

Regional Economic Impacts of the Proposed Grandfather National Scenic Area

Sarah Cline and Ayse Aydin

Colorado State University

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## **EXECUTIVE SUMMARY**

Public lands designations have been shown to have significant impact on their contextual regional economies. This paper first reviews the existing literature on how public lands shape and impact the proximate regional economies in which they are situated. Based on this collected wisdom the paper first synthesizes past lessons into a comprehensive, site-based impact methodology. The research then considers the particular case of the proposed Grandfather National Scenic Area (GNSA) in North Carolina, applying this new methodology to assess the likely effects of the designation on tourism, spending, employment, and the trajectory of the region's economic development.

The proposed Grandfather NSA would include 25,500 acres of the 510,119 acre Pisgah National Forest near Blowing Rock, North Carolina. The Grandfather NSA would include land in three North Carolina counties – Avery, Caldwell and Watauga. We estimate direct and regional economic effects in the three-county region. Based on our estimation, a total of 1.5 million visitors (including some of the current visitors to the Pisgah National Forest) are expected to visit the GNSA. These visitors are expected to lead to \$26.1 million in direct recreation-related expenditures. In addition to these direct output impacts, indirect and induced effects are estimated at \$12 million for an estimated total regional output impact of \$38.4 million. The direct effects of the GNSA are also estimated to result in 573 jobs in the region. Additional indirect and induced effects would result in 151 jobs, for a total employment impact of 724 jobs in the three-county region.

## **INTRODUCTION**

Public lands and protected areas in the United States provide amenities, recreation opportunities and environmental services for citizens and visitors. Although it is widely understood that these areas provide benefits, it has only been in recent years that the broader economic benefits that accrue to the surrounding communities have been estimated. Many researchers have begun to assess the economic impacts that may accrue to communities surrounding public lands and protected areas.

While all types of public lands may provide economic benefits to regional economies, some areas may contribute more to the local economy than others. Rasker (2006) assesses the impact of different types of public lands to the local economy, finding that public lands (particularly protected lands) are strongly associated with income growth in the western states, especially in more isolated counties. It is also possible that certain types of protected area designation may signal a different type or quality of experience than other areas. Weiler (2006) discusses the signaling that site designation provides to consumers in the case of changing designation from National Monument to National Park status. In addition, some recent studies have addressed how different types of protected areas may lead to different levels of visitation and thus potential economic impacts for the surrounding communities. For example, Weiler and Seidl (2004) have assessed the impact on visitation of changing the designation from a National Monument to a National Park. They found that such a change in designation had a significant impact on the number of visitors to the area for the eight sites that experienced a change in designation over a twenty-year period.

This paper presents a typology of different types of protected areas on federally-owned public lands in the United States, assessing various aspects of these lands that may influence the

signal that the areas send to potential visitors. In addition, we provide a synthesis of previous studies that have estimated the economic value of different types of protected areas throughout the United States. Next, we present a theoretical model for deriving estimates of the effect of different types of protected areas on their core economic drivers, namely visitors to the site, in terms of quality (type of protected area) and quantity (annual visitation) of the site. Finally, we use these methods in the case of the proposed Grandfather National Scenic Area (GNSA) in North Carolina and apply regional economic impact analysis techniques to estimate the direct, indirect and induced effects of the GNSA on the regional economy.

## **TYOLOGY OF PROTECTED AREAS IN THE UNITED STATES**

Federally-owned public land in the United States is generally managed by one of four agencies: the National Park Service (NPS), the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the United States Fish and Wildlife Service (USFWS). Within these federal agencies, many different classifications of protected areas exist. Some, such as National Parks, are administered solely by one agency, while others, such as Wilderness Areas, exist on federal lands administered by multiple agencies. In addition, some types of protected areas have particular standards for designation, while others may vary quite a bit between sites with the same designation.

The diverse characteristics of each type of protected area can provide different signals to potential visitors about the quality of a particular site. This can subsequently lead to different levels of visitation and regional economic impact. Some of the factors that might lead to different signals include the level of protection, the name recognition of the type of area (which could be affected by the total number of designated sites of a given type throughout the United States),

and the perceived quality of the protected area. Table 1 describes several different types of protected areas, along with the administering agency, the branch of government in charge of designation, and the current number of sites of each type<sup>1</sup>.

The 58 National Parks in the United States are administered exclusively by the National Park Service and are designated by acts of Congress. These sites generally encompass large areas of land and prohibit hunting, mining and other consumptive uses. There are currently 95 National Monuments which are located on each of the four types of federally-owned public lands. These areas are designated by the President and are generally smaller in area than National Parks and may allow hunting, mining and other consumptive uses (Weiler and Seidl 2004). National Preserves are areas located on NPS and USFS land and are designated by Congress. These sites have characteristics similar to National Parks but they also allow hunting, trapping and oil and gas extraction. Wilderness Areas are located on USFS, BLM and USFWS lands. These sites are designated by Congress and have a somewhat different objective than many other types of protected areas in that they are meant to maintain the site in its natural condition and should not contain any human-made improvements. National Recreation Areas are generally located near areas used for water-based recreation or large population centers. These sites are designated by Congress and administered by the NPS, USFS or BLM.

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<sup>1</sup> In our typology we exclude areas that focus on historical preservation (such as National Historic Sites and National Battlefields) and those that focus on water resources (such as Wild and Scenic Rivers and National Seashores) since these areas likely focus on a specific sub-group of visitors. We also did not include Scenic Recreation Areas in our analysis since the Opal Creek SRA is the only area with this designation.

