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CONSERVATION AND ECONOMIC GROWTH

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## POLICY BRIEF

Competing claims about the economic value of public lands to local communities abound. Officials from the outdoor recreation industry, for example, claim that protecting public lands from multiple uses such as motorized and even pedal-powered recreation and oil, gas, and mineral extraction is “really truly about jobs” (Prettyman 2012). A hunting and fishing group, Sportsmen for Responsible Energy Development, commissioned a study that examined the relationship between economic security and public land management strategies. The study’s authors concluded that in rural counties in the Rocky Mountain West “as the proportion of conservation/recreation lands declines, so do indicators of economic health and growth” (Southwick 2012, 19) By contrast, our own work (Steed, Yonk, & Simmons 2011) found that wilderness, in general, negatively impacts local economic conditions.

In an attempt to reconcile, or at least to understand the reasons for differences, between competing claims about public lands management, we conducted an analysis of relationships between different public land management regimes and economic conditions in rural counties. For our analysis we use data from the Bureau of Labor Statistics and U.S. Census data for *each* county in the U.S. dating back twenty-five years. Most studies of the effects of public lands make comparisons only within the Rocky Mountain States (e.g., Southwick, 2012 and Headwaters Economics, 2011). We include data from every county in the United States. We include every county in order to partially control for the fact that many Mountain States Counties are so dominated with federal lands that meaningful comparisons among them are relatively futile. Even making comparisons across Rocky Mountain States is problematic, as the federal government owns 54 percent of the land. In Nevada (84.5 percent), Utah (57.5 percent), and Idaho (50.2 percent) federal lands are a majority of all the land in the state.

For our analysis we use data from the Bureau of Labor Statistics and U.S. Census Bureau for each county in the U.S. dating back twenty-five years. . As a measure for local economic conditions we use the following:

*Per Capita Income* gathered by the U.S. Census, these data specifically addresses how individuals are faring in the county-level economy. Additionally this data is not self-reported, and thus more reliable than other income measures.

*Total Tax Receipts* measures the economic conditions of a county. These data have the advantage of being gathered by local governments, as opposed to self-reported. Thus, this information is more reliable and complete than other options available from individuals and businesses.

*Total Business Activity*, this broad measure illustrates how businesses are faring and often gives a better picture of whether specific industries are prospering or not. One advantage of these data is that they capture all businesses within that county. It does not, however, provide a measure of capital investment.

Although it is not possible to develop a complete measure of economic growth, these three variables taken together give us a better indication of a given county’s economic well-being over time than any single variable can. We believe they combine to provide a close approximation of economic prosperity. They provide a relatively complete description of the economic effects of conservation and energy extraction. To ensure that our measures are not impacted by exogenous factors we control for median age, sex, race, percent high school graduates and college graduates, and land area.

### *Measuring Energy Extraction*

Measuring energy extraction is problematic using publicly available data, particularly because definitions, measurement techniques, and expectations have changed substantially over time. In fact the US Census and Bureau of Labor Statistics provide only two consistent measures that are related to energy extraction across the twenty-five year period from 1980 to 2005. These indicators are:

*Mining Income*, measures the total income to a county from all mining activities that are primary source of energy extraction across this period.

*Public Utilities Income*, which is a measure of all energy production income that includes both production areas and energy generation.

As with our economic indicators these data do not paint a complete picture of energy extraction but we believe that taken together they are reasonable proxies for the energy production profile of county. Further, these indicators are likely to be directly correlated with the ‘boom and bust’ cycle that is sometimes associated with energy extraction.

*Measuring Conservation*

In order to make comparison across counties we obtained data on the percent of federal land in each county. We also used GIS generated maps of Wilderness and overlaid them on each county. We chose Wilderness, as it is the highest level of protection that is afforded public lands.

*Approach*

We used a six-panel regression design including data from the 1980, 1985, 1990, 1995, 2000, and 2005 reports from the US Census Bureau and the Bureau of Labor Statics. We tested whether counties with more conserved land have better economic outcomes than those with less conserved land. Further, we tested whether counties with more energy extraction industries have worse economic outcomes than those with less energy extraction industries.

*Results*

In general, we find that counties with federal lands (especially Wilderness lands) do not have higher per capital income or higher tax receipts. The presence of federally designated Wilderness is associated with a decrease of \$679,456.70 per year in total business activity (see Table 1). This finding is both statistically significant and substantive enough to have serious implications for a county’s economic growth. These results are in sharp contrast to claims that Wilderness designations are a draw for visitors and significantly increase economic growth.

Table 1- Overall Effects of Wilderness on Local Economies <sup>1</sup>			
	Per Capital Income	Tax Receipts	Business Activity
Wilderness Effect	\$129.70	\$18,296.41	-\$679,456.70**

\*P=.10    \*\*P = .05    \*\*\*P = .01

This result is what we anticipated. Wilderness areas tend to be in counties with few economic

1 Full regression tables are included in Appendix One

opportunities. Precluding any commercial activities other than the few allowed in Wilderness may reduce local economic development opportunities without providing any new alternatives.

As might be expected, given our findings regarding Wilderness designations, we find that areas with larger mining and public utilities income have higher per capita income, higher tax receipts, and higher total business activity. As noted in Table 2 below, a one thousand dollar increase in spending either in mining or in public utilities contributes to all three of the economic indicators we considered.

Table 2- Overall Effects of Energy Activities on Local Economies <sup>2</sup>			
	Per Capita Income	Tax Receipts	Business Activity
Mining Activity	\$0.87***	\$364.58***	\$7,884.20***

\*P=.10    \*\*P = .05    \*\*\*P = .01 (In thousands)

*Detailed Results*

We find no evidence for the hypothesis that increased conservation as measured by federal lands in a county or by the presence of federally designated Wilderness has a consistent positive impact on local economies. We do however note that conservation is broader than simply the presence or absence of Wilderness and we explore the differing managing agencies impacts on economic conditions in the following section.

*Per Capita Income*

In exploring the impacts of extraction conservation on per capita income in counties across the twenty-five-year period we studied, we found the following results:

- Income in mining and public utilities is related to an increase in per capita income.
- As mining income increases by \$1,000, tax receipts increase by \$870 as presented in Table 3.

The relationship between per capita income and federal land management is decidedly mixed. Every one percent increase in land owned by the BLM (Bureau of Land Management, USFS (United States Forest Service),

2 Full regression table included in Appendix One

or Native American Tribes leads to a decrease in per capita income as noted in Table 4.1 and 4.2 below. Other federal land management agencies show a positive impact, consistent with the theory that raised revenues can increase per capita income. The agencies showing positive effects are the Tennessee Valley Authority (TVA) and the National Park Service (NPS). TVA's primary focus is use and electricity generation, and NPS's is public recreation.

Table 3- Change in Per Capita Income from a \$1000 dollar increase in Energy Activity <sup>3</sup>		
	Per Capita Income	
Mining Activity	\$870.00***	Mining Activity
Public Utilities	\$550.00***	Public Utilities

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 4.1- Impact of a 1 Percent Increase in Federal Land Agencies land control on Per Capita Income <sup>4</sup>				
	Tennessee Valley Authority	Bureau of Land Management	Bureau of Reclamation	Dept. of Defense
Per Capita Income	\$102.02**	-\$22.93***	-\$107.46	\$0.43

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 4.2- Impact of a 1 Percent Increase in Federal Land Agencies land control on Per Capita Income <sup>5</sup>				
	Forest Service	Fish and Wildlife	National Park Service	Tribal Lands
Per Capita Income	-\$9.73***	-\$16.75	\$40.46***	-\$39.54***

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

### Tax Receipts

Our second measure of economic conditions is the total tax receipts received by local counties. These receipts include all direct taxes paid and intergovernmental transfers into county budgets, but do not include

3 Full regression table included in Appendix One

4 Full regression table included in Appendix One

5 Full regression table included in Appendix One

expenditures made by other governmental agencies in the county. Counties with growing tax receipts are likely to have seen an increase in both business activity and personal spending within their borders. This indicator illustrates a local government's economic health.

We find that both mining and public utilities increase total tax receipts. For example, as public utilities spending increases by \$1000, expected tax receipts increase by \$31.65. Also as mining spending increases by \$1,000, expected tax receipts increase by \$364.85.

The impact of federal agencies again mixed (see Table 6.1 and 6.2). As the percentage of a county's lands made up of Forest Service lands, for example, increases by one percent, the predicted total tax receipts decrease by \$1,050 dollars. Similarly, as the percentage of a county's land area that is made up of Tribal lands increases by one percent, the predicted total tax receipts decrease by \$1,118. There are no statistically significant effects by any other land management agency, however.

Table 5- Total Tax Receipts Change from a \$1000 dollar increase in Energy Activity	
	Total Tax Receipts
Mining	\$364.85***
Public Utilities	\$31.65***

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 6.1- Impact of a 1 Percent Increase in Federal Land Agencies land control on Total Tax Receipts				
	Tennessee Valley Authority	Bureau of Land Management	Bureau of Reclamation	Dept. of Defense
Total Tax Receipts	\$719.77	-\$515.84	-\$4,174.98	-\$621

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 6.2- Impact of a 1 Percent Increase in Federal Land Agencies land control on Total Tax Receipts				
	Forest Service	Fish and Wildlife	National Park Service	Tribal Lands
Total Tax Receipts	-\$1,050.42***	-\$1,265.63	\$752.74	-\$1,118.43***

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

**Business Activity**

As was the case with the other economic conditions measures, mining increases total business activity. As mining income increases by \$1,000, predicted total business activity increases by \$7,884.20. Public utility income did not have a statistically significant effect on total business activity (see Table 7).

As was the case with tax receipts, economic effects by federal agency differ. We assume that these outcomes are likely results of the different agencies' different rules of use. We find, for example, that the presence of Department of Defense lands leads to higher levels of business activity. A one percent increase in Department of Defense lands leads to a predicted increase in total business activity of \$94,255. We expect this is explained through the higher wages, and substantial federal spending that often accompany Department of Defense lands and defense-related projects on those lands.

