wilderness in each county across time. The dummy is coded 1 for the presence of wilderness within a county and 0 when a county contains no wilderness. If the null hypothesis is incorrect, we expect that the sign on the coefficient for the wilderness dummy would be significant and consistent across models. To ensure that it is the effect of wilderness and not simply federal land ownership that harms economic conditions, we include control variables for each federal agency that manages public land. These variables are expressed in percent of county owned by that entity and provide a necessary disaggregation of the effects of federal ownership.

**Table 2. Economic Indicators Summary Statistics**

<b>Year</b>	<b>Median HH income (dollars)</b>	<b>Total payroll (thousands of dollars)</b>	<b>Tax receipts (tens of thousands of dollars)</b>
1988 mean:	14,299	484.2	33.1
St. dev	3,428	2,365.1	192.4
Q1:	11,921	21.0	2.6
Median:	13,887	64.5	6.0
Q4:	16,197	202.0	15.3
1994 mean:	23,975	582.0	46.3
St. dev	6,607	3,066.5	196.0
Q1:	19,693	17.5	3.8
Median:	22,737	62.0	8.3
Q4:	26,927	224.8	22.5
2000 mean:	32,634	983.6	237.9
St. dev	8,054	4,527.1	1,220.1
Q1:	27,366	41.6	22.6
Median:	31,385	129.0	51.0
Q4:	36,385	416.9	130.9

*Source:* US Census Bureau and Bureau of Labor Statistics.

We also include several variables that control for the significant differences among counties. These variables include population, land area, and number of households. We include more traditional controls that are indicated by published research as likely to affect economic development. We include birth rate and school enrollment, which act as proxies for the population's age. Infant death rate provides information about the health care system in the various counties. Further, we include variables indicated by the economic development literature as likely important in determining outcomes: high school graduates, median household income, poverty rate, crime rate, government employment, unemployment rate, and social security recipients. Table 3 presents summary statistics by year for key control variables. Average population and males per 100 females increase over the period, while percent white and the unemployment rate decrease.

**Table 3. Selected Control Variable Summary Statistics by Year**

Year	Population		Males per 100 females	
	Mean	St. Dev	Mean	St. Dev
1988	76788	253170	96.210986	8.3508827
1994	81209	269545	96.518847	7.4963908
2000	90671	295824	98.048688	10.026364
Year	Percent white		Unemployment rate (%)	
	Mean	St. Dev	Mean	St. Dev
1988	88.57422	14.50289	8.70	4.12
1994	85.796737	15.939059	7.18	3.26
2000	84.399777	16.601808	4.77	2.62

*Source:* US Census Bureau and Bureau of Labor Statistics.

## V. Results

Table 4 presents the results of our regression using each of the three proxies for economic well-being. Each of these regressions estimates a negative coefficient for the variable of interest—the presence of wilderness—with varying levels of significance. We find basically no evidence for any effect of wilderness on tax receipts, marginally statistically significant results for the effect on median household income ( $p = 0.086$ ), and a significant effect on total payroll ( $p = 0.039$ ). The estimated effects are also economically significant, decreasing median household income by \$496 and total payroll by \$124,200. We find no evidence that the presence of wilderness increases any of our measures of economic well-being. Controlling for other factors influencing county economic conditions, wilderness designation is associated with lower per capita income and lower total payroll, and it has no measurable relationship to tax receipts. Section 5 includes an expanded discussion of the results of our regression. The reported R-squared values are the lower of the between- and within-panel R-squared values.