**Table 1. Different Types of Protected Areas in the United States**

Type of Protected Area	Description	Agency <sup>1</sup>	Designated by	Number
National Park	Large natural places having a wide variety of attributes. Hunting, mining and consumptive activities are <i>not</i> authorized.	NPS	Congress	58
National Monument	Landmarks, structures, and other objects of historic or scientific interest situated on lands owned or controlled by the government.	NPS, USFS, BLM, USFWS	President	95
National Preserve	Areas with characteristics associated with national parks, but in which public hunting, trapping, oil/gas exploration and extraction are permitted.	NPS, USFS	Congress	19
National Recreation Area	Areas generally centered on large reservoirs that emphasize water-based recreation or are located near major population centers.	NPS, USFS, BLM	Congress	43
National Parkway	Roadway and the parkland paralleling the roadway, intended for scenic motoring along a protected corridor, often connecting cultural sites.	NPS	Congress	4
National Trail <sup>2</sup>	Linear parklands (over 3,600 miles) authorized under the National Trails System Act of 1968.	NPS, BLM	Secretary of Interior or Agriculture	26
National Scenic Area	Areas that ensure the protection and preservation of scenic quality, water quality, natural characteristics, and water resources; protect wildlife and fish habitat; protect areas that may develop characteristics of old-growth forests; and provide a variety of recreation opportunities	USFS	Congress	9
Wilderness Area	An area retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.	USFS, BLM, USFWS	Congress	704
National Conservation Area	Areas that provide for the conservation, use, enjoyment, and enhancement of certain natural, recreational, paleontological, and other resources, including fish and wildlife habitat.	BLM	Congress	14
National Wildlife Refuge	A national network of lands and waters administered for the conservation, management and where appropriate, restoration of the fish, wildlife and plant resources and their habitats.	USFWS	Congress	548

<sup>1</sup> NPS=National Park Service; USFS=US Forest Service; BLM=Bureau of Land Management; USFWS=US Fish and Wildlife Service

<sup>2</sup> Includes National Scenic Trails and National Historic Trails

National Scenic Areas, such as the proposed Grandfather NSA in North Carolina, are located on USFS lands and are designated by acts of Congress. These sites serve a variety of purposes including the preservation of different types of natural areas and the provision of recreational opportunities. There are only 9 NSAs currently in the United States, each with a specific purpose and description laid out in its legislation. National Conservation Areas are similar sites designated on BLM lands. The 14 designated National Conservation Areas serve a similar purpose to NSAs, focusing on protection of various natural features and providing for the use of the site.

Two types of protected areas listed in Table 1 are somewhat distinct from the other areas listed in the table. National Parkways and National Trails are linear protected areas that are often connected or adjacent to other types of protected areas. National Parkways are administered by the NPS, while National Trails can exist on either NPS or BLM lands. Both of these types of protected areas are designated by acts of Congress. Parkways and Trails can be important in terms of visitation to other protected areas and their surrounding communities. These areas often link together different protected areas (for example, the Blue Ridge Parkway connects Shenandoah National Park in Virginia to Great Smoky Mountains National Park in North Carolina and Tennessee), which could potentially increase visitation to other areas along the route.

## **LITERATURE REVIEW**

A number of studies have addressed the economic impact of protected areas in the United States. The purpose, type of area considered, and analytical methods used vary significantly across studies. The purpose of some studies is to determine the economic impact of a proposed

protected area, while other studies focus on the economic impact of an existing area. Different types of protected areas have been considered in the literature including many of those listed in Table 1, as well as state parks. Analytical methods vary across studies and include econometric techniques, meta-analysis, input-output methods and the economic trend analysis. This section summarizes the existing literature, focusing on the types of sites that have been considered, the analytical methods used, the regions of the United States that have been covered, and some of the basic findings. Table 2 summarizes some of the basic information from each study.

Previous studies have considered a range of different types of protected areas. Weiler (2006) and Weiler and Seidl (2004) consider a change in designation status from National Monument to National Park within the National Park System. Weiler and Seidl (2004) use econometric analysis to estimate the impact of the conversion of protected areas from National Monuments to National Parks. They further used IMPLAN input-output modeling software to determine the economic impact of the conversion of the Great Sand Dunes in Colorado from a National Monument to a National Park. Researchers at Michigan State University have developed MGM2, the Money Generation Model, that estimates the economic impact of spending of National Park visitors on the area surrounding the park land (Stynes 2008). Using this methodology, the authors have developed economic impact estimates for a large number of NPS lands throughout the United States. Dawson et al. (1993) estimate the regional economic impact of the Great Basin National Park in Nevada using IMPLAN. Based on survey data and input-output analysis, the authors find that visitor expenditures lead to \$3.78 million in gross output. Power (2001) investigated the expected effects of a proposed National Park in Maine on the region's economy using economic trends in the region and information from a nearby National Park. The paper concludes that the creation of the National Park is expected to result in

a net positive impact on the regional economy. Although there is expected to be some job loss in the forestry sector, in aggregate, there is expected to be one percent annual growth in jobs in the area around the Park. Haefele et al. (2008) consider the economic impact of the Carrizo Plain National Monument in California. Using regional asset indicators and economic trend analysis, the report concludes that the presence of the National Monument will significantly contribute to the social and economic success of the region.

Loomis and Richardson (2001) conducted an analysis of Wilderness Areas across the United States on public lands managed by the USFS, NPS, USFWS and BLM. In their paper, they consider several different types of economic value from Wilderness Areas including recreation, passive-use, ecological service, scientific, biodiversity and community values. In terms of recreation values, they estimate that the addition of an additional 10,000 acre roadless area would lead to an additional \$153,500 in the western US and \$435,700 in the eastern US. Phillips (2008) applies the estimates of Loomis and Richardson (2001) to a proposed Wilderness Area in the Monongahela National Forest in West Virginia. He estimates values for recreation, enhanced property value, amenity-based development, ecosystem services and passive use values. Based on the proposed size of the Wilderness Area, the additional recreation value would be around \$110 per acre.