As the percentage of a county made up of Forest Service lands increases by one percent, the predicted total business activity increases by \$18,720.25. Note that the presence of Forest Service lands in a county had no effect on total incomes or on tax receipts. This result seems to indicate that while Forest Service lands increase business activity, money from that business activity is not primarily used inside the county.

We find a negative association between economic growth and Tribal lands of \$27,296.47 per year in total business activity. For the remaining agencies we can find no statistically significant impact on the total business activity of a county (see Table 8.1 and 8.2).

Table 7- Change from a \$1000 dollar increase in Energy Activity	
	Total Tax Receipts
Mining	\$7,884.20***
Public Utilities	\$584.60

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 8.1- Impact of a 1 Percent Increase in Federal Land Agencies land control on Total Business Activity				
	Tennessee Valley Authority	Bureau of Land Management	Bureau of Reclamation	Dept. of Defense
Total Business Activity	-\$11,232.70	-\$8,539.03	\$192,031.70	\$94,255.33***

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

Table 8.1- Impact of a 1 Percent Increase in Federal Land Agencies land control on Total Business Activity				
	Forest Service	Fish and Wildlife	National Park Service	Tribal Lands
Total Business Activity	\$18,720.25***	-\$28,000	-\$25,051.96	-\$27,296.47***

\*P=.10 \*\*P = .05 \*\*\*P = .01 (In thousands)

**Discussion**

Table 9 summarizes our findings. We found that counties with more conserved land, as indicated by increased acres under federal management do not have better economic outcomes than those with less federal managed land. We also found that counties with federally designated Wilderness are worse off economically than those without federally designated Wilderness, whether or not any of that county's lands are owned by the federal government. Lands managed by the Department of Defense, the TVA, and the Forest Service, however, have a positive impact on business activity and per capita income.

Table 9- Summary of Direction of Significant Results			
	Per Capita Income	Total Tax Receipts	Total Business Activity
<b>Energy Activity</b>			
Mining Income	↑	↑	↑
Public Utility Income	↑	↑	
<b>Federal Agencies</b>			
Wilderness			↓
Tennessee Valley Authority	↑		
Bureau of Land Management	↓		
Bureau of Reclamation			
Dept. of Defense		↑	
Forest Service	↓	↓	↑
Fish and Wildlife Service			
National Park Service	↑		
Tribal Lands	↓	↓	↓

# THE ECONOMIC EFFECTS OF CONSERVATION

*Trinity County, California*

These results provide some instances where local economies benefit from some particular types of federal lands; however, this is explained by the fact that those sectors (such as Department of Defense lands) spend substantial federal dollars directly in their operation of those lands. Our analysis, with few select exceptions, is that the majority of preserved lands have an overall negative effect on the counties that house them.

These negative results are likely the product of distant federal offices that make decisions regarding federal lands. These decisions have significant impacts on the counties in which these lands are located. Yet, residents with more knowledge about the interactions between themselves and their land are not seen as qualified to determine the appropriate levels of preservation and development. As is often the case on protected lands, politics dictate that more protection be granted to satisfy constituencies and local economies suffer as a consequence.

As the following case studies continue to illustrate, economic and environmental outcomes are better once a balance is found between finding means for extracting resources that ensures the long-term health of those in the area and the land itself. When environmentalists and energy producers are able to negotiate their own terms for blending these two activities, those involved in the negotiations are often happier with the outcome than one mandated from Washington D.C.

In 1973 President Nixon signed the Endangered Species Act (ESA) into law stating, “Nothing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed.” (The American Presidency Project, n.d.). The Act intended to protect endangered flora and fauna, as well as the habitats in which they live or require to survive. For a species to be placed on the Endangered Species List a complicated and cumbersome process must be completed. First, an individual or organization must present a petition, backed by sufficient and substantial information warranting federal protection, requesting that the species be granted protection. If the petition is deemed sufficient to merit this protection, it is given a status review in which the best available scientific and commercial information available is analyzed and ongoing conservation efforts are considered.

## *Logging and the Timber Industry*

Although lumber’s role in the U.S. economy has changed dramatically over time, the relative importance of logging to the overall economy has stayed constant. In the late 1980’s and early 1990’s environmental regulations began to severely limit the amount of timber that could be harvested. Conflicts between environmental groups and the logging industry over California’s old-growth forests remains the defining controversy in the region’s economy. These conflicts are especially divisive in places like Trinity County where residents rely on timber as their only real natural resource (Harris, 2000).

## *Trinity County, California*

Trinity County was once booming due to the strong logging industry. A rural, mountainous region in California, encompasses approximately 3,200 acres of pristine alpine forest. The County’s economy relied heavily upon timber and mining to provide jobs for the local population, and government revenues to pay for public services (Trinity County, n.d.; Wilma, 2003).

Today however, Trinity is suffering economically. In 2010, this alpine county still had no traffic lights, freeways, parking meters, or incorporated cities. Environmental regulations have severely limited the ability of the County to grow. Two compounding factors have resulted in the current economic slump: The first is that the majority of Trinity County is made up of federally owned public lands, which severely limit local citizens and County official's abilities to make use of the resources available to them. The second is due to the spotted owl that lives primarily in old-growth forests. The same forests that make Trinity County perfect territory for the logging industry also make it perfect nesting grounds for the northern spotted owl, which was placed on the Endangered Species List in 1990 by the U.S. Fish and Wildlife Service (FWS) (Wilma, 2003).

The fate of this species has created a decades-old conflict between environmental groups and the logging industry, which has had huge effects on the economy and the population of many communities in the Northwest U.S. It is arguable that no other area has been as strongly affected by these factors as Trinity County, California. The history of this conflict was publicly renewed when the FWS released a proposal in March of 2012 that would increase restrictions on lands containing the spotted owl.

The proposal promised to more than double the designated critical habitat of the northern spotted owl, which in turn would ban harvesting on millions of acres of timber and even extend these regulations to private lands. In analyzing the current situation the history of the conflict between the northern spotted owl and the logging industry in Northern California and also the Northwestern U.S. in general is useful to explore (One Voice for Working Forests, 2012; U.S. Fish and Wildlife Service, 2012, March 8).

#### *History of Northern Spotted Owl Protectionism*

In the early 1970's, an interagency committee called the Oregon Endangered Species Task Force brought protection of the northern spotted owl into the national spotlight. The Task Force began developing guidelines for managing the owls and the old-growth forests in which the owls live. Their main focus was on the decline of forests on private and public land due to the logging industry. To correct this decline the Task Force recommended the creation of a critical habitat for the spotted owl. During the late 1970's and early 1980's the Oregon Endangered Species Task Force made highly varying suggestions for spotted owl management.

One report in 1977 recommended that three hundred acres should be preserved for each owl pair – thus allowing the space needed for the species to reproduce. The report went further to suggest that this should be

done for 290 pairs of owls. A later recommendation in 1984 stated that the 551 owl pairs in the area would require at least one thousand acres per pair as the minimum necessary for keeping the species alive (The Forest History Society, n.d.(a)).

In addition to the cumbersome requirements of the ESA, the 1976 National Forest Management Act (NFMA) was passed, which has also impacted the residents of Trinity County. The NFMA requires that the Forest Service “maintain viable populations of existing native and desired non-native vertebrate species in the planning area,” (Forest History Society, n.d. (b))

The 1980's were a decade that dramatically impacted both the logging industry of the Pacific Northwest region and the northern spotted owl population. In 1987 a proposal to list the bird on the Endangered Species List was denied by the U.S. FWS. Conflict erupted between environmentalists and the logging industry and litigation ensued on behalf of environmental groups. After political maneuvering by environmental groups the U.S. FWS reversed their position two years later and proposed listing the owl as “threatened” on the Endangered Species List.

In 1990, after overwhelming controversy, the listing was made official throughout Oregon, Washington, and California. For the Trinity County logging industry, much of the damage had already been done. Any “taking” of critical habitat for the northern spotted owl on private, federal, or tribal lands was now outlawed (Wilma, 2003).

A few years later in 1994, the Clinton Administration passed the National Forest Management Act, protecting the majority of a ten million hectare (nearly twenty-five million acres) parcel of federal lands. Of these lands 90 percent were deemed suitable habitat for the northern spotted owl. The Northwest Forest Plan had severe impacts on the timber industry of the Pacific Northwest by reducing the projected volume of the harvest from approximately 32.1 million cubic meters per year to 2.6 million cubic meters per year (Blakesley & Noon, 2006).

After decades of controversy and the furthering of environmental regulations, Trinity's economy has been forced into decline and reliance upon the federal government to make up for lost revenue (once provided for by the timber industry) to provide basic services like public education. Trinity, along with other cash-strapped rural counties that once relied on extraction of natural resources to support their populations, now receives “timber payments” from the federal government as part of the Secure Rural Schools Act. This law was originally passed

in 2000 and has since provided \$3 billion to rural counties whose economies are hurting due to environmental protections and logging restrictions (Barnard, 2012).

The adverse effects of regulations enacted to protect the spotted owl have been clearly seen on Trinity's economic growth and employment rate. From 1990 to 2010 employment in the logging industry dropped 65 percent and the state now imports approximately 80 percent of its wood. Unemployment rates in Trinity County and nearby Siskiyou County have been consistently higher than the State average, and stood at 17.8 percent and 18.3 percent respectively in December of 2011 compared to a state average of 10.9 percent (Lin, 2012). The most current unemployment rate for July 2012 stands at 16.3 percent in Trinity County (State of California, 2012).

Many in the region such as Fred Krauss, who used to own Rough & Ready Lumber Co., are skeptical about prospects for economic success in a region in which, "the human being has come in second to an owl in all this . . . We're kind of an endangered species now too," he said. "If you have a wife and two little kids and a home you're paying for the, just because of an owl you lose your house and your job, well that's pretty bad" (Verhovek, 2012). Others in the area have expressed similar frustrations. One of these residents is Dee Sanders, the general manager of Trinity County's last remaining sawmill and the County's single largest private employer. "It's been a struggle to maintain log supply here," said Sanders as he described the current economic situation, "even though we're sitting in a sea of timber" (Lin, 2012).

