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Examining The Effects of National Monument Establishment on Surrounding Communities

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Abstract

Examining the Effects of National Monument Establishment on Surrounding Communities

Sarah Elizabeth Maloney

The Katahdin Woods & Waters National Monument, located in northern Maine just outside the town of Millinocket and created by President Obama in August 2016, has elicited vocal support and opposition. It has been heralded on one hand as a massive victory for conservation in Maine, and on the other hand, as an overreach by the federal government. This controversy was so widespread that it resulted in the Katahdin Woods & Waters National Monument being included in a Department of the Interior review of twenty-seven National Monuments during the summer of 2017, which was conducted by Secretary of the Interior Ryan Zinke, a Trump administration appointee. Secretary Zinke's review suggested that the Katahdin Woods & Waters National Monument should remain intact, with potential changes to allowable land uses. Many people in the communities surrounding the Katahdin Woods & Waters National Monument felt hopeful about this decision, as their communities have been experiencing an economic decline in recent decades due to the collapse of the pulp and paper industry in the region. The development of a tourism-based economy surrounding the National Monument has been looked to as a potential economic savior for the area. With the National Monument here to stay, is there evidence to back up the hope that this National Monument will economically revive the region with a new tourism industry? This paper examines three National Monuments established in the 1990's to examine the level to which those communities have experienced growth since National Monument establishment. These three National Monuments are the Grand Staircase Escalante National Monument in Utah, Newberry National Monument in Nebraska, and Agate Fossil Beds National Monument in Oregon. Landsat remote sensing imagery from three time periods (time of establishment, middle point, and 2017) is classified in this analysis to determine if developed areas (i.e. new buildings, increases in paved roads) increased through time. Due to census data availability, one of these National Monuments (Newberry) is examined using U.S. Census Data to see how the socio-economic characteristics of the human population have changed in the first ten years following National Monument establishment. Data analysis

(census and remote sensing) was conducted for the Maine study area to provide a baseline for the Maine study area at the time of National Monument establishment. This work also included an interview with Lucas St. Clair, who was involved in the establishment of Katahdin Woods & Waters National Monument in Maine. The findings of this study were that there was no appreciable or statistically significant physical or economic growth in the communities near the selected National Monuments between their establishment (in the late 1980's or early/mid 1990's) and 2017.

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Dedication

I would like to dedicate this work to the memory and life of my late grandmother, Betty Eugenia Watson Maloney. Her humor, humility, kindness, dedication to family and independent spirit, especially in her last few years with us, has inevitably shaped who I am, and subsequently this work, as well as all that will follow it.

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Introduction

What is a National Monument?

National Monuments are distinct from National Parks or any other federally protected lands. Written into law in the Antiquities Act of 1906, a National Monument can be created by a Presidential order or through an act of congress to protect federal lands that contain objects of historic or scientific interest (Vincent & Baldwin 2016, Sanders 2016). U.S. Presidents have created 151 National Monuments via presidential proclamation order since the Antiquities Act was passed into law (Vincent & Baldwin 2016). Congress has also created or modified National Monuments in the past, and several have been rescinded (Vincent & Baldwin 2016).

The Antiquities Act was originally drafted into law to protect historic sites or features that were at risk of imminent damage. This is why the Antiquities Act allowed National Monuments to be created quickly via presidential action (Sanders 2016, Vincent & Baldwin 2016). There are some guidelines that are supposed to be applied when National Monuments are created, including a restriction that requires a National Monument should be the smallest possible size to protect the object of interest (Vincent & Baldwin 2016, Sanders 2016). However, some National Monuments are as large as 261 million acres leaving some to question whether large National Monuments truly follow that restriction (Vincent & Baldwin 2016, Sanders 2016). More recently, the Antiquities Act of 1906 has been used to protect expansive environmental communities instead of one specific feature, object or attraction at risk of imminent damage (Sanders 2016).

National Monuments do not necessarily remain National Monuments in perpetuity. Nearly half of all National Parks in the United States began as National Monuments (Sanders 2016, Vincent & Baldwin 2016).