Keith and Fawson (1995) use input-output analysis to consider the economic impact of proposed Wilderness Areas on lands managed by the Bureau of Land Management in rural Utah. Their results show that wilderness recreation will not likely be the substantial source of economic growth in the short and medium runs. Duffy-Deno (1998) considered the designation Wilderness Areas on federally-owned land in the intermountain western United States. He uses econometric analysis to assess county-level employment and population. His findings show that

the existence of federal wilderness does not affect the study counties' employment level or population density. Rasker and Hackman (1996) used case studies to test whether the protection of wildlands through the designation of Wilderness Areas and National Parks has a negative impact on economic development in the northern U.S. Rocky Mountains and Rocky Mountains of southern British Columbia and Alberta, Canada. In their analysis, the authors compare employment and income trends in counties with a high degree of wildland protection with counties with high levels of resource extraction and little wildland protection. The results indicated that the wilderness counties experience faster employment and income growth and higher degree of economic diversification and lower employment rates than in resource extraction counties.

Unsworth and Paterson (1999) assess the potential impacts of a proposed National Wildlife Refuge that is to be developed from privately-owned land. They noted that although development of the National Wildlife Refuge may create substantial social welfare benefits, the full implementation of the refuge proposal in the short run will result in a net loss in annual regional output. This net loss is due to the fact that they consider the losses from taking the private land out of agricultural production in order to create the Refuge. Unsworth et al. (2000) investigate the regional economic contribution of recreational and commercial activities on the Monomoy and Nantucket National Wildlife Refuges. They conclude that both refuges not only have ecological significance but also contribute regional economic activity. The refuges stimulate the regional economy primarily through visitor expenditures on lodging, provisions and equipment. Laughland and Caudill (1997) focus on the regional income and employment effects of recreational visitors to 15 different National Wildlife Refuges. They note that recreational visits to NWRs generate substantial economic activity, and in some areas, refuge visitors are the

major economic stimulus to the local economy. Rasker (2006) investigated different types of federal public land management regimes, including a range of uses from protected to industrial, to determine their impact on the economic growth Western US counties. He found that public lands in general and protected public lands specifically are associated with economic growth in the non-metropolitan counties considered.

Some authors have also assessed the regional economic impacts of state-owned public lands. Bergstrom et al. (1990) assessed the economic impacts of existing state parks in North Carolina, South Carolina, Georgia and Tennessee using IMPLAN analysis. Their work suggests that recreational spending by out-of-state visitors may stimulate a considerable amount of economic activity in the state economies studied. Hubacek et al. (2002) investigated several scenarios in the case of the Adirondack Park in New York including whether to acquire more land for protecting open space, to negotiate conservation easements, or to embrace development. They use a break-even analysis within an input-output framework and conclude that the working forest conservation easement scenario required the least amount of additional demand to reach the break-even point.

**Table 2. Summary of Previous Studies**

<b>Author (Date)</b>	<b>Region</b>	<b>Type of Protected Area</b>	<b>Method of Analysis</b>	<b>Designation Status</b>	<b>Value per acre</b>	<b>Value per visitor</b>
Bergstrom et al. (1990)	Southern US	State Park	IMPLAN	Designated		
Dawson et al. (1993)	Western US	National Park	IMPLAN	Designated	49.02	54.78
Duffy-Deno(1998)	Western US	Wilderness Area	Econometric model Economic trend analysis	Designated		
Haefele et al. (2008)	Western US	National Monument		Designated		
Hubacek, Erickson and Duchin (2002)	Northeastern US	State Park	IMPLAN	Designated	748 – 1,792	1.40 - 3.35
Keith and Fawson (1995)	Western US	Wilderness Area	IMPLAN	Proposed		
Laughland and Caudill (1997)	United States (15 NWRs across the US)	National Wildlife Refuge	IMPLAN	Designated	Average: 297.70 44.37	Average: 19.24
Loomis and Richardson (2001)	Eastern US	Wilderness Area	Meta-Analysis	Designated	(Eastern) 15.63 (Western)	
Phillips (2008)	Western US	Wilderness Area	Application of previous estimates	Proposed	60.36	
Power (2001)	Eastern US	Wilderness Area	Economic trend analysis	Proposed		
Rasker (2006)	Northeast US	National Park				
Rasker and Hackman (1996)	National Parks, National Monuments, Wilderness, National Recreation Areas, National Wildlife Refuges	Wilderness Area and National Park	Econometric model Econometric trend analysis	Designated		

**Table 2. Summary of Previous Studies (Continued)**

<b>Author (Date)</b>	<b>Region</b>	<b>Type of Protected Area</b>	<b>Method of Analysis</b>	<b>Designation Status</b>	<b>Value per acre</b>	<b>Value per visitor</b>
Stynes (2008)	United States	National Parks, National Monuments, National Recreation Areas	MGM2 Model	Designated	Nantucket: 225,208 Monomoy: 2,490	NP: 34.36 NM: 25.43 NRA:17.36 Nantucket: 154
Unsworth, Paterson and Sigman (2000)	Northeastern US	National Wildlife Refuge	IMPLAN	Designated	2,490	Monomoy: 165
Unsworth and Paterson(1999)	Midwestern US	National Wildlife Refuge	Econometric model and IMPLAN	Proposed	333.40 to 472.97*	19.53 to 31.88*
Weiler and Seidl (2004)	Western US	National Park	Econometric model and IMPLAN	Designated	15.8	9.15

\* Depending on the Scenario considered.