### *Implications*

Talking to people like Fred and Dee makes one thing very clear; in balancing the interests of environmentalists and the local population, northern spotted owl protections are putting the well-being of the owl above that of Trinity County citizens. The current proposal to more than double the protected habitat of the species would only further the economic woes of Trinity County and other Pacific Northwest communities that depend on the "sea of timber" that surrounds them to make a living.

The process of hydraulic fracturing, or hydrofracking, has been receiving increased attention in the media over the past several months. Reports on the economic benefits and illusory environmental costs are varied, to say the least. Counties across the United States have seen substantial economic growth due to the natural gas boom. Simultaneously, videos have been propagated across YouTube of homeowners lighting the water leaking from their sinks on fire. In actuality relatively minor environmental damage has been done due to fracking. Despite the lack of substantial evidence of environmental harm, hydrofracking proponents are on the defensive (Considine, Watson, & Considine, 2011; Economist, 2012).

According to IHS Global Insight, natural gas from oil shale production is expected to add \$118 billion in economic growth over the next four years (Chandra, 2012). Once economically dried-up towns in states such as Ohio, Pennsylvania, and North Dakota have now begun to see tremendous economic growth. In Pennsylvania for example, the natural gas industry is providing 2.4 percent of the jobs as well as an \$11.4 billion industry (Gillspie, 2012). Just north of Pennsylvania in New York, the economic benefits of oil shale are being weighed against the fears stoked by conservation groups of dire environmental costs.

Despite the considerable economic success that nearby Pennsylvania has seen with the wide spread use of fracking, citizens of New York have been much more apprehensive. All of this hesitation is occurring despite the fact that throughout the sixty plus years fracking has been employed there has yet to be any distinct evidence of environmental harm. This dithering has reached the highest levels of the government in New York where Governor Andrew Cuomo has been weighing the economic benefits and political costs of continuing to allow limited drilling for natural gas (or fracking) in his state.

Environmental groups are already poised to retaliate against any plan the Governor puts forth that sanctions drilling (Hakim, 2012). Meanwhile gas companies have been lobbying to

continue their work with the permits they have been granted and for the opportunity to apply for more drilling permits in the future. In 2008 New York State began investigating hydraulic fracking, putting a temporary hold on all new drilling permits. Governor Cuomo has been waiting for final reports from New York's Department of Environmental Conservation (DEC) to inform his final decision; this report is expected by the end of summer 2012 (Campbell, 2012).

In the meantime, to avoid the political backlash that could follow a decision either for or against drilling, Cuomo has been discussing the possibility of a "home rule". This rule would allow municipalities' support or opposition towards fracking to be one factor in determining if fracking is sanctioned. Many cities are already exercising this option; creating a patchwork of municipalities across the state that have either passed a moratorium on fracking, or a passed a resolution supporting hydrofracking (Campbell, 2012). Across the State, forty-five towns have passed resolutions declaring their support of property and mineral rights as long as drilling is conducted in a safe manner. Meanwhile one hundred and fifteen towns had passed a similar moratorium on natural gas exploration and production (Colley, 2012, June 28). Currently, most of those townships opposing hydrofracking reside in northern New York where there is little oil shale, while those supporting fracking are close to the Marcellus Shale region near Pennsylvania<sup>6</sup> (Campbell, 2012).

One of the New York towns that chose to temporarily ban fracking was Avon. Located near Albany in northern New York, Avon falls in the above-mentioned category of a town containing little oil shale. Despite the limited amounts of oil shale available, Avon was already home to several smaller hydrofracking sites. All of these natural gas wells were shut off after the city of Avon passed a one-year moratorium on high volume hydrofracking on June 28 (Appell, 2012; Associated Press, 2012). One of the operators of these sites was John Holko, president of Lenape Resources. Lenape operates sixteen gas wells in Avon, covering 5,000 leased acres (Associated Press, 2012). The moratorium passed by the Town of Avon was not intended to force all current producers to stop productivity. In fact, those crafting the resolution had even carefully added a "grandfather clause" that would allow all current operators to continue their activities (Appell, 2012).

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6 See Appendix Two for a full map of these resolutions.

According to the town's Supervisor, David LeFeber, "We were very careful to word out moratorium to protect existing gas wells ... This is only a moratorium, not a ban. We wanted to take some time to study the issue..." (Esch, 2012). This resolution, however, did not take into account the expense that operators would incur if their ability to make future investments into increased drilling were to be stifled.

According to Lenape's attorney, Michael Joy, the city knew before they passed the provision that this moratorium would cause Lenape to operate at a loss (Esch, 2012). "They [Avon city officials] don't understand the need to bring new wells into production." (Esch, 2012). Not only has Lenape been forced into a tight corner by state and federal regulations, as well as this moratorium, but so have gas companies across the state. According to Joy:

Certainly John Holko's company [Lenape Resources] has been aggressively trying to stop moratoriums not only in Avon but in other towns where it has land under lease ... They just weathered through four years of the DEC not allowing them to drill cost-effective wells. Now they have the town telling them they can't drill here. Lenape doesn't know where its future operations are going to stand. (Esch, 2012).

Previous to this moratorium landowners that had been leasing their land to Lenape Resources had been receiving free gas and royalty checks in return (Esch, 2012). Once pumping gas was no longer economically feasible the availability of free natural gas and the royalty checks these Avon residents were receiving were no longer available. Residents that once relied on these royalty fees and gas payments must know adjust their family's budget.

The costs of getting hydraulic drilling equipment sited and running are higher than the immediate returns from selling the gas extracted; not to mention the costs of licensing and complying with a myriad of local, state, and federal regulations. The recent increase in regulations has led to the closure of many oil and gas sites in New York, which in turn has had staggering effects on Joy's legal practice. In 2007 he represented twenty-seven energy companies, and by the end of 2011 had only two remaining clients (Appell, 2012).

In 2011 the Manhattan Institute Center for Energy Policy and the Environment released a report on the potential economic benefits the State of New York could be receiving if it ended its moratorium on new

drilling permits. The author of the report, Professor Timothy Considine, found that New York could expect \$11.4 billion in economic output, in addition to \$1.4 billion in tax revenues (Considine, Watson, & Considine, 2011). In Western and Southern New York an expected 15,000-18,000 jobs could be created. Considine's study examined Pennsylvania and found the environmental cleanup cost from an oil shale well was \$14,000, compared to the expected \$4 million in economic benefits each gas well produces (Considine, Watson, & Considine, 2011).

Avon has not been the only city in New York to restrict gas and oil activity within its city limits. Just over one hundred miles away in Dryden, NY the conflict between city officials and gas companies occurred after the town passed a similar moratorium that ended up in court (Ithacan Staff, 2012). Anschutz Exploration Corporation leased 22,000 acres of land for exploration in Dryden. In August the town amended their zoning ordinances such that the exploration, production, extraction, or storage of gas was no longer allowed within city limits. Anschutz in turn sued the city citing New York's Oil, Gas, and Solutions Mining Law, which explicitly gives all authority to the state to regulate oil and gas extraction. The courts, however, agreed with the city of Dryden and upheld the moratorium, possibly setting a precedent for other towns with the risk of similar lawsuits.

### *Implications*

Until the final decision is handed down by New York's DEC, landowners with leased lands are forced to sit and wait. The potential economic benefits of permitting hydraulic fracking in the area far outweigh the known environmental costs, and would leave communities better suited to preserve their lands themselves. A major argument against localized control of public lands is that local entities lack the necessary resources to properly protect local environments. Under this situation however, with local communities gaining revenue from development, resources would increase to allow proper preservation by those who know the area best. Until proper decisions are made however, that balance the need for both environmental preservation and economic opportunity, communities such as Avon New York will undoubtedly continue their downward economic spiral.

With energy demands expected to increase 31 percent within the next twenty-five years, the United States is looking for ways to increase domestic energy production and thus avoid increased dependence on foreign sources of energy (U.S. Environmental Protection Agency, U.S. Department of Energy, 2010). One possible solution to this energy production dilemma is to increase oil exploration and extraction off the shores of the United States in the Outer Continental Shelf (OCS).

Oil resources in the OCS have been largely unexplored; in fact, the Bureau of Ocean Energy Management, Regulation and Enforcement estimates that about 60 percent of untapped oil and 40 percent of undiscovered natural gas fields are located within the OCS. In addition, the Bureau postulates that recoverable resources from these undiscovered fields range from 66.6 to 115.3 billion barrels of oil and 326.4 to 565.9 trillion cubic feet of natural gas (Bureau of Ocean Energy Management, Regulation and Enforcement, n.d.).

In response to public outcry over high gas prices, Congress in 2008 lifted its annually renewed moratorium on new OCS development allowing exploration of this vast, untapped resource, creating with it a sense of anticipation and promise (U.S. House of Representatives Natural Resources Committee, 2011). Because of unexpected events, however, this exploration was cut short in 2010 when President Obama issued additional restrictions to those already in place for offshore drilling projects. These stringent restrictions on oil exploration and production in the OCS have caused the various states and their shoreline counties in this region to lose several billion dollars of potential revenue, taxes, job creation, and economic growth.

### *Resources*

At \$6 billion annually, oil is the second-largest generator of revenue for the U.S. government and thus a significant part of the U.S. economy (Senator David Vitter, n.d.). Debates about the use and environmental impact of oil have triggered a host of environmental regulations. When

offshore drilling began in 1887, few if any federal regulations were in place. By the early 1900's and particularly in the 1950's and 1960's, environmental concerns pushed the federal government to begin regulating the industry. A slew of acts, including the Submerged Lands Act (SLA) of 1953, the Outer Continental Shelf Lands Act (OCSLA) of 1953, and the Coastal Zone Management Act, placed restrictions on and implemented guidelines for the extraction of resources off the coast of the United States.