Where is the Katahdin Woods & Waters National Monument? What is that area like?

The Katahdin Woods & Waters National Monument is located in Northern Central Maine (see Figure 7). This area's economy historically centered on the timber and paper industries (Miller 2016). During the twentieth century, these industries employed much of Northern Maine and paid some of the highest wages in the state, providing for many families (Miller 2016). The vast expanses of land in Northern Maine, referred to colloquially as the 'North Woods', comprises 4 million hectares of forest and has historically been owned by various timber companies (Vail & Hultkrantz 2000). However, the timber and paper industry has experienced a substantial decline in recent decades (Sharon & Inskeep 2016). This decline of the pulp and paper industry in Maine parallels a national decline in agriculture and domestic manufacturing that has directly threatened rural areas all over the United States (Wilson et al. 2001, Siemens 2007). Rural communities in the United States have historically relied on natural resource extraction-based jobs like fishing and forestry (Siemens 2007). As paper companies have been failing in Maine, they have been selling off their land holdings in this region and laying off workers (Vail & Hultkrantz 2000, Sharon & Wertheimer 2016). The reduced demand and production of Maine timber and paper has also resulted in increased development pressure on the Maine woods to meet other economic needs (Matsuura et al. 2016).

Northern Maine has many unorganized townships and territories that have much lower household incomes than the average for Maine or for the greater U.S. (Vail & Hultkrantz 2000). Additionally, many in Maine's unorganized townships rely on subsistence fishing and hunting (Vail & Hultkrantz 2000). Interior Maine, as compared to tourism-rich Coastal Maine, is lacking in economic resources (Vail 2007). Interior Maine has even been referred to as the "stepchild" of Coastal Maine (Vail 2007, pg. 113). The State's natural resource distribution, rural character, and dense distribution of tourism along the coast contribute to economic instability (Gabe 2007).

How did the Katahdin Woods & Waters National Monument come to be, and why would people oppose it?

Land declared as National Monument must be owned by the federal government (Vincent & Baldwin 2016). In the case of the Katahdin Woods & Waters National Monument, the land

was donated to the federal government by Roxanne Quimby, a wealthy Maine resident and a co-founder of the Burt's Bees Body Care company (Miller 2016, Sharon & Wertheimer 2016, Miller 2017). Quimby used her wealth to begin to accumulate land holdings in Northern Maine with the hope that someday this area would become some kind of recognized conservation area (Miller 2016, Miller 2017). In past years, Quimby had upset some Maine residents for restricting certain land uses on the properties she purchased (Miller 2017). Traditionally, Maine residents have looked at private land as a "customary entitlement" that allowed some use by the public (Vail & Hultkrantz 2000, pg. 223). Most outdoor recreation in Maine, including 98% of primitive camping and 60% of hiking, occurs on private land (Vail & Hultkrantz 2000). In 2015, local voters rejected the idea of a park or other conservation area in the region (Sharon & Wertheimer 2016).

Quimby's land holdings were transferred from Elliotsville Plantation, the Quimby family's non-profit, to the Department of the Interior just prior to the land's designation as a National Monument in the summer of 2016 (Miller 2016). However, this donation included more than just land. Quimby additionally donated $20 million to support the Monument's start up costs and an additional $20 million to support its further development and maintenance needs (Hetter 2016). Quimby's family has openly expressed that they hope that this National Monument someday becomes a National Park (Sharon & Inskeep 2016, St. Clair). Lucas St. Clair, Roxanne Quimby's son, has now become the public face of the monument (Sharon & Inskeep 2016, Miller 2017). St. Clair is now running for United States Congress in Maine's second district, where the National Monument is located (St. Clair, Floyd 2017). Lucas St. Clair indicated in the interview conducted for this research that he would support changing the designation of the Katahdin Woods & Waters National Monument to a National Park should be be elected (St. Clair).