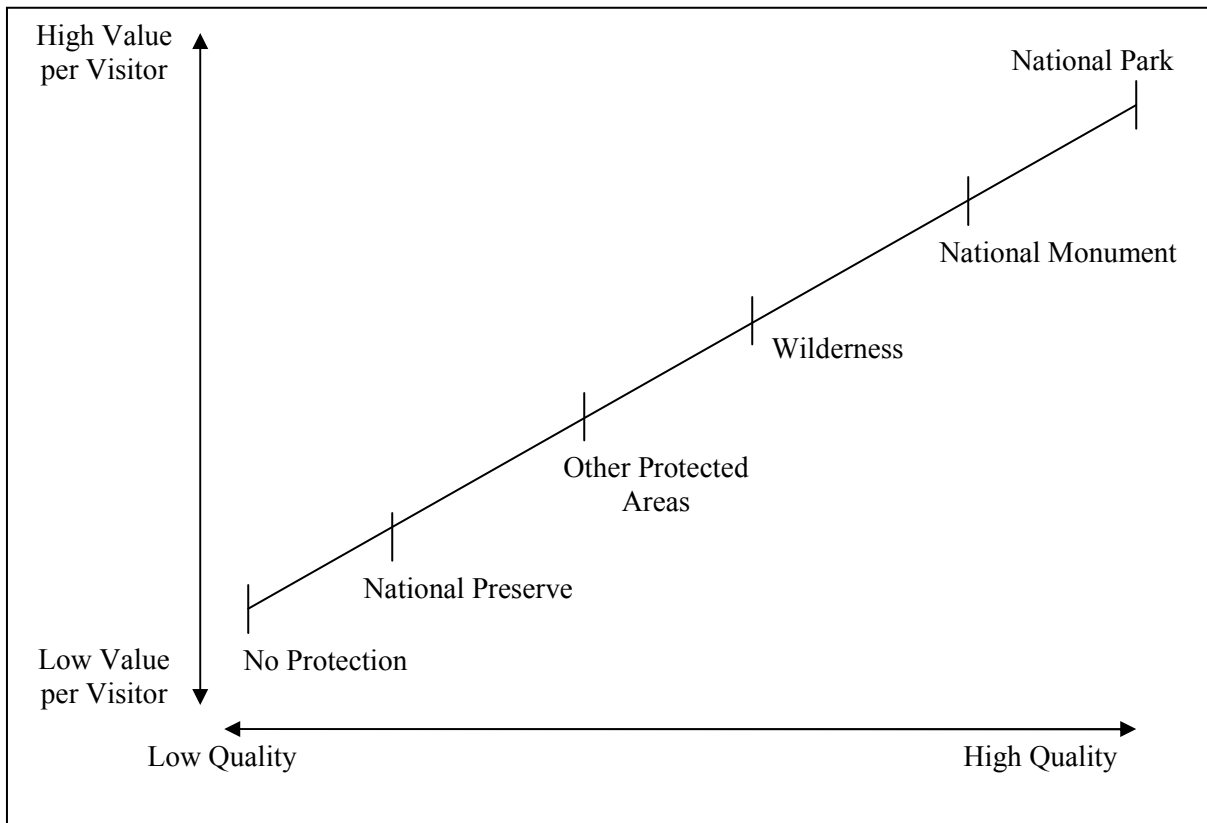
## **SYNTHESIS: CHANGE IN QUALITY AND QUANTITY**

Based on the typology of protected areas presented above and the analysis of previous studies, we have developed a methodology to estimate the economic impacts of a given site. Our methodology considers the two dimensions of protected area designation – quality and quantity. The quality dimension is related to the type of designation for a given site, with certain types of protected areas providing a higher value per acre to visitors than others. The quantity dimension is represented by the number of visitors to the site under consideration. Changes in these dimensions lead to differences in expected visitation and tourist expenditures, and thus different regional economic impacts. The measurement of each of these dimensions is described in the sections below.

### *Change in Quality: Site Designation*

In order to assess the quality of a given protected area, we have created a hypothetical gradient based on the type of protected area designation (Figure 1). In order to simplify our analysis, we assume a linear relationship between the different area types. In the lower left hand corner of this continuum of protected areas, we consider the lowest level of protection, which includes public lands managed by the USFS and BLM that have a multiple use mandate. Next we consider National Preserves which have similar characteristics as National Parks but allow for consumptive use of resources that are prohibited in most other protected areas. The next category, Other Protected Areas, includes National Wildlife Refuges, National Conservation Areas, National Recreation Areas, and National Scenic Areas. These areas are considered together in our analysis

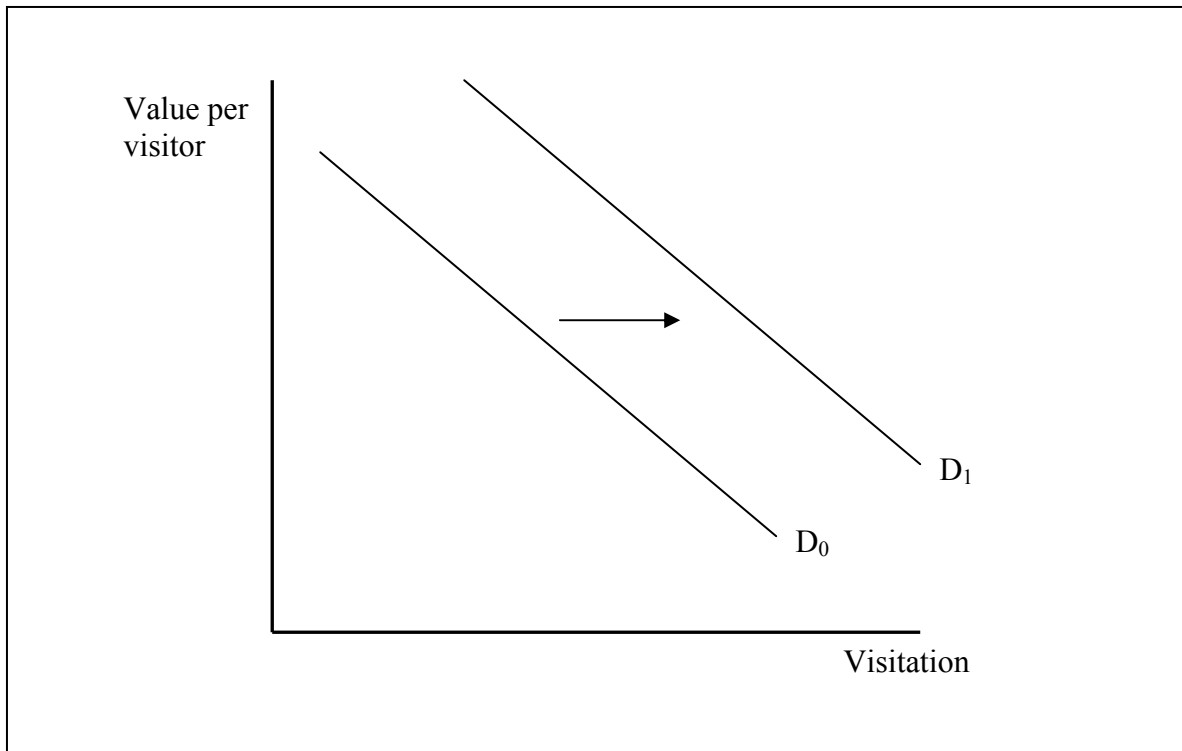
since there is a great deal of overlap in the stated purpose of each type of area. Wilderness Areas are considered as the next highest level of quality due to their high level of protection. Next we consider National Monuments since they have similar qualities as National Parks but are generally smaller in size. Finally, in the upper right corner of the continuum, we consider National Parks as having the highest designation quality due to their highly protected status and their reputation as the “crown jewels” of public lands in the United States.