Additional restrictions were implemented in the aftermath of the 1969 natural gas blowout in Santa Barbara, during which 200,000 gallons of crude oil were released, creating an eight-hundred mile slick and polluting thirty-five miles of coastline. In fact, the 1981 Congressional ban and 1989 presidential ban on offshore drilling were at least partially in response to the environmental damage and public outcry of the Santa Barbara accident (Hill, 2008, 4). The restriction on offshore drilling continued until 2008, when the restrictions on offshore drilling were finally lifted.

#### *Offshore Drilling in the Gulf of Mexico*

On September 27, 2008, a twenty-seven year ban on offshore drilling off the Atlantic and Pacific coasts in the United States was lifted (Hill, 2008). Just over a year and a half after the ban on offshore drilling was lifted, a BP oil well off the coast of Louisiana exploded. This explosion caused a sea floor oil gusher that eventually released approximately 4.9 million barrels, or 205.8 million gallons of crude oil, into the Gulf of Mexico (Hoch, 2010).

In the aftermath of the spill, environmental groups such as the Center for Biological Diversity immediately demanded a moratorium “on new offshore oil leasing, exploration, and development of all our coasts” with the Natural Resources Defense Council calling for a “time-out” of all drilling in the area (Bailey, 2010). In response to environmental group concerns, the White House issued an executive order placing a six-month moratorium on all deep-water drilling projects. The order stopped all offshore drilling in areas deeper than five hundred feet of water, which pulled the plug on thirty-three exploratory drilling projects and suspended any new permits (Associated Press, 2010).

Such a decision, made at the behest of environmental groups, failed to recognize and examine the possible effects such a decision would have on national, state, and local economies. One such study determining the effects of the moratorium showed that, even with modest estimates of economic impact, the moratorium “would result in billions in

additional lost economic activity in the Gulf” (Mason, 2010, 1). The report placed total losses from the six-month moratorium at “\$2.1 billion in output, 8,169 jobs, over \$487 million in wages, and nearly \$98 million in forfeited state tax revenues” (Mason, 2010, 3). Additional spillover losses into other states outside the Gulf region constituted several million dollars in terms of output, wages, and tax revenue (Mason, 2010, 3). Another study of the moratorium effects predicted even more dire consequences, indicating that some 46,200 jobs could be sidelined by the moratorium, with \$5-\$10 million lost in wages per month for each platform shut down, and long-term job losses reaching up to 120,000 jobs by 2014 (Morin, 2010).

As soon as the executive branch issued the moratorium, challenges to the order arose in both the judicial and legislative branches of government. Senator Vitter of Louisiana proposed a bill in the Senate that would halt the moratorium, arguing that the moratorium “threatens to finish what the oil spill started. If it stays in place, even for six months, it will be a devastating blow to the economy of Louisiana and other Gulf States” (Senator David Vitter, n.d.). Relief from the moratorium came in the form of a federal court decision in New Orleans, wherein federal judge Martin L.C. Feldman blocked the moratorium because the administration had failed to explain the need for such “a blanket, generic, indeed punitive, moratorium” (Savage, 2010). In the decision, he also expressed concern for the impact such an order would have on the local, state, and national economy.

The decision received widespread support in Louisiana from citizens and politicians alike; Louisiana Representative Bill Cassidy stated that such a decision was “welcome news for thousands of Louisiana welders, pipefitters, engineers, and roustabouts whose jobs were threatened by a political decision” (Savage, 2010). In response, the White House vowed to appeal the decision and reiterated its stance by issuing a new moratorium less than two months later, placing additional restrictions on all floating facilities as well.

A little over a year later, in November of 2011, the Obama administration announced a new draft plan that allows lease sales in the Western Gulf of Mexico. This same plan, however, closed portions of Alaska and the entire Atlantic and Pacific Coasts to new energy production and job creation, profoundly impacting the

economies of many coastal states and their counties. Said House Natural Resource Committee Chairman Doc Hastings in response to the announcement,

The President's plan is to simply say 'no' to new energy production and 'no' to new American jobs created by new offshore drilling. It's a plan that is sending American jobs overseas, forfeiting new revenue, and denying access to American energy that would lessen our dependence on hostile Middle Eastern oil (U.S. House of Representatives Natural Resources Committee, 2011).

Now, roughly 97 percent of the United States' OCS is closed to drilling. Included in this plan is the delay of lease sales off the shore of Virginia, which had been scheduled to take place in 2010 and is now postponed until at least 2018 (U.S. House of Representatives Natural Resources Committee, 2011).

#### *Hampton Roads, Virginia*

In 2007, the US Federal Government classified various offshore areas near Virginia's coast as areas available for oil and gas leases, poising Virginia's coastal counties to be the recipients of new business revenues and jobs. Under the Bush Administration in 2008, bans on offshore drilling along the Pacific and Atlantic coasts were lifted, allowing a scheduled 2011 Virginia lease sale to progress. President Obama continued to endorse policies that could lead to offshore development in Virginia when in his 2010 State of the Union Address he declared an "all of the above" energy strategy for the United States (Bell, 2012). Nevertheless, the following year the Obama Administration delayed the Virginia lease sale until 2012, and then later dropped Virginia altogether from the government's most recent leasing plan, announcing that no areas off the Atlantic Coast would be available for energy development in the next five years, delaying development in Virginia until after 2017.

These arbitrary decisions by the federal government regarding oil and natural gas exploration and development off the coast of Virginia have and will continue to negatively impact the economies of Virginia's coastline areas, particularly the area of Hampton Roads, a metropolitan coastline area including Surry, Isle of Wight, and Southampton counties and nine independent Virginian cities. Virginia Governor Bob McDonnell, a strong supporter of Virginia offshore energy development, has accused the actions of the Obama

administration as killing jobs and hindering economic development, costing "millions in potential investment," and squandering "the opportunity to create thousands of jobs during a time when our economy needs our support" (Virginia Energy Independence Alliance, 2011).

Virginia's Governor hasn't been the only elected official criticizing the administrations decisions either. Most of Virginia's elected officials, regardless of party affiliation, have expressed interest in drilling and the economic benefits that could come to their financially struggling constituency. Particularly active in this regard have been U.S. Democratic Senators Jim Webb and Mark Warner (Kumar, 2012).

Virginia's politicians haven't been the only ones vocal about the issue. Governor McDonnell's administration has expressed that 80 percent of Virginians support offshore oil and gas exploration, a percentage similarly represented in local survey results (Fears, 2012). One man, in response to a news article discussing the debate over offshore oil drilling in Virginia, said that he would be part of the debate if he wasn't "flying down to Louisiana and working on supply boats in the gulf." He questioned other readers, "Don't you think I would rather work in my own back yard and spending my hard earned money in VA [*sic*], not in Louisiana?" (ryanwood86, 2012).

Research conducted by the Southeast Energy Alliance, a non-partisan organization of businesses, trade associations and non-profit organizations indicates that offshore energy development in Virginia has the potential to create nearly two thousand jobs for Virginians, produce 750 million barrels of oil, and 6.65 trillion cubic feet of natural gas. These numbers may yet prove conservative estimates as technological advances and actual drilling provide better information about the potential of energy development in the area (Investor's Business Daily Editorials, 2012).

Other estimates of job creation put the potential as high as 3,000-15,000 jobs for Virginians, the actual number depends on the scale of development and whether or not Virginia companies would be able to service oil and gas rigs operated in other Atlantic coastal areas (Virginia Energy Independence Alliance, 2011). This represents a large, untapped economic potential for the citizens of Virginia's coastal areas; potential that is being denied due to broad policy decisions by the federal government.

## COUNTIES MIXING CONSERVATION AND ENERGY DEVELOPMENT

*Lea County, New Mexico*

The decision of the Obama Administration to close most areas of the OCS to exploration and extraction represents a poor decision in the face of evidence indicating the negative impact of such a decision. In the words of Virginia Senator George Allen,

the Obama Administration continues to obstruct Virginia's energy resources and is blocking thousands of new, good-paying jobs. They have repeatedly said 'No' to Virginia developing our energy resources off our coast. Virginia is willing and able to produce the affordable energy we need from our coast...but Washington continues to stand in the way with counterproductive energy policies that eliminate good-paying jobs and raise costs to families and small businesses. The Obama Administration's decision...means higher fuel and electricity prices for Virginia families and small businesses (Allen, 2012).

### *Implications*

While the costs of environmental damage have been shown to be real, the costs of failing to develop energy where the economy will benefit are also high. Risks to the environment can be minimized and there are many advantages to responsible drilling, especially for the Virginians of the Hampton Roads metropolitan area, who are currently denied such development because of the federal government imposed moratorium and new lease plan.

The Permian Basin, two hundred and fifty miles wide and three hundred miles long, spans across multiple counties in southeast New Mexico and western Texas (Texas State Historical Association, n.d.). The New Mexican portion of the Basin houses three of the largest oil fields in the United States. Due to these fields, Lea County ranks of first in oil production and fourth in natural gas production out of all counties in the Basin (Lea County, New Mexico, n.d.).

Prior to being created from portions of neighboring Eddy and Chaves Counties in 1917, the area that is now Lea County seemed like little more than a vast expanse of pastureland (Lea County, New Mexico, n.d.). Years later, the discovery of the Hobbs Oil Field within County limits proved to be the single most important oil discovery for the entire state of New Mexico. The abundant natural resources within the County have been said to be some of the "most valuable oil fields anywhere in the world" (Lea County, New Mexico, n.d.).

The location of Lea County within the Permian Basin has significantly increased its value to the state of New Mexico and the nation as a whole, as oil developers have moved into the area. Local residents have benefitted from the discovery as well, as successful drilling has led Lea County to be ranked in the top three New Mexican counties with the highest weekly income (Bureau of Labor Statistics, 2012, 6). A recent conservation battle, however, has pitted environmental and economic interests against each other in the conflict for public land control.