Although the opposition to the Katahdin Woods & Water is no doubt complex, it has been previously examined by this author and it will only be touched on briefly here. The excerpts below, summarize much of the opposition to the Quimby family and to the federal government's role in creating the Katahdin Woods & Waters National Monument:

"And a government park coming - not a national park, government park. They couldn't keep an ant farm running. We don't need them. Let the state run the things."

(Source: Area resident Sam Houston quoted in Sharon & Inskeep 2016)

"It's kind of disheartening to think that everybody in the area is against this (National Monument), and it's being shoved down our throat all because someone's got money."

(Source: East Millinocket Selectman and local resident, Mark Marston quoted in Sharon & Wertheimer 2016)

"I don't believe (the National Monument is) going to create the jobs, and we all know it's not going to that they claim it's going to."

(Source: Phillepe Page, area resident, quoted in Sharon & Wertheimer 2016)

"St. Clair's biography page on the Quimby Family Foundation website describes his rearing 'in a hand-built log cabin with few amenities' – a dismal attempt at likening his background to arguably the poorest and hardest working folks in Maine. Sorry, we're not buying it. What follows is a litany of educational and professional highlights such as attendance at elite schools and an appointment to the Quimby Family Foundation Board. Nowhere did I see his time spent in the frozen Maine woods swinging a saw, breaking his back in the potato fields of The County or raking blueberries Downeast for day wages. He's led a charmed life indeed... How can the entitled son of a left-wing millionaire seriously expect to represent the values, wants and needs of a simple, conservative district? Has he never heard the term 'carpetbagger'?"

(Source: Taylor 2017)

Why Was the Katahdin Woods & Waters National Monument Reviewed by the Secretary of the Interior? What were the findings of the review?

Multiple National Monuments established after 1996 were reviewed in the summer of 2017 by Secretary of the Interior, Ryan Zinke, under the direction of President Trump (Eilperin & Fears 2017, Department of the Interior 2017). Those selected for review had to meet one of two conditions: either they were at least 100,000 acres in size or they were created "without adequate public consultation" (Department of the Interior 2017, pg. 1). The Katahdin Woods & Waters National Monument is 87,500 acres (The White House 2016), indicating that it likely met the Department of Interior's second criteria (2017). Maine Governor Paul Lepage has also been a vocal opponent of this National Monument, and some think that his opposition and interaction with the Trump administration could be why the Katahdin Woods & Waters National Monument was reviewed (Miller 2017).

Two big concerns regarding National Monuments were outlined in the summary of Zinke's report (Department of the Interior 2017). One concern was the nebulous definition of an object of interest eligible for protection under the Antiquities Act, and the second concern was the questionable following of the requirement that National Monuments be the smallest size possible to accomplish their goal of protecting the object of interest (Department of the Interior 2017). Zinke also indicated that no National Monument should be used to restrict the public's access to traditional land uses like hunting and fishing (Department of the Interior 2017, Miller 2017). He also highlighted in the summary that a new National Monument designation may pressure neighbors to the monument to sell their land (Department of the Interior 2017). Though the report summary did acknowledge that National Monuments have the potential to foster visitation and grow the service industry, it highlighted that these monuments would require investment by the government to ready the lands and their surrounding communities for these potential increases in visitation and tourism (Department of the Interior 2017).

At the time this study concluded, Zinke's full report had not yet been released, but the press has reported that the Katahdin Woods & Waters National Monument will not be reduced or eliminated (Miller 2017, Sambides 2017). Although some National Monuments, such as two in Utah, may be reduced in size, the Katahdin Woods & Waters National Monument likely will not be (Eilperin & Fears 2017). During Zinke's visit to the monument during his review, he hinted

that his findings may include changes to allowable land uses within the National Monument, like allowing hunting, snowmobiling and/or timber harvesting (Miller 2017).

Why is the development of the area around the Katahdin Woods & Waters National Monument a concern? What problems may the region encounter if it does develop a tourism-based economy?