**Figure 1. Hypothetical Gradient of Protected Area Status**

A change in designation from one type of status to another could be viewed as a shift in the demand curve for visitation to a particular site (Figure 2). In terms of this

analysis, we are considering an average total product on a given demand curve and a subsequent shift in the demand curve due to a change in protected area status. For example, if a particular area were to experience a change in designation from unprotected status to Wilderness, the demand curve for visitation to the area would be expected to shift outward (from  $D_0$  to  $D_1$  in Figure 2), indicating an expected increase in visitation. Changes in designation could also be addressed in terms of marginal changes, or the *additional* visitation to a given protected area due to a change in visitation. Although marginal changes would also be useful for such analysis, we focus on average changes in the GNSA case study due to data limitations.



**Figure 2. Shift in Demand Curve for Visitation due to a Change in Quality**

We can estimate a value per visitor for each type of protected area based on estimates from previous studies. To help standardize our estimates, we only consider those studies that list recreation values. In addition, based on the small number of studies for some of the categories, we choose a small number of points to estimate along the continuum. Although we would ideally prefer to have an estimate for each of the categories, we only estimate values for National Parks, National Monuments and Other Protected Areas due to lack of previous studies for other area types (See Table 3).

**Table 3. Value per Visitor by Type of Protected Area**

<b>Type</b>	<b>Value per visitor</b>
National Park	\$34.58
National Monument	\$25.43
Wilderness <sup>2</sup>	N/A
Other Protected Areas	\$17.36

We generally choose the lowest bound estimate of those available in the literature for each type of protected area, so these data points should be viewed as conservative estimates. While most estimates considered measure the total value of a designation, Weiler and Seidl (2004) estimate a marginal change from the change in designation from a National Monument to National Park. We can add Weiler and Seidl’s estimate to the Stynes value for National Monuments and obtain a value of \$34.58 per visitor, which is almost identical to the average value from the Stynes studies (\$34.36). In the case of National Monuments, we use the average estimate of Stynes’ studies for National Monuments (\$25.43), as these are the only estimates that we found for National Monuments. For the Other Protected Areas category, we choose the lowest bound

<sup>2</sup> Per visitor data is not available for the Wilderness studies included in our sample.

estimate of those for National Wildlife Refuges and National Recreation Areas, which yields a value of \$17.36 per visitor.

### *Quantifying the Visitation Driver*

In terms of the quantity dimension of our methodology, we considered two possible measures of quantity, acreage and visitation. We chose visitation as our measure of quantity instead of acreage since the number of visitors is really the driver of local economic impacts, and it is likely that the acreage of the area is one of the factors influencing total visitation. In addition, for some of the smaller areas in terms of acreage (which are often located near urban areas), the per-acre measure is likely to be large compared to other areas. For these reasons, we consider the number of visitors to an area as the measure of quantity for our analysis. Effectively, this quantity represents the supply curve of the economic driver for the site, namely its visitors.