For the most part, our control variables are signed consistently with intuition. The control variables population and school enrollment are highly correlated (0.94) as both are raw counts increasing with the population, and the sign of population flips in our first model if we drop school enrollment from our regression. Even signing the effect of these variables is problematic given the high multicollinearity, but our aim is to control for these effects, not to estimate them. A negative correlation between economic outcomes and the birthrate is in line with theory, as is a negative correlation between the infant death rate and economic well-being. Our model estimates a uniformly positive relationship between economic

outcomes and the percentage of the population with high school degrees, and uniformly negative and significant relationships between outcomes and both the crime and unemployment rates. A negative relationship is estimated between the median household income and the poverty rate, but the estimate is positive and significant in our other two models. This may be an issue with collinearity again, as there is a fairly strong correlation ( $0.30 < |r| < 0.45$ ) between the high school graduation rate, the poverty rate, and the unemployment rate. Again, our study does not aim to estimate the effects of these control variables on economic indicators. Rather, we control for these effects to check the individual effect of wilderness land designations and leave the specification of these effects to other studies.

The economic effects of other federal lands are generally not significantly different than zero. FWS and other federal lands are correlated with higher incomes with moderate economic significance. Other lands represent a tiny proportion of federal lands and few counties contain them, and this relationship is likely coincidental and not causal. The bulk of land the FWS administers lies in the National Wildlife Refuge System lands, which are unique in their management and purpose. Neither of these relationships holds for the other economic indicators. Department of Defense (DoD) lands are correlated with worse economic outcomes for median HHI and total nonfarm payroll with weak and strong statistical significance, respectively. These coefficients are only marginally economically significant, however, and DoD lands may contribute to local economies in ways not reflected in these indicators. The tenacity with which representatives protect military bases and shipyards suggests that they are economically and politically important in local economies. Our results do suggest, however, that DoD lands are not an unqualified economic good for an economy, potentially representing economic drags on certain economic indicators.

**Table 4. Cross Sectional Time Series Regressions**

Variable	Model 1: Median household income		Model 2: Total payroll		Model 3: Tax receipts	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Wilderness	-495.75	289.2*	-124.2	60.250**	-1.978	27.1
Population	-0.0028	0.001***	0.014	0.000***	0.0011	0.001***
Land area	0.104	0.042**	-0.0309	0.009	-0.0022	0.004
Males per 100 females	-15.88	9.8453	4.462	2.061**	-2.0258	0.923**
Percent white	-151.85	5.995***	-6.774	1.248	-4.1749	0.562***
Birth rate	-154.52	31.05***	-17.459	6.50***	-8.5994	2.911***
Infant death rate	-124.19	11.19***	-2.377	2.330	-2.0998	1.049**
School enrollment	0.0249	0.004***	-0.015	0.001	0.0031	0.001***
Percent HS grads	235.99	8.835***	9.056	1.840	3.8845	0.828***
Poverty rate (%)	-443.15	14.46***	14.074	3.009	5.6641	1.356***
Crime rate	-0.223	0.045***	-0.052	0.009	-0.303	0.004***
Unemp. rate (%)	-737.05	26.81***	-19.71	5.580	-8.8615	2.514***
% BLM	3.372	10.874	0.256	2.309	0.6374	1.02
% BoR	-323.08	242.55	7.472	50.850	4.5998	22.74
% DoD	-41.35	21.98*	-24.53	4.695	-2.5556	2.061
% FS	7.6389	5.628	1.6291	1.177	0.2762	0.528
% FWS	100.46	29.4***	0.566	6.115	0.5334	2.756
% NPS	34.264	22.261	-8.236	4.693*	1.8616	2.087
% TVA	124.24	82.25	12.86	17.270	2.6403	7.712
% Tribal	1.4517	12.136	-2.152	2.537	-0.6975	1.1378
% Other	201.23	63.27***	9.563	13.200	-0.6543	5.932
Constant	37150.58	1282.55***	-347.85	267.310	454.85	120.25***
	R-squared		R-squared		R-squared	0.412
	0.456		0.626			

Source: US Census Bureau, Bureau of Labor Statistics, and authors' calculations based on the US National Atlas.

Note: p values = \* $p < .1$ , \*\* $p < .05$ , \*\*\* $p < .01$

## VI. Discussion and Analysis

We began our analysis of the economic effects of wilderness on local economies by positing that wilderness has no economic effects. We chose this beginning point because of contradictory academic findings and contradictory claims by stakeholders in the policy process. We found that wilderness, when other types of public lands are controlled for, is associated with lower economic well-being. Our data do not support the argument often stated by the environmental community that wilderness is good for a local economy. In fact, the evidence suggests that wilderness harms local economies, if anything.