Tourism may have negatives such as an increase in crime, conflicting values as the area changes, disruption of the current community, displacement of people, and a negative impact on local culture (McCool & Martin 1994). A sustainable type of tourism has been defined as "activities that, individually and in aggregate, function within ecological carrying capacities while contributing to durable economic prosperity and to social, civic and cultural vitality in host regions" (Vail & Hultkrantz 2000, pg. 226).

Businesses developing in rural areas have specific and unique issues to overcome (Siemens 2007). Development of tourism in rural areas includes challenges like ensuring that attractions can cater to all types of visitors, utilizing regional cooperation, and incorporating a thorough planning process for development (Sharpley 2007). Attracting a sufficient number of visitors and getting recognition as a destination location is an additional challenge in many rural areas (Sharpley 2007). Specifically in Maine, there has been more pressure on rural areas for the development of more logging roads, a push for more tourism marketing and increased real estate development for summer homes (Vail & Hultkrantz 2000). The State of Maine gets 30% of its local and state revenues from tourism and tourism based activities (Vail & Heldt 2000). Tourism has the potential to be a tool to improve communities for their own benefit (McCool & Martin 1994). A positive of starting up a tourism-based economy is that it is typically less expensive than trying to establish other types of economies like manufacturing (Wilson et al. 2001).

There are four principle challenges to the development of sustainable nature-based tourism in Northern Maine: managing capacity congestion at peak areas and times; allowing both tourism and non-recreational activities in the same or nearby spaces; keeping damage to natural areas to a minimum; and incentivizing contributions to conservation for private landowners (Vail & Hultkrantz 2000). Siemens (2007) conducted interviews with small business owners in rural

areas to identify their concerns and challenges. The most commonly expressed concerns were that relying on just tourism as your livelihood is risky, that the seasonality of the business is very challenging, and that basic infrastructure to support the community like good quality roads, grocery stores and banks, was frequently lacking (Siemens 2007). Infrastructure needs to be developed to support their travel and experience, but this remoteness that attracted them needs to somehow simultaneously coexist with infrastructure development (Siemens 2007). Additionally, it may also be cost prohibitive for individual business owners to collect information about promotion and get technical assistance on their own (Wilson et al. 2001).

The literature also suggests some solutions to some of these problems. One may be pooling the resources of multiple business owners to get more information about support and technical assistance (Wilson et al. 2001). The literature also found that because resources in a rural community are limited, addressing concerns as a community (compared to addressing them as individual business owners) may help address issues like diversification and seasonality (Siemens 2007). As far as managing environmental degradation due to increased tourism traffic, gating areas off may be a good solution; restricting access using gating certain areas may frustrate visitors at first, but it will help mitigate impacts and improve the overall tourism experience by preserving the natural environment (Vail & Heldtz 2000, Vail & Hultkrantz 2000).

This section has laid out some problems that other communities have faced in developing a tourism-based economy and the solutions they have utilized to move forward. The challenges faced by the Katahdin region may be some combination of the challenges laid out here, but there may also be challenges that cannot be predicted or that are completely unique to Northern Maine at this point in time.

Methods

Literature Collection

Literature relevant to this project was collected during the summer of 2017 using Google Scholar and merged with literature from the author's previous work (i.e. Sanders 2016, Hampton 1981, Sharon & Inskeep 2016, Miller 2015, Petrzelka & Marquart-Pyatt 2013, Sambides 2016, Schneider-Hector 2014, Sharon & Wertheimer 2016, and The White House 2016). Keywords used in the literature search included: *'national monuments', 'tourism-based economy', 'tourism development', 'rural development', 'rural tourism'* and *'national monument development'*. Peer reviewed and published literature were preferred, but due to the recent nature of events, news articles were relied upon for up to date information regarding the Katahdin Woods and Waters National Monument, as well as the National Monument review.

Selection of National Monuments

Towns near National Monuments selected to examine for remote sensing work were chosen based on the criteria listed in Table 1.

Table 1: Criteria/rationale for selection of towns near National Monuments selected for study.