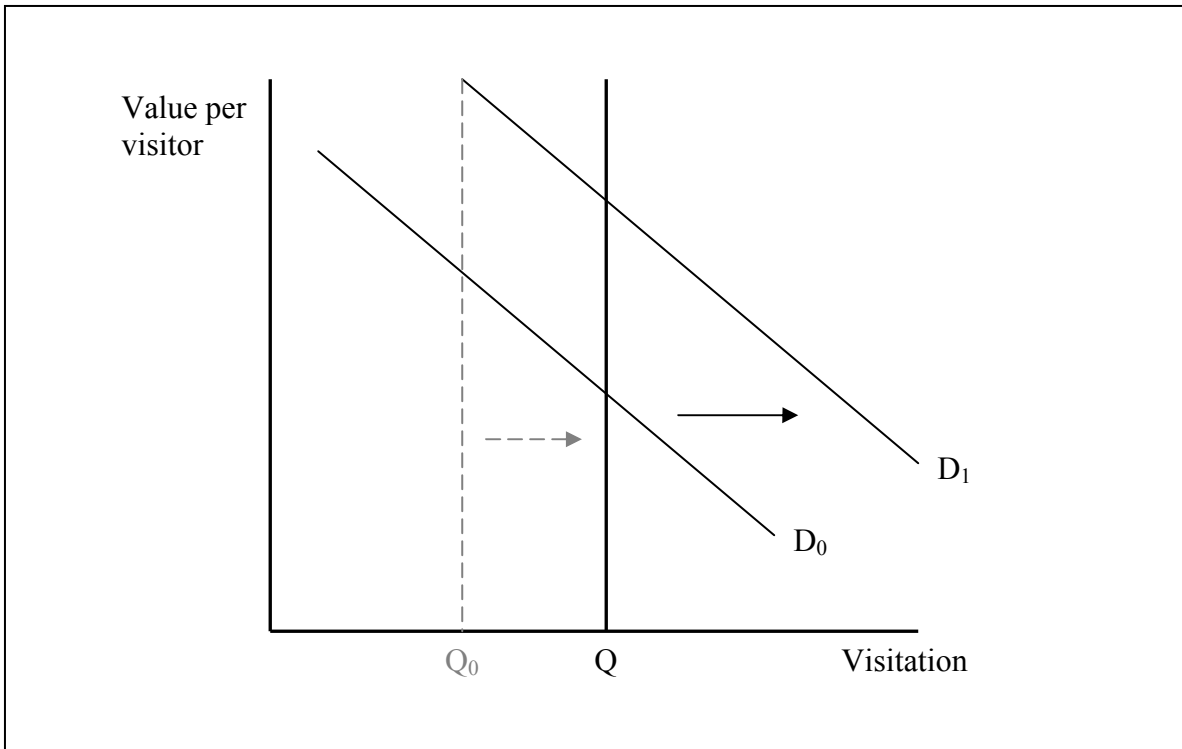
In order to apply value per visitor to the creation of a new protected area or a change in designation from one type of protected area to another, we must also obtain an estimate for visitation based on the new designation. Ideally, we would use a real-world baseline for existing visitation with resulting change in visitors from re-designation by econometric analysis. However, in this case, data were not available on either Pisgah National Forest or comparative re-designations to allow for either benchmark.

Therefore, we propose a general econometric estimate of visitation that can be applied to any of the protected area designations considered in Figure 1. In each case, current visitation data would be collected for all sites currently under a particular designation. Visitation would then be estimated as a function of explanatory variables

expected to impact the level of visitation. For this analysis, we estimate a simple equation with visitation as a function of acreage, state population (population of the state in which the protected area is located), and contiguous state population (population of the states surrounding the state where the site is located) as shown in Equation 1. State population has been shown to be a better measure of the source of visitors than national population (Weiler and Seidl 2004; Weiler et al. 2003).

$$Visitation = f(Acreage, State Population, Contiguous State Population) \quad (1)$$

It should be noted that this type of analysis is only able to provide estimates for *total* visitation to a given area. In this sense, estimates produced using this data only provide the total economic impact of a given designation and not a marginal change in visitation based on a re-designation. We illustrate this in Figure 3, which shows the supply curve for visitation. In this case, we have a single estimate of *total visitation* at Q. Ideally, we would like to estimate a change in visitation from  $Q_0$  to Q, but as noted above, data was not available to estimate a change in visitation for this study. These caveats should be taken into account in the interpretation of the case study that follows.



**Figure 3. Supply Curve for Total Visitation Estimate**

To illustrate the use of this econometric model for the GNSA case study, we estimated Equation 1 for the Other Protected Areas category shown in Figure 1. Due to lack of visitation data for many of the protected areas included in this category, our sample includes data for 25 National Recreation Areas across the United States. The regression results estimated for this sample of data are shown in Table 4.

**Table 4. Regression Results for Other Protected Areas Visitation**

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**Dependent Variable = Annual Visitation**

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<b>Variable</b>	<b>Coefficient</b>	<b>t-statistic</b>	<b>p-value</b>
<i>Acreage</i>	2.102	1.29	0.209
<i>State Population</i>	0.103	2.36	0.027
<i>Contiguous Population</i>	0.022	0.93	0.362
N = 25	R <sup>2</sup> = 0.4435	F-stat (3, 22) = 5.84	

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## **APPLICATION TO THE GRANDFATHER NATIONAL SCENIC AREA**

### *Description of the Study Area*

Based on the methodology described in the previous section, we can estimate the potential regional economic impacts of the proposed Grandfather National Scenic Area in western North Carolina. The proposed Grandfather NSA would include 25,500 acres of the 510,119 acre Pisgah National Forest near Blowing Rock, North Carolina. The Grandfather NSA would include land in three North Carolina counties – Avery, Caldwell and Watauga.

This area of the Pisgah National Forest is also near the Blue Ridge National Parkway. The Blue Ridge Parkway is a National Parkway administered by the National Park Service leading from Shenandoah National Park in the north to Great Smoky Mountains National Park in the south. The parkway is almost 500 miles in length and traverses Virginia and North Carolina. The parkway travels through four National Forests including the Jefferson and George Washington in Virginia, and the Pisgah and Nantahala in North Carolina. The development of the Grandfather NSA will help protect

some of the scenic views that are available to those individuals traveling along the Blue Ridge Parkway.

### *Analytic Methods*

Input-output (I-O) models are a tool often used in regional economics to show linkages between different sectors of the economy. I-O models allow researchers to forecast and assess the impact of particular shocks on different sectors of the regional economy (Blair 1995). These models measure the impacts of these shocks on the economy as direct, indirect, and induced effects. Direct effects can be described as the “first round” effects and occur as changes in production in the industry that is directly affected by the policy shock. Indirect effects are changes that occur in industries that are directly related to the industry that felt the policy shock. These interactions cause impacts in one sector to be felt in all related sectors in the regional economy. Induced effects occur through linkages between the affected sector and households in the model. These impacts occur from labor linkages between households and other economic sectors as well as other effects due to additional changes in household spending based on changes in wages.

IMPLAN (IMpact Analysis for PLANning) software is an I-O modeling package developed by the U.S. Forest Service and maintained by the Minnesota IMPLAN Group. IMPLAN uses data from the Bureau of Economic Analysis and the Bureau of Labor Statistics and defines industry groupings using SIC codes to allow users to forecast or predict regional economic impacts for specific industries. It should be noted that

IMPLAN estimates static impacts, meaning that the model does not allow for adjustments that might be made in related industries over time.