### *Sagebrush Sand Dune Lizard*

The sagebrush sand dune lizard (SDL) is extraordinarily rare. Estimates of the lizard's habitat generally place the species as living within small areas of southeastern New Mexico and small portions of Texas (U.S. Fish and Wildlife Service, n.d.(b)). Whether this scarcity is caused by human actions or related to strict habitat requirements is unclear, as sand dune lizards are

notoriously particular about their habitats (U.S. Fish and Wildlife Service, n.d.(b)). Unfortunately for the lizards, their habitat of choice happens to sit just above a major U.S. oil field.

Dwindling SDL populations were not initially recognized until the lizard was classified as a separate species in 1992 (U.S. Fish and Wildlife Service, n.d.(b)). The SDL was eventually listed as endangered by the New Mexico Department of Game and Fish (U.S. Fish and Wildlife Service, n.d.(b); Biota Information System of New Mexico, n.d.), but some groups were left unsatisfied and pushed for the lizard to also be listed as an endangered species under the Endangered Species Act (ESA). Local stakeholders recognized that doing so would undoubtedly lock up public lands from development and in turn hurt local interests. Residents were then incentivized to look for ways to maintain the economic viability of their lands while also preserving the lizard and its habitat.

#### *Results*

Legacy Reserves, LP is an oil and gas developer based out of Midland, Texas “focused on the acquisition and development of oil and natural gas properties primarily located in the Permian Basin” (Legacy Reserves LP, n.d.). Although the company currently has drilling assets in other parts of the U.S., until 2007 all assets were located within the Permian Basin. The majority of company assets are still largely located within the region, with \$142.2 million of the total assets coming from the basin in 2011, with a significant portion of production taking place within Lea County (Legacy Reserves LP, n.d.). As a possible ESA listing gained greater momentum and posed a larger threat to land usage, stakeholders such as Legacy Reserves pushed for increased awareness regarding economic losses that would befall the area under these potential restrictions. Knowing that an endangered listing could cost his company large sums of money, Steven Pruet, President and CFO of Legacy Reserves, warned that if profitable areas in Lea County were to be restricted “we would be forced to move our capital dollars elsewhere” (Wiseman, 2011).

Dilemmas between preserving the environment and defending economic well-being are not specific to Lea County, New Mexico, or the Permian Basin. Conflicts surrounding these issues span the United States; but many of these debates end with only one champion cause. Either the environment takes precedent and business suffers, or business interests prevail with little consideration to environmental impacts. In the case surrounding

the sand dune lizard, however, both sides of the debate found common ground. Realizing the impending threat endangered species listing would have on public land use, while also acknowledging the need for conservation measures, stakeholders on both sides came together to create voluntary conservation agreements (U.S. Fish and Wildlife Service, n.d.(a)). One year before the lizard was to become a candidate for an endangered listing,

a coalition of state and federal agencies took action to stop further population reductions ... They brought together concerned public and private stakeholders to negotiate a consensus-based strategy ... Over thirty stakeholders participated in the negotiations and included oil and gas industries, state and federal agencies, ranchers, conservation and recreation groups (Simmons, Steed, Yonk, 2011, 21).

This agreement was based on the logic that voluntary preservation now would prevent forced federal conservation later, thus keeping lands under local control (Perryman, 2012). Not only was the livelihood of big drilling companies at risk, the livelihood of local residents was also at stake. Although habitat destruction was occurring through drilling associated activities, destruction was also occurring as ranchers and property owners cleared shinnery oak bushes (the lizard’s preferred home) to make way for cattle or roadways.

Fortunately for Lea County and other areas in SDL habitat, the conservation agreements have seen some level of success. On June 13, 2012 Department of the Interior Secretary Ken Salazar announced that the SDL would not be listed as an endangered species under the ESA. In commenting on the decision, Senator Tom Udall of New Mexico applauded the decision and remarked that the decision was completely unprecedented:

It’s the result of months of collaboration and serves as a testament to the positive efforts of New Mexico Land agencies, ranchers and oil and gas producers who reached a compact that simultaneously protects the local economy and the lizard... The end result proves that over-heated political rhetoric and conflict are not the most effective way to resolve disputes over conservation. I hope it will serve as a model for future agreements (Davis, 2012).

The Fish and Wildlife Service provide a general outline indicating nine points of interest covered in the conservation agreements (U.S. Fish and Wildlife Service, n.d.(a)). Among these restrictions are regulations such as “no surface occupancy within 200 meters of areas designated as occupied or suitable...” and “Route and construct new roads, buried pipelines, and power lines outside of occupied and suitable shinnery dune

complexes” (U.S. Fish and Wildlife Service, n.d.(a)). Restrictions such as these created by the conservation agreements are much more preferable than those accompanying an ESA listing.

### *Implications*

From local oil and gas companies, to local ranchers, and even the sand dune lizard itself, collaborative locally focused conservation efforts are benefiting everyone involved. As the potential economic harm of ESA listing spread, conservation efforts spread across state lines to counties in western Texas also believed to house the lizard. Overall, 88 percent of all known SDL habitats have been covered by local agreements within the Permian Basin (Forsyth, 2012). Localized efforts in public land management within the region now serve as examples to similar areas. The agreements reached in Lea County and its surrounding areas represent a new method for public land management and demonstrate that under localized control, communities no longer need to feel pressured to choose between economics and environmental conservation: they can have both.

In the United States, nuclear energy contributes 20 percent of the country’s electricity, is cost-effective, reliable, “supports clean air, land, water and wildlife”, and is economically beneficial (CAS Energy Coalition, 2009). In addition to these advantages, nuclear energy contributes significantly to local and state economies. In Virginia alone, \$1.25 billion of materials, services, and fuel were procured from more than 1,050 companies related to the nuclear power industry. Additionally, the typical nuclear energy facility generated \$430 million in economic activity in the surrounding area (Whitman, 2011).

Nuclear energy is seen by some as a bright spot in the country’s future energy production. Compared to other sources of energy, nuclear power plants provide more jobs per 1,000 megawatts of generating capacity than any other form of energy (Nuclear Energy Institute, 2008(b)). On average, a nuclear power plant creates 1,400-1,800 high-paying jobs during construction, with peak employment estimated as high as 3,500 jobs during that period, and yields four hundred to seven hundred jobs during the operation of the plant (Nuclear Energy Institute, 2011).

Nuclear power plants also encourage economic development in the form of residual jobs in the area surrounding the plant. This development includes an average of \$20 million in state and local taxes for the average nuclear power plant, in addition to \$75 million per year in federal taxes (Nuclear Energy Institute, 2008(b)). Analyses of twenty-three U.S. nuclear plants representing forty-one plants show that every dollar spent by the average plant results in the creation of \$1.04 in the local community, \$1.18 in the state economy and \$1.87 in the U.S. economy (Nuclear Energy Institute, 2012).

*Louisa County, Virginia*

Dominion, one of the nation's largest energy production and transportation companies, owns and operates the North Anna Power Station (NAPS), a nuclear power plant located near the city of Mineral in Louisa County, Virginia. The North Anna facility was completed in 1972 and serves as a key contributor to the local and state economy. Of every dollar put in from the NAPS, the local economy produces \$1.02, the state of Virginia economy produces \$1.19, and the United States' economy produces \$1.56 (Nuclear Energy Institute, 2008(a)). The power plant also provides electricity to the state, generating approximately 21 percent of Virginia's electricity and serving Dominion Virginia Power's 2.4 million customers (Nuclear Energy Institute, 2008(a)).

Average production costs are significantly lower than other forms of energy, making the plant incredibly cost efficient and keeping electricity costs down in the state. Substitution of the plant for a natural gas plant would cause average cost per kilowatt-hour to increase more than 30 cents (Nuclear Energy Institute, 2008a). Many of the 960 full-time employees live in the surrounding area and contribute to economic growth in the local communities, where they earn approximately 7 percent more than average earning of workers in Louisa County (Nuclear Energy Institute, 2008(a)). Richard Myers, NEI vice president of policy development said,

It [the North Anna power station] is among the largest employers in that area of the state and has been among the nuclear industry's best-managed and best-operated facilities. There is enormous value to Virginians in terms of electricity production and hundreds of millions of dollars of economic benefit from the North Anna plant. (NEI Nuclear Notes, 2008).

In the aftermath of the nuclear plant meltdowns in Japan, there was much concern that support for nuclear plants would fall drastically and that additional restrictions and regulations would make it increasingly difficult to produce nuclear energy. It appears that such worries have been misplaced, as much of the nuclear energy industry has been allowed to continue on as before. Public support for the plant remains high as well, with six in ten Virginia voters saying that, "the earthquake did not affect their views on the safety of the North Anna nuclear facility" (Whitman, 2011). In addition, 71 percent of those polled support nuclear power production and 60 percent support new nuclear facility construction in the state (Whitman, 2011). In fact, production of two additional nuclear plants in Virginia is already underway, and other sites throughout the country are also being explored as potential nuclear power generator locations.

*Lake Anna*

In the 1970's, Dominion's predecessor company, Virginia Electric and Power Company, purchased land and created Lake Anna to provide cooling for the company's North Anna Power Station. The lake was formed by damming the North Anna River and today covers thirteen thousand acres, stretching seventeen miles long, one and a half miles wide, and offering two hundred miles of shoreline. Lake Anna is one of the largest freshwater inland lakes in Virginia, situated in Louisa and Spotsylvania counties and reaching into parts of Orange County. The lake currently consists of public and private components managed cooperatively by Dominion and state natural resource agencies, including the Virginia Department of Game & Inland Fisheries and the Virginia Department of Conservation and Recreation (Dominion, 2002, p. 2-3).