If the test for whether or not to designate public lands as wilderness is an economic one, wilderness fails. Our results show that

wilderness is not justified on economic grounds. But economic reasoning did not underlie the Wilderness Act or any of the wilderness areas established since the act was passed. Wilderness is established for emotional, ecological, and cultural purposes. Our results show that those purposes are accomplished at a cost to local economies.

A variety of factors could lead to the negative relationship between wilderness and economic conditions. Arguably, areas “untrammeled by man” have less existing economic activity. Reducing the potential for future economic development by designating those areas as wilderness will not, on net, be economically positive. It is also possible that different types of wilderness may have different implications for economic conditions. As noted above, four federal agencies currently manage wilderness areas. Wilderness managed by different agencies may have different economic impacts on counties. Wilderness within national parks, for instance, may more effectively attract tourists than wilderness on BLM or US Forest Service lands.

Finally, it is probable that the location of wilderness has an impact on the direction and magnitude of its economic impact. Phillips (2004), for instance, found that wilderness designation in the Green Mountains of Vermont had a positive impact on private land values in the area. This result is consistent with basic economic theory; by reducing the amount of land available for development, the remaining land is now relatively scarce and its value should increase. Although this finding does not mean the wilderness designation benefitted the local economy on the whole rather than only landowners in the area, we assume that some wilderness does, in fact, have positive economic impacts. Evaluation of individual areas could reveal these positive relationships, but our findings suggest that these cases are the exception and not the rule, with wilderness representing an economic drain rather than driving economic growth. Similarly, we use the economic indicators we consider to be the best available. The effect of wilderness on other indicators (such as property values) may well be positive, and additional work is needed to flesh out the full effect of wilderness.

Wilderness may not increase local economic growth, but that does not imply that wilderness is a bad thing, *per se*. Rather, it identifies trade-offs inherent in land designations. The emotional, ecological, or cultural values of wilderness may still justify wilderness designations, especially since wilderness has consistently maintained a

popular position nationally. The benefits and costs of wilderness, however, are not evenly distributed, since local communities bear a disproportionate share of the costs of wilderness designations. This is probably why local officials (especially in rural areas of the Western United States) are frequently vehemently opposed to wilderness.

If wilderness proponents wish to create more wilderness, they might pay more attention to the interests of local communities, since wilderness designations economically disadvantage those communities. Local interests do not trust claims about economic advantages from wilderness, apparently, for good reason. By working with those local interests to overcome the costs of wilderness, proponents could generate the trust necessary to develop outcomes that protect wilderness values while reducing economic harm.

There has been some progress in this direction in recent years, as increasing consensus has developed about the value of local participation in wilderness designations. In Washington County, Utah, for example, local officials participated in discussions for years with farmers, ranchers, environmentalists, and outdoor recreation enthusiasts to create a consensus position regarding lands that could be designated as wilderness. Though consensus building is difficult and time consuming, the process led to wilderness designations in 2009 that had the support of local political elites, the local populace, and the environmental community.

The Washington County process was modeled on an earlier and also successful process in Nevada in which Clark and Lincoln counties also developed a comprehensive land use plan that envisioned wilderness as part of the local land portfolio. These processes seem to avoid acrimonious debate between local officials and environmental activists and may represent a way forward in creating locally supported environmental regulation.

We find no evidence that wilderness land designations represent an economic boon to local economies. Rather, the evidence suggests that wilderness designations accompany worse economic outcomes. Diverse motivations lead to wilderness designations, and the designations may successfully meet political, environmental, and conservation goals. Our findings suggest that claims that wilderness also promotes economic growth are unfounded. Recognizing that designations represent costs to local economies should inform a consensus-building approach to new wilderness area designations.

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