*Estimation of Direct, Indirect and Induced Effects*

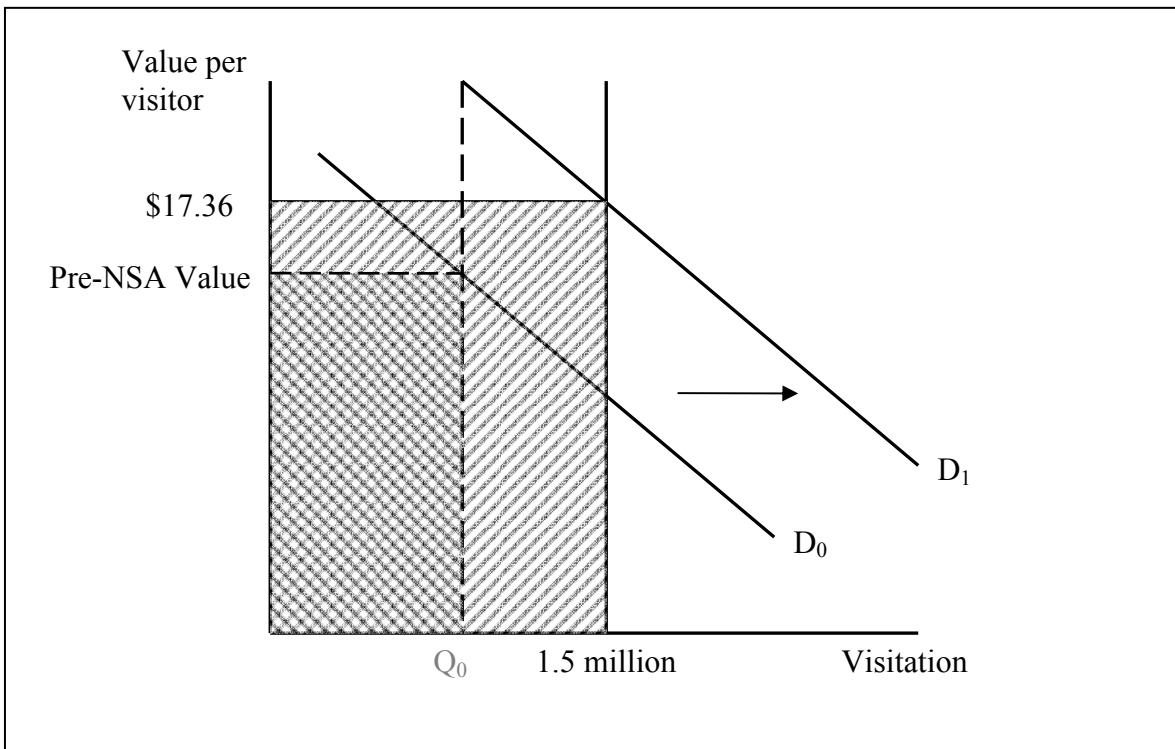
Since the proposed area of the GNSA includes parts of Avery, Caldwell and Watauga counties, we consider the economic impact in these three counties for the purposes of the I-O analysis. Baseline data on industry output, employment and employee compensation for the year 2002 is shown in Table 5 for all three counties combined. As shown in Table 5, in 2002, total output in the area was around \$6.4 billion, employee compensation was around \$1.9 billion, and total employment was 73,376.

**Table 5. Region-wide Economic and Employment Data (includes Avery, Caldwell and Watauga Counties)**

	<b>Baseline Estimates</b>
Total Industry Output ( <i>2002 Dollars</i> )	\$ 6,384,443,000
Total Employment ( <i>Number of Employees</i> )	73,376
Total Employee Compensation ( <i>2002 Dollars</i> )	\$ 1,900,983,000

In order to estimate the potential direct, indirect and induced effects of the designation of the Grandfather National Scenic Area, we must first estimate the projected visitation for the area based on the regression results presented in the previous section. Based on these regression results, we project that the total visitation to the GNSA would be 1,505,934 visitors annually. It should be emphasized that this figure is the *total* estimated visitation for the GNSA, which would be expected to include some current visitors to the Pisgah National Forest. Due to lack of accurate visitation information for

the Pisgah National Forest, we are unable to project what portion of this visitation would be in addition to current visitation in the area. Using our estimates for change in quality and quantity in terms of value per visitor as shown in Table 3, we can multiply the total estimated visitation by the value per visitor of \$17.36 to obtain an estimated direct recreation value of the GNSA of \$26.1 million. This estimation is shown in graphical form in Figure 4. We see that the value per acre of \$17.36 occurs at the point where the supply curve for 1.5 million visitors and the demand curve with higher quality ( $D_1$ ), reflecting the new NSA designation, cross. The total direct recreation value is shown by the entire shaded rectangle. It should be noted again that our estimate here is of total visitation, and if we had been able to estimate the change in visitation (from  $Q_0$  to 1.5 million), the change in recreation value would only be the checked area to the left and below the dashed lines.



**Figure 4. Graphical Representation of Total Direct Recreation Value**

This total direct impact of \$26.1 million should be applied to the appropriate industries based on the expenditures of visitors to the GNSA for the I-O analysis. In order to break down this impact by economic sector, we apply percentages of trip-related expenditures for wildlife-viewing recreation as reported in the 2001 National Survey of Hunting, Fishing and Wildlife-Viewing (US Department of Interior and US Department of Commerce 2001) due to lack of location-specific expenditure data. Table 6 shows the break-down of direct economic impacts by sector for the projected economic impact of recreation in the GNSA applied to the impact analysis in IMPLAN. As shown in Table 6, the largest percentage of the impact is applied to the food and drinking sector, followed by transportation, lodging, and other recreation expenditures.