The public side includes marinas and boat launches and is part of the Lake Anna State Park. The private part of the lake serves as the NAPS's waste heat treatment facility. This area receives warm water discharge from the power plant, water that is further cooled through mixing with the public waters after navigating a series of canals. Soon after the lake was created in 1972, the state of Virginia stocked the lake with five and a half million fish, and has continued periodic restocking. Today about thirty-three species of fish thrive in the lake, including largemouth bass, striped bass, and catfish (Dominion, 2012(a)). While Lake Anna's reservoir and water heat treatment facility play an important role in providing safe and reliable electricity to Virginians, it also provides outdoor recreation and fishing for Virginian residents and property owners (Dominion, 2012(b)).

Dominion has taken a great interest in Lake Anna and its environmental stewardship of the area. In 1971, the NAPS was one of the first utility companies to establish a permanent environmental department. This department consists of many environmental professionals such as engineers, chemists, biologists, meteorologists, and technicians who constantly monitor the environment for changes or problems, ensuring that energy production at the plant does not negatively impact the environment, community, and area at large (Dominion, 2012(b)). As evidenced through Lake Anna's use as a recreational state park for swimming, boating, and fishing, water quality in Lake Anna remains excellent.

Lake Anna has not merely had a neutral impact on the environment; it has actually provided many benefits

to the environment. For example, before the creation of Lake Anna, water quality in the North Anna River was degraded by sedimentation and acid mine drainage from Contrary Creek. Land near Contrary Creek was previously used for iron pyrite mining and when the mine was abandoned in the 1920's mine shafts and tailings piles were left exposed to weather conditions, creating runoff from the mine area that was acidic and highly metallic. As a result, the density and diversity of aquatic life in the North Anna River immediately downstream of its confluence with Contrary Creek was markedly reduced.

The creation of Lake Anna has mitigated some of the water quality problems from the Contrary Creek runoff area by reducing the impacts of acid mine drainage on the North Anna River. This reduction occurs as the low-pH creek water is neutralized as it mixes with higher-pH Lake Anna reservoir water. Heavy metals in the water can be removed by absorption to clay particles that then settle, and chemical precipitation is shown to remove zinc and copper ions from Contrary Creek water when it mixes with Lake Anna water (Dominion, 2002, p. 5).

NAPS's use of Lake Anna as a cooling reservoir has also had a positive impact on the fish population of Lake Anna. Lake Anna has been shown to support a larger amount of fish than most US reservoirs, especially game fish such as largemouth bass, a popular sport fish. This has made Lake Anna a well-known producer of trophy certificate largemouth bass and striped bass (Dominion, 2002, p. 10). Threadfin shad, an important component of the striped bass diet, were introduced to Lake Anna in 1983 and have thrived thanks to warm water discharged from the power plant. Without the slightly higher water temperatures in the lake created by NAPS operation, this species vulnerable to cold shock and winter kills, would have to be re-introduced into the water every year and this important source of food for game fish wouldn't be able to thrive (Dominion, 2002, 10).

Aside from Lake Anna, the area around NAPS and its transmission lines supports several wildlife species. Dominion's environmental department monitors the maintenance of these transmission lines by mapping the location of rare or sensitive plant species that could be harmed by improper grass cutting, herbicide use, brush control, and other maintenance activities, thus avoiding the adverse impacts on rare and sensitive species and habitats. One method of maintenance, preventing woody growth from reaching the transmission lines, in fact enhances several rare plant and animal species dependent upon open conditions such as grassland and

bog-like habitat. Dominion further cooperates with the Virginia Department of Conservation and Recreation in their Natural Heritage Program's preparation of annual rare plant species reports by allowing surveys of the rare plants within the transmission corridors. Dominion has also allowed landowners, hunting clubs, and conservation organizations to establish wildlife food plots and Christmas tree plantations under transmission lines (Dominion, 2002, 15-17).

### *Conclusion*

While these energy and employment producing activities have occurred, conservation has also been allowed to continue and thrive through the cooperation of Dominion, the state and federal government, and several independent conservation organizations. The nuclear energy industry contributes significantly to the overall electricity production in Virginia and represents one of the few industries in the country showing robust growth during the prolonged economic recession. Operations of the North Anna Power Station contribute significantly to the local, state, and national economy and provide much needed jobs in a struggling economy. The decision of the government not to interfere and enforce new regulations and restrictions on nuclear energy development, even in the aftermath of the nuclear plant problems in Japan, represents a wise choice that has allowed the industry to create new jobs and generate more revenue.

## CLEARFIELD COUNTY, PENNSYLVANIA

Except for election season the average American does not concern themselves with the sources of their electricity. For the last sixty years, however, the silent champion of electricity generation has been coal, producing 42 percent of the electricity in the U.S. (U.S. Energy Information Administration (EIA), 2012, July 13). The United States is rich in coal sources, and because of this abundance it is relatively cheap to produce, giving producers more freedom to experiment with new technologies.

Similar to other traditional energy sources, the technology used has been growing rapidly. Along with that growth has come a decrease the environmental impacts associated with the collection and production of coal. Because the traditional energy services sector has been busy promoting the environmental benefits of natural gas, the recent gains in the coal sector have gone relatively unnoticed (EIA, 2012, July 13).

### *Coal Mining*

Coal is a dark combustible sedimentary rock formed from the application of heat and pressure to dead plants over millions of years. The areas in which coal is most often found are known as seams, or 'beds'. These areas are most often found in areas that were once swampy, or boggy. There are two types of coal: low-ranking soft coal and high-ranking hard coal (World Coal Association (WCA), 2012). In the United States, particularly where coal production is high, hard bituminous coal is mined (Detroit Salt Company, 2012). Bituminous coal is the most abundant form of coal in the United States.

There are two types of bituminous coal: thermal and metallurgical. Thermal coal is often called 'steam coal' because it is used primarily as a power source to generate steam for electricity and industrial use. Metallurgical coal is used to make coke—a hard porous rock needed to make

steel (Sunshine, 2012). Bituminous coal has a high heat content—less fuel is needed to produce a given amount of electricity—it is used frequently—though it emits hazardous particulate matter such as, sulfur-oxides, nitrogen-oxides, lead, mercury, hydrogen chloride gas, and hydrogen fluoride gas (Sunshine, 2012).

As technologies have developed so have the techniques used for mining coal. There are now four main types of mining: shaft mining, slope mining, drift mining, and surface mining. In shaft and drift mining, the coal is extracted by tunneling vertically and horizontally to the coal seam, respectively. Slope mining is a cross between shaft and drift mining, where a sloping tunnel to the coal seam is dug. Surface mining is considered a particularly destructive kind of mining where the land is dramatically changed either by digging a large open pit or leveling a mountain (Detroit Salt Company, 2010).

### *Clearfield County, Pennsylvania*

Coal mining is normally associated with smoke stacks, dust-covered miners, and grimy soot. Although subsidies have slightly shifted energy production to renewable energies, American's reliance on coal won't change significantly in the near future. It seems necessary then for the gap between these two demands to be bridged. Jacob Hachnar at the River Hill Coal Company wants his company to be the group to do that.

The River Hill Coal Company is located in Clearfield County, Pennsylvania on the edge of one of the largest bituminous coal fields in the country (Window on State Government, 2012). Concerned with the development of surface mines, RHCC prepares and sells bituminous metallurgical coal and bituminous steam coal used in metallurgical production and power generation. Both of these types of coal are used to make intermediate goods, steel and electricity, respectively.

Self-branded as environmentally conscious, River Hill re-mines abandoned mines, restores land to its original habitat, reintroduces wildlife, and incorporates solar power and biofuels in the production process (River Hill Coal, 2011). In the coal industry, River Hill Coal Company is experimenting to find new ways to continue the development of energy resources while minding concerns over their environmental impacts. River Hill Coal Company has the distinction of being one of the most eco-friendly and safe coal mining operations in the United States (River Hill Coal, 2011). For the past twenty years River Hill Coal has teamed up with

green energy start-up companies such as Optimus Technology, Epiphany Laboratories, and G-Tech. These companies work together in an effort “to develop ways to use the younger companies’ green technology in coal mining as well as to get River Hill ready for the day when coal is no longer a viable energy source (Spencer, 2010).” River Hill is also the only privately held coal company in the world actively implementing carbon-reducing technologies (Welcome to River Hill Coal Company, 2012).

To reduce its own carbon impact and to save money, River Hill Coal has partnered with Optimus Technology, a biofuels company in Pittsburgh, Pennsylvania. Optimus Technology uses canola and waste oil to replace diesel fuel with a cheaper, cleaner, alternative for River Hill Coal to use when they melt coal, as part of the coke making process. Epiphany Laboratories worked with River Hill to develop solar energy as a way to passively reduce moisture from coal, a method that will create a safer, cleaner working environment in contrast with the standard method of electrical heating. For help in remediating mining sites, G-Tech and River Hill plant roughly one hundred and fifty acres of sunflowers per every one thousand acres of mines. Sunflowers help remove toxins from the soil and plant roots suck up water before it leaches into the ground causing acid mine runoff (O’Toole, 2010).

There are over 11,000 abandoned mines in Pennsylvania (Penn State, 2012). Piles of low-energy-value byproduct from certain coal operations leach iron, manganese, and aluminum into waterways causing acid drainage that kills streams and may catch on fire releasing toxic pollutants into the air (Energy Justice Network, 2012). The state of Pennsylvania spends up to \$75,000 per acre to clean up these mines (River Hill Coal Company [RHCC], 2011). Fortunately, River Hill Coal helps reclaim and rehabilitate these mines to ease the burden on the taxpayers.

Unfortunately, liability concerns for assuming responsibility of these abandoned mines under the current state regulations deter many from reclaiming them and bettering the environment (Pennsylvania Department of Environmental Protection (PADEP), 2009). Under Pennsylvania law, it is possible that companies attempting to clean up abandoned mines could be held responsible for pre-existing toxins (PADEP, 2009, 1). In an effort to get more companies to reclaim these mines, the (PADEP) petitioned the EPA to consider a pilot study project under

the project XL program, for eXcellence and Leadership.

In April of 2000 an agreement was reached that allowed an adjustment to the regulations in re-mining permits. Water quality performance would be based on actual in-stream monitoring rather than individual (or collective) discharging units or sites (PADEP, 2009). The study would monitor eight watersheds in western and central Pennsylvanian counties, permits for continuation of mining would be based on the water quality of the main stream(s) feeding into these watersheds, and samples of these key streams would be taken semi-monthly for a year. The results of this pilot study were positive, overall. Some streams did better than others, but overall, all the streams studied improved.

During this study, River Hill Coal Company operated three of the sites: the Kasubic, Midd Penn, and Wheatfield operations. Between these three sites they reclaimed a total of thirty-one acres, (the Wheatfield operation was barely mined and wasn’t as intensely studied as the other operations) saving taxpayers an estimated value \$1,989,759 (PADEP, 2009). River Hill Coal Company continues to work with local, state, and federal officials to develop and implement environmental laws and regulations that improve coal mining’s environmental impacts, while still being profitable (RHCC, 2011).

### *Implications*

Companies that specialize in developing energies with limited raw materials understand the temporal aspects of their product. It is in their long-run interests to create new technologies that allow them to continue to their work, while providing a cleaner environment. Additionally, as increasing attention is being drawn to the environmental impacts of companies that mine coal, companies such as River Hill Coal, will have to work with local residents, local governments, and environmental groups to ensure the longevity of their operations.

# ENERGY DEVELOPMENT FOCUSED COUNTIES

*Callicoon, New York*

## *Hydraulic Fracking*

The process of hydraulic fracturing, or hydrofracking, has been receiving increasing attention in the media over the first half of 2012. Reports on the economic benefits and illusory environmental costs are varied to say the least. Economies across the United States have seen surprising growth due to the natural gas boom. Simultaneously, videos have been propagated across YouTube of homeowners lighting the water leaking from their sinks on fire. Although in actuality relatively minor environmental damage has been done due to fracking, hydrofracking proponents are on the defensive (Considine, Watson, & Considine, 2011; *The Economist*, 2011).

According to IHS Global Insight natural gas from oil shale production is expected to add \$118 billion in economic growth over the next four years (Chandra, 2012). Once economically dried-up towns in states such as Ohio, Pennsylvania, and North Dakota have now begun to see tremendous growth. In Pennsylvania for example, the natural gas industry is providing 2.4 percent of the jobs as well as an \$11.4 billion industry (Gillspie, 2012). Just north of Pennsylvania in New York the economic benefits of oil shale are being questioned as environmental groups remind citizens about potential environmental concerns.

Despite the considerable economic success that Pennsylvania has seen with the wide spread use of fracking, citizens of New York have been much more apprehensive towards fracking. All of this apprehension is occurring despite the fact that there has yet to be concrete and complete evidence of environmental harm in Pennsylvania, where hydrofracking is prevalent. New York's Governor, Andrew Cuomo has been weighing the economic benefits and political costs of continuing to allow limited drilling for natural gas, or fracking, in his State.

Environmental groups are already poised to retaliate against any plan the Governor puts

forth that sanctions drilling (Hakim, 2012). Meanwhile gas companies have been pushing to continue their work with the permits they have been granted and for the opportunity to apply for more drilling permits in the future. In 2008 New York State began investigating hydraulic fracking, putting a temporary hold on all new drilling permits. Cuomo has been waiting for final reports from New York's Department of Environmental Conservation (DEC) to inform his final decision; this report is expected by the end of summer 2012 (Campbell, 2012).

In the meantime, to avoid the political backlash that could follow a decision either for or against drilling, Cuomo has been discussing the possibility of a "home rule". This rule would allow municipalities' support or opposition towards fracking to be one factor in determining if fracking is sanctioned. Many cities are already exercising this option; creating a patchwork of municipalities across the State that have either placed a moratorium upon, or support hydrofracking (Campbell, 2012). Across the state forty-five towns had passed resolutions attesting their support of property and mineral rights as long as drilling is conducted in a safe manner. Meanwhile one hundred and fifteen towns had passed a similar moratorium on natural gas exploration, production (Colley, 2012b). Currently, most of those townships opposing hydrofracking reside in northern New York where there is little oil shale, while those supporting fracking are close to the Marcellus Shale region near Pennsylvania<sup>7</sup> (Campbell, 2012b).

Oil shale is composed of sedimentary rock containing organic matter, much like traditional oil. This shale may also come in the form of shale gas, similar to natural gas. This organic matter, however, is trapped inside layers of rock and must be extracted using a mixture of water, heat, and chemicals. The process by which this oil is extracted is called fracking. A form of fracturing, the mixture of water, heat, and chemicals mentioned above is forced through tiny fissures in the rock and the oil is pushed up to the surface. The exact process and chemical used varies based on the geophysical characteristics and the type of shale at the site.

## *Callicoon, New York*

Callicoon is located within Sullivan County approximately two hundred miles southeast of Avon. Situated

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<sup>7</sup> See Appendix A for a full map of these resolutions.

atop the Marcellus Shale formation, the township is prime natural gas territory near the border between New York and Pennsylvania. Rural Sullivan County was one of the last areas within New York to be populated, and currently boasts a total population of only 76,900 and a total land area of less than one thousand square miles (Town of Callicoon, n.d.; Sullivan County, New York, n.d.). A town that could very well be described as an economically dried up community, Callicoon originally was settled because of timber in the area, and the agricultural industry soon became its now failing economic base. Recent advances in technology, however, paired with increased demand, have led to greater calls for natural gas drilling as a means of boosting the dwindling economy.

The Marcellus Shale formation is a large deposit of black shale, spanning across parts of Ohio, New York, Pennsylvania, as well as several other northeastern states. While the existence of natural gas in the area has been known for quite some time, it was not until recently that pricing and technological conditions made extraction economically feasible for energy developers. As local communities throughout New York realized the earning potential under their feet, serious conversations discussing the feasibility of fracking began to take place (Cornell Cooperative Extension, 2005).

Opposing views regarding the fracking process have spread across the nation and most certainly have not excluded New York. The interconnection of communities through watersheds and other possible environmental degradation has split the state, leaving communities to band together with other like-minded communities. As previously stated in the example of Avon, 115 towns set local bans against gas drilling; this move was directly opposed by forty-five that have adamantly publicized their willingness to lease to paying investors. Interestingly, the majority of towns opposed to fracking methods are located in areas where there are little known gas reserves; most of the forty-five dissenting townships are situated in gas-rich areas (Colley, 2012(a)).

The State moratorium that has temporarily been placed on new drilling leases is an outrage to areas such as Callicoon, which need the economic boost gained through using the rich natural resources below their lands. In fact, Sullivan County as a whole has much to gain from drilling developments, publicizing their willingness on a billboard advertising their support of development (Colley, 2012a). Noel van Swol, an advocate for

localized land management, stated that property owners had the potential to make \$6,400 plus royalties for a simple five year drilling lease on one single acre (Zeller, 2012). For the citizens of small town Callicoon, such numbers create a strong incentive to support fracking.

Apprehension against fracking within city limits is fed by a variety of factors. Possible contamination of the water supply is a very large deterrent for many; but as seems to be the case in Callicoon, some simply do not want development for aesthetic reasons. Retiree or wealthy citizens who come to the area from larger cities in search of tranquility, oppose drilling because they do not want to disrupt the rural environment that initially pulled them in (Colley, 2012b). Residents that have worked the land for generations, however, feel that progression is both necessary and safe.

If you have decent regulations in place, there's no reason you can't develop this resource while maintaining a safe environment and clean water... It's a win-win situation for everyone. You can have your cake and eat it too (Zeller, 2012).

At a public town hearing, talks were underway to create a comprehensive plan covering future developments. In the end, the town board decided not to ban fracking in the area, instead leaving the issue open-ended. Drilling was not prohibited on the grounds that in the future, development may occur so long as citizens “protect and enhance the town’s natural environment and character while simultaneously promoting smart growth and economic development” (Colley, 2012(b)). Citizens that had invested in the local economy for years and grown up working the fields of Callicoon were appreciative of the decision. Newer and less economically invested residents however, were not so pleased with the decision and adamantly spoke against any allowance of future drilling in what has been deemed a form of “class warfare” as “trust-fund babies... trying to throw their weight around” according to Noel van Swol – President of a local property owners association (Colley, 2012b; Banerjee, 2012).

Economic diversity is needed for the residents of Callicoon, who are described as being in a state of “pastoral poverty” (Colley, 2012(b)). For years the area has been reliant on agriculture, the sole dependence of which can arguably be said to be the very thing that has kept the town at an economic standstill. With the harsh

financial times that have spread across the country, some property owners are considering leasing lands simply to save their farms (Banerjee, 2012). Diversifying the local economy would prove beneficial through increased revenue, which would then in turn provide property owners the actual means to maintain the land's integrity.

As the state of New York readies itself to lift the current moratorium on natural gas leases, citizens across the state will be left to choose whether or not to permit hydraulic fracking within their communities (Banerjee, 2012). While the subject has been controversial, officials such as Lisa Jackson, the Environmental Protection Agency's administrator, have assured landowners that she is "...not aware of any proven case where the fracking process itself has affected water." (Colley, 2012(b)). For areas such as Callicoon, where economic development projects are relatively few, to the point where local stakeholders lack the resources to manage their lands, the use of hydraulic fracking could dramatically increase the needed revenue in the area. The actions taking place in New York towns such as Callicoon represent interesting phenomenon; where the general ownership and conservation of private property may be maintained through responsible local land management.

### *Conclusions*

This case illustrates the point that when land and resources are under local control, this government can manage them in a way that supports the economy while still protecting the environment. It is in the best interest of local leaders to balance both their amenities and energy extraction activities. Environmental policy is often best set by local government officials who can see how the two industries interact day-to-day.

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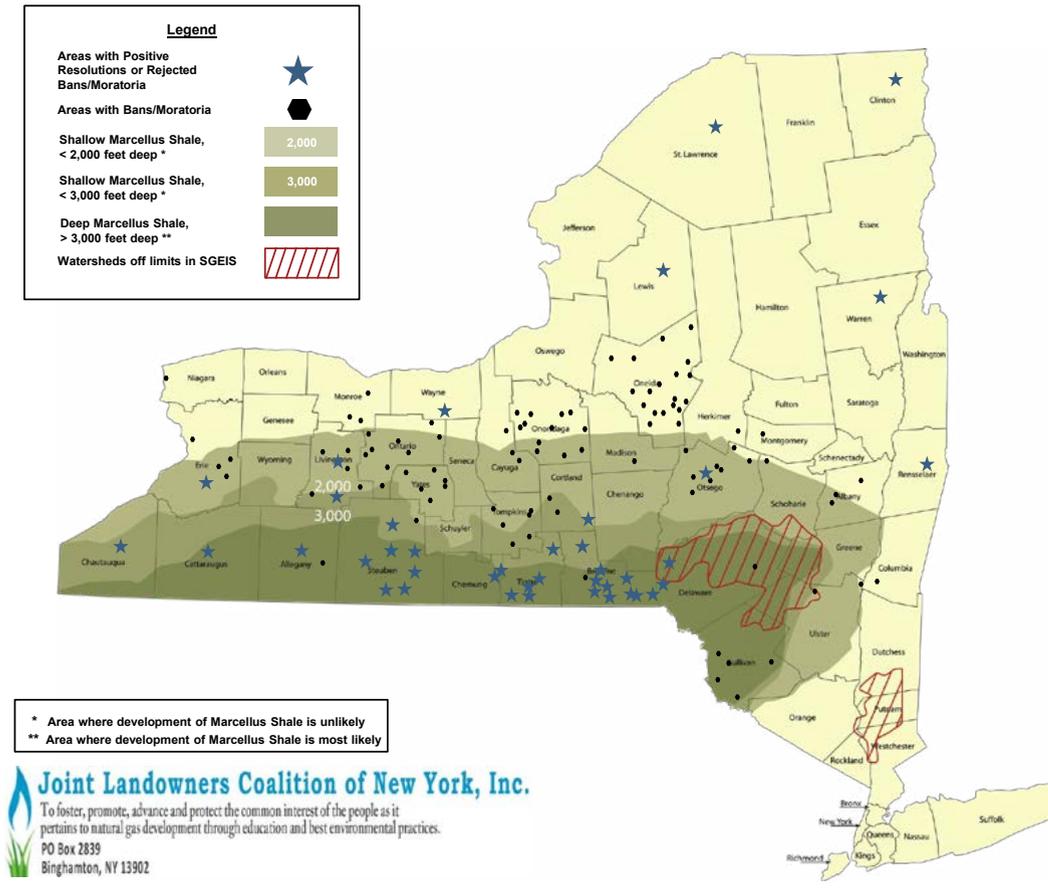
Total Business Activity (Dollars) GLS Regression Panels: 6 Variable: Year Observations: 18,8849					
R Square Within panel: .045 Between Panels: .546 Overall: .046			Obs Per Group Min: 3139 Average: 3141.5 Max: 3144		
Variable	Coefficient	Standard Error	P Value	95 Percent Confidence Interval	
Mining Income	7.844	0.558	.000***	6.748	8.939
Public Utility Income	0.058	0.111	0.6	-0.159	0.276
Wilderness Dummy	-679456.7	333381.7	.042**	-1332873	-26040.5
Percent White	-19801.24	4180.42	.000***	-2799.7	-11607.7
Percent Female	34844.21	7798.45	.000***	19559.5	50128.89
Median Age	1.88	0.435	.000***	1.03	2.73
Percent High School Grad	-37663.53	9052.69	.000***	-55406.4	-19920.5
Percent College Grad	299561.7	16266.99	.000***	267679	331444.4
Land Area (acres)	2.19	24.5	0.929	-45.86	50.25
Birth Rate (per 1000)	75409.46	24685.5	.002***	27079.69	123739.2
Percent Tennessee Valley Authority Lands	-11232.7	75832.57	0.882	-159861.8	137396.4
Percent Bureau of Land Management Lands	-8539.02	10219.54	0.403	-28568.95	11490.9
Percent Bureau of Reclamation Lands	192031.7	242840.6	0.429	-283927.2	667990.6
Percent Department of Defense Lands	94255.33	23856.04	.000***	47498.34	141012.3
Percent Forest Service Lands	18720.25	5258.48	.000***	8413.81	29026.69
Percent Fish and Wildlife Lands	-28000.68	22363.01	0.211	-71831.37	15830.01
Percent National Park Service Lands	-25051.96	19573.77	0.201	-63415.83	13311.92
Percent Tribal Lands	-27296.46	11069.64	.014**	-48992.56	-5600.35
Constant	-1406736	681057.2	.039**	-2741584	-71888.7

Total Tax Receipts (Dollars) GLS Regression Panels: 6 Variable: Year Observations: 18,8849					
R Square Within Panel: .140 Between Panels: .707 Overall: .14			Obs Per Group Min: 3139 Average: 3141.5 Max 3144		
Variable	Coefficient	Standard Error	P Value	95 Percent Confidence Interval	
Mining Income	0	0.019	.000***	0.345	0.423
Public Utility Income	0	0.004	.000***	0.238	0.039
Wilderness Dummy	18,296	11850.21	0.123	-4929.58	41522.39
Percent White	-1,176	48.59	.000***	-1466.84	-884.36
Percent Female	2,096	277.19	.000***	1553.19	2639.8
Median Age	0	0.015	.000***	0.419	0.48
Percent High School Grad	-1,699	321.78	.000***	-2330.14	-1068.77
Percent College Grad	15,073	578.22	.000***	13939.52	16206.1
Land Area (acres)	-1	0.872	0.2	-2.83	0.591
Birth Rate (per 1000)	1,613	876.49	.066*	-104.55	3331.26
Percent Tennessee Valley Authority Lands	720	2695.51	0.789	-4563.32	6002.86
Percent Bureau of Land Management Lands	-516	363.26	0.156	-1227.8	196.13
Percent Bureau of Reclamation Lands	-4,175	8631.88	0.629	-21093.16	12743.2
Percent Department of Defense Lands	-621	847.97	0.464	-2283	1040.99
Percent Forest Service Lands	-1,050	186.92	.000***	-1416.77	-684.07
Percent Fish and Wildlife Lands	-1,266	794.9	0.111	-2823.62	292.35
Percent National Park Service Lands	753	695.76	0.279	-610.92	2116.41
Percent Tribal Lands	-1,118	393.8	.004***	-1889.64	-347.24
Constant	-50,339	24208.5	.038**	-97786.97	-2891.38

\*p<.10 \*\*p<.05 \*\*\*p<.01

Per Capita Income (Dollars)					
GLS Regression					
Panels: 6 Variable: Year Observations: 18,8849					
		R Square		Obs Per Group	
		Within Panel: .091		Min: 3139	
		Between Panels: .919		Average: 3141.5	
		Overall: .394		Max: 3144	
Variable	Coefficient	Standard Error	P Value	95 Percent Confidence Interval	
Mining Income	0.0008	0.0003	.006***	0.0002	0.001
Public Utility Income	0.0005	0.00006	.000***	0	0.0006
Wilderness Dummy	129.69	188.1	0.49	-238.97	498.36
Percent White	-64.74	2.36	.000***	-63.37	-60.11
Percent Female	119.19	4.4	.000***	110.57	127.82
Median Age	-0.0012	0.0002	.000***	-0.001	-0.0006
Percent High School Grad	329.89	5.1	.000***	319.88	339.9
Percent College Grad	50.42	9.17	.000***	32.43	68.1
Land Area (acres)	-0.006	0.0138	0.685	-0.033	0.021
Birth Rate (per 1000)	-455.85	13.91	.000***	-483.12	-428.59
Percent Tennessee Valley Authority Lands	102.02	42.78	.017**	18.15	185.87
Percent Bureau of Land Management Lands	-22.93	5.77	.000***	-34.22	-11.62
Percent Bureau of Reclamation Lands	-107.46	137.01	0.433	-376	161.08
Percent Department of Defense Lands	0.433	13.46	0.974	-25.95	26.81
Percent Forest Service Lands	-9.73	2.96	.001***	-15.55	-3.92
Percent Fish and Wildlife Lands	-16.75	12.61	0.184	-41.47	7.98
Percent National Park Service Lands	40.45	11.04	.000***	18.8	62.102
Percent Tribal Lands	-39.54	6.25	.000***	-51.78	-27.29
Constant	215.99	384.27	0.574	-537.15	969.14

\*p<.10 \*\*p<.05 \*\*\*p<.01



\* Area where development of Marcellus Shale is unlikely  
 \*\* Area where development of Marcellus Shale is most likely

**Joint Landowners Coalition of New York, Inc.**  
 To foster, promote, advance and protect the common interest of the people as it pertains to natural gas development through education and best environmental practices.  
 PO Box 2839  
 Binghamton, NY 13902

- 2010 Positive Resolution**
- Amity
  - Ashland
  - Barker
  - Busti
  - Butler
  - Carrollton
  - Chazy
  - Chenango
  - Conklin
  - Holland
  - Kirkwood
  - Lake Luzerne
  - Leicester
  - Louisville
  - New Bremen
  - Pittstown
  - Sanford
  - Tioga
  - Town of Windsor
  - Village of Windsor
- 2012 Positive Resolution**
- Broome
  - Barker
  - Town of Binghamton
  - Colesville
  - Conklin
  - Kirkwood
  - Lisle
  - Sanford
  - Windsor
  - Chemung
  - Van Etten
  - Cortland
  - Willet
  - Delaware
  - Deposit
  - Steuben
  - Addison
  - Bath
  - Jasper
  - Painted Post
  - Woodhull
  - Tioga
  - Barton
  - Berkshire
  - Nichols
  - Spencer
  - Tioga