Criteria	Reasoning
National Monument near town **must** have been established in 1997 or earlier	Allows at least 20 years for any subsequent development to occur
Towns **must** be within 50 miles (driving distance) of National Monument	The distance of 50 miles is thought to be a high but still reasonable commuting distance
Towns **must** have a 2016 population of less than 15,000	To make sure that chosen towns are small towns or rural communities that are fair to compare to literature about rural communities and the Maine study area

Known vocal opposition to local National Monument designation was taken into account	To examine similar cases to Maine where local people opposed National Monument designation
Selected study areas must be located in different states	To examine National Monuments in many places, not just in one region of the U.S.

Study Areas Chosen for Remote Sensing Work

Table 2: Study areas selected for the remote sensing work in this research.

Town	**State**	**Local NM**	**Year of NM's Establishment[1]**	**Driving Distance to NM[2]**	**2016 Population[3]**
Escalante	Utah	Grand Staircase Escalante	1996	30 miles	787
Three Rivers	Oregon	Newberry	1990	12 miles	3,014
Scottsbluff	Nebraska	Agate Fossil Beds	1997	48 miles	14,883
Millinocket	Maine	Katahdin Woods & Waters	2016	18.6 miles	4,506

[1]According to Johnston Archive 2017
[2]According to Google Maps
[3]According to the U.S. Census Bureau

Land Use/Land Cover Mapping Using Remote Sensing

Remote sensing was chosen for this project to evaluate any appreciable increases in development in the selected towns near National Monuments. The goal of the remote sensing was to clearly detect 'developed areas'; which in this context would mean paved roads, built structures, residences, commercial properties, and so on. Remote sensing is frequently used for this purpose (Warner et al. 2017). This analysis used three time steps: the time of establishment (as close as possible given available imagery), a current image and a midpoint. Because this study is to inform the development of the recently established Katahdin Woods & Waters

National Monument, there is only one image from the year of establishment for the Maine study area. These dates are laid out in the following table (Table 3). All image classification was completed using TerrSet. Google Earth was used to complete the error assessments.

Landsat Imagery was obtained using USGS Earth Explorer (earthexplorer.usgs.gov). Images that were selected contained less than 10% cloud cover. Images were also selected in the June-September months so that peak vegetation or agriculture could be detected. Images were downloaded, imported into TerrSet and windowed to focus on the selected town. The image classification procedures in this study followed those suggested by Warner et al. 2017.

Training sites were then developed, followed by signature extraction. SEPSIG and SIGCOMP were used to evaluate separability of the land cover classes. Supervised linear spectral unmixing (LSU) classification was performed on the images. LSU was selected because the communities examined were relatively small, so mixed pixels were expected. LSU is able to deal with mixed pixels (Warner et al. 2017). The images were then masked by a one mile buffer around the town boundary. This masking was done to focus the area of development and to standardize the study areas. This was a problem in the Three Rivers, Oregon study area where the one mile buffer exceeded the windowded image on the Southern edge (See Figure 5). This does not interfere with the ability to compare time steps in this study area, but it does limit comparability with other classifications outside this study. Town Boundaries were obtained either from state GIS data sources (see data sources table in the Appendix) or digitized. In the case of Scottsbluff, there was no town polygon publicly available. Instead, one was georeferenced using a screenshot from Google Maps and a reference ESRI basemap. A 100 point error assessment was then performed on the 2017 images according almost entirely to the procedures suggested by Warner et al. 2017. The difference between the suggested procedures by Warren et al. (2017) and this analysis was that the randomly generated sample points were opened in Google Earth to because it has easily accessible high resolution imagery. The results of this error assessment can be found in the results section (Table 8). Final map compositions were created in ArcMap 10.4. Microsoft Excel was used to create the summarized graphical representations of this data.

Table 3: Summary of Landsat imagery data and their nearby towns examined in this study.

National Monument	State	Nearby Town Selected for Analysis	Sensor	Image Acquisition Date	Time Step
Katahdin Woods & Waters	Maine	Millinocket	Landsat 8	08/23/2016	Implementation
Grand Staircase Escalante	Utah	Escalante	Landsat 5	09/21/1995	Establishment
Grand Staircase Escalante	Utah	Escalante	Landsat 5	08/23/2008	Middle Point
Grand Staircase Escalante	Utah	Escalante	Landsat 8	09/01/2017	Current
Newberry	Oregon	Three Rivers	Landsat 5	06/08/1989	Establishment
Newberry	Oregon	Three Rivers	Landsat 5	09/08/1999	Middle Point
Newberry	Oregon	Three Rivers	Landsat 8	07/10/2017	Current
Agate Fossil Beds	Nebraska	Scottsbluff	Landsat 5	06/27/1997	Establishment
Agate Fossil Beds	Nebraska	Scottsbluff	Landsat 5	08/09/2007	Middle Point
Agate Fossil Beds	Nebraska	Scottsbluff	Landsat 8	08/04/2017	Current

Data obtained from USGS EarthExplorer

Census Data Analysis Methods

Census data mapping was used in this project to evaluate any demographic or socioeconomic changes in the area surrounding the Newberry National Monument. Census data for this portion of the analysis was obtained from National Historic GIS (see Table A1 in Appendix). Hotspot analysis was utilized to complete this analysis. ESRI's hotspot analysis (or Gi*) identifies clusters of statistically significant low and high values (cold spots and hot spots) as compared to the rest of the study area (Mitchell 2017).

The Newberry National Monument area was the only National Monument area eligible for time step analysis deemed eligible for census data collection. The United States Census shifted from the traditional decennial model in 2006 to the American Community Survey (see U.S. Census Bureau 2016). To ensure the most defensible methods, this study chose not to compare decennial census data with American Community Survey data. Newberry National Monument was established in 1989 (Johnston Archive 2017), which fit cleanly into the window of decennial census data collection in 1990 and 2000.

The variables explored in Oregon were per capita income, population density (people/square mile), and education (percent of population receiving a bachelor's degree or higher) at the census tract level. Hotspot analysis was used with the zone of indifference method and a neighborhood distance of fifty-thousand meters. False discovery rate (or FDR) was applied in all iterations of hotspot analysis in this project.

Maine American Community Survey data was used as a baseline in this report to help describe the current state of the Maine region. Since Katahdin Woods & Waters was established in 2016, no decennial census data was needed or available for comparison. The variables explored for Maine were population, per capita income, education (percent of population with a bachelor's degree or higher), and percent of households receiving public assistance. These variables were explored at the census tract level. Hot Spot analysis was used with a neighborhood distance of fifty-thousand meters. False discovery rate (or FDR) was applied in all iterations of hotspot analysis for this project.

The sources for all vector format data used in this study can be found in Table A1 (see appendix).

Interview Methods

In order to be well informed on all perspectives, Lucas St. Clair, the son of Roxanne Quimby and President of Elliotsville Plantation Inc., was interviewed for this work. Mr. St. Clair was asked a series of open-ended questions in a telephone interview to illicit his motivations for being a part of creating the Katahdin Woods & Waters National Monument and what his vision for the future of the Katahdin Region of Maine looks like. This interview was conducted on February 15th, 2018 and was approved by the Clark University Office of Sponsored Programs and Research (IRB). Information from this interview is referenced using '(St. Clair)' in text.

Results

Hotspot Analysis
Oregon (Newberry National Monument)

In 1990, the area adjacent to the Newberry National Monument was not a statistically significant hot or cold spot in terms of education levels. This was also true in 2000. This indicates that the percentage of residents who had a bachelor's degree or higher was neither significantly higher or lower than adjacent areas both at the time of National Monument implementation and at the present day. The hotspot analysis results for the Oregon study area can be found in Figures 1-3.

In 1990, the census tracts located adjacent to and nearby the Newberry National Monument were classified as cold spots by this analysis for the income variable. This indicates that income values in this area near the National Monument were significantly lower than other areas of the state ($p<0.01$). By 2000, the census tracts closest to the National Monument were classified as 'not significant', meaning they were no longer considered a cold nor a hotspot by this analysis. This could indicate an increase, or that this area is no longer statistically significant as compared to its neighbors.

In 1990, the areas adjacent to this National Monument were considered a cold spot for the population density variable ($p<0.01$ and $p<0.1$, see Figure 3). This was the same in the year 2000. This simply indicates that this area was rural in 1990, and continued to be rural in 2000. There appears to have been no appreciable increase in population density.

Hotspot Analysis
Maine (Katahdin Woods & Waters National Monument)

The new Katahdin Woods & Waters National Monument is currently located in education cold spot ($p<0.1$). This indicates that the number of individuals with this level of education is

lower relative to other areas of the state. The largest hotspot for this area is located in Southern and Coastal Maine. The hotspot analysis results for the Maine study area can be found in Figure 4.

The per capita income of residents in the same census tract as the Katahdin Woods & Waters National Monument is not a significant hot or cold spot as compared to the rest of the State of Maine. However, it is important to note that nearby census tracts (to the East and South) are statistically significant cold spots ($p<0.01$, $p<0.05$). This indicates that areas near the new Katahdin Woods & Waters National Monument do have lower per capita income levels as compared to other areas of the state. The largest income hotspot for this area is located in Southern and Coastal Maine.

The population density of the census tracts near the Katahdin Woods & Waters National Monument is not a significant hot or cold spot as compared to the rest of the region. This indicates that the population is relatively consistent across the region. The largest population hotspot for this area is located in Southern and Coastal Maine.

The census tract containing the Katahdin Woods & Waters is not a significant hot or cold spot in terms of the percent of households receiving public assistance. However, it is notable that all four hotspot census tracts in the state of Maine for this variable are located nearby the new Katahdin Woods & Waters National Monument (See Figure 4).

Land Use/Land Cover Analysis Results

Three Rivers, Oregon (near Newberry National Monument)

Land use/land cover mapping was conducted for three time steps for this National Monument study area. The three time steps were just prior to implementation (1989), mid-point (1999), and present (2017). This study area was the town of Three Rivers, and a one mile buffer surrounding the town boundary. These findings can be found in Figures 5 and 6.

The results in this area indicate that there was no significant increase in developed areas (i.e. residential, commercial, paved areas) between implementation and the present day (a span

of 28 years). The figure, seen below, reflects a slight decrease in developed areas between 1989 and 1999, with this amount of developed areas staying consistent between 1999 and 2017. Water increased between 1989 and 1999, and decreased between 1999 and 2017. Natural land covers increased between 1989 and 2017.

Table 4: This table reflects the area (by acreage and percentage) of various land covers detected in Three Rivers, Oregon.

Land Cover	Area in Square Miles in 1989	Area in Percent in 1989	Area in Square Miles in 1999	Area in Percent in 1999	Area in Square Miles in 2017	Area in Percent in 2017
Water	2.78	9.13	5.19	17.08	2.92	9.60
Developed Areas	8.01	26.35	5.82	19.13	5.71	18.78
Natural Land Covers	19.62	64.52	19.40	63.79	21.78	71.62

Millinocket, Maine (Town near the Katahdin Woods & Waters National Monument)

The land use/land cover mapping completed for Maine was conducted purely to provide a baseline for how the largest town closest to the new National Monument looked at the time of implementation. The date of the imagery used for this mapping was August 23rd, 2016, just one day prior to the National Monument's establishment (The White House 2016). These results can be found in Figures 7 and 8.

The results at this study site indicate that the town of Millinocket (plus a one mile buffer surrounding the town boundary) is very rural and not highly developed at the time of National Monument implementation. Natural land covers and water make up almost 98% of this area, with less than 2% developed areas (i.e. residential, commercial structures, paved areas).

Table 5: Millinocket land/use land cover mapping results.

Land Cover	**Area by Square Mile**	**Area by Percent**
Natural Land Covers (forest, bare soil etc.)	33.17	81.18

Water	6.83	16.72
Clouds	