**Table 6. Estimated Direct Economic Impact of the GNSA by Category**

<b>NAICS Code</b>	<b>Sector</b>	<b>Percentage</b>	<b>Economic Impact</b>
407	Gasoline Stations	32%	\$ 8,313,117
479	Hotels and Motels	24%	\$ 6,351,160
481	Food and Drinking Places	35%	\$ 9,082,844
478	Recreation	9%	\$ 2,395,900

Applying the direct impacts in the four sectors as shown in Table 6, we can estimate the total impacts (including indirect and induced effects) in terms of employment and output for Avery, Caldwell and Watauga counties. As shown in Table 7, recreational activity of visitors to the GNSA is estimated to result in 724 jobs across the three-county area. Direct impacts result in 573 jobs, with indirect effects resulting in 55 jobs and induced effects producing 97 jobs in the regional economy. In addition to the

four industries that felt direct impacts, the remaining impacts tended to come from retail and service sectors.

**Table 7. Employment Impacts from Recreation in the GNSA (Top Ten Sectors)**

<b>NAICS</b>					
<b>Code</b>	<b>Industry</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
481	Food services and drinking places	249.8	3.1	13	265.9
407	Gasoline stations	171.2	0.2	1.4	172.8
479	Hotels and motels- including casino hotels	115.2	0.6	1	116.9
478	Other amusement- gambling- and recreation industries	36.4	0.1	1.5	38
431	Real estate	0	5.8	3.2	9
390	Wholesale trade	0	4.6	3.9	8.5
405	Food and beverage stores	0	0.7	5	5.8
465	Offices of physicians- dentists- and other health	0	0	5.8	5.8
467	Hospitals	0	0	4.6	4.6
410	General merchandise stores	0	0.7	3.4	4.1
<i>Total Impact</i>		<i>572.6</i>	<i>54.6</i>	<i>96.8</i>	<i>724</i>

In terms of output, the total impact on the regional economy due to recreation in the GNSA is estimated to be \$38.4 million. This impact encompasses direct effects of \$26.1 million, indirect effects of \$4.9 million, and induced effects of \$7.4 million. In addition to the direct impacts in the food, gasoline stations, hotel and recreation sectors, indirect and induced output impacts are felt primarily in the housing (real estate and owner-occupied dwellings) trade, and service (physicians and hospitals) sectors.

**Table 8. Output Impacts from Recreation in the GNSA (Top Ten Sectors)**

<b>NAICS Code</b>	<b>Industry</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
481	Food services and drinking places	9,082,844	114,245	471,793	9,668,882
407	Gasoline stations	8,313,117	9,614	67,324	8,390,055
479	Hotels and motels- including casino hotels	6,351,160	32,216	56,730	6,440,106
478	Other amusement- gambling- and recreation industries	2,395,900	3,313	100,460	2,499,673
431	Real estate	0	961,524	524,904	1,486,428
509	Owner-occupied dwellings	0	0	1,092,067	1,092,067
390	Wholesale trade	0	505,995	425,138	931,134
465	Offices of physicians- dentists- and other health	0	0	443,949	443,949
467	Hospitals	0	0	428,500	428,500
30	Power generation and supply	0	262,538	130,577	393,115
<i>Total Impacts</i>		<i>26,143,021</i>	<i>4,861,886</i>	<i>7,414,113</i>	<i>38,419,019</i>

In order to put these results into perspective, it is useful to calculate the impacts of the GNSA as a percentage of the total output and employment in the three-county region. As shown in Table 9, the GNSA total output impact of \$38.4 million is only around 0.6 percent of the total output in the three-county region. Similarly, in terms of employment, the 724 jobs generated by the GNSA are approximately one percent of the regional employment.

**Table 9. Summary of Regional Economic Impacts**

	<b>Regional Total</b>	<b>GNSA Impact</b>	<b>Percentage of Total</b>
Output (2002 Dollars)	\$6,384,443,000	\$ 38,419,019	0.6%
Total Employment (Number of Employees)	73,376	724	1.0%

It should be noted that these estimates only include the benefits accruing to the regional economy based on expenditures of recreation visitors to the GNSA. Additional non-market benefits that may be enjoyed by visitors to the GNSA above their expenditures are not considered. In addition, other ecological benefits that might occur due to the additional protection in the GNSA are also not quantified in this analysis. Non-market valuation research such as contingent valuation would need to be applied to obtain estimates for either of these additional categories of benefits. Finally, we are considering only the estimated recreation values of designation and do not consider potential losses in revenue from restriction of any current consumptive uses in this area of the Pisgah National Forest.

## **CONCLUSIONS**

This paper has developed a site-based impact methodology that can be used to determine the regional economic impacts of protected area designations on public lands. This methodology incorporates both changes in quality, in terms of the signal sent to potential visitors, and quantity, in terms of estimated number of visitors. This methodology can be applied in the case of proposed protected area designations in order to estimate potential regional economic impacts of spending of recreation visitors to the site.

We also present the case of the Grandfather National Scenic Area, which is proposed to be designated on 25,500 acres in the Pisgah National Forest near Blowing Rock, North Carolina. Our methodology estimates that the new GNSA would likely result in a total of 1.5 million visitors, although this estimate could include some current

visitors to the Pisgah National Forest. Direct impacts from recreation expenditures from the designation of the GNSA are estimated at \$26.1 million. Additional regional economic impacts include 724 jobs and \$38.4 million in output (including direct, indirect and induced effects) in the surrounding three-county area.

It should also be noted that this estimate is of direct recreation benefits only. It is also likely that visitors to the area (including individuals driving on the Blue Ridge Parkway) and residents of the nearby communities would value the protection of the resources in the forest and the views from the Parkway that this designation would protect. Ecological benefits generated through the protection of forest resources are other values that could be considered in terms of the total value provided by the GNSA. These values were not estimated here due to time and budget constraints but could be estimated using non-market valuation techniques such as contingent valuation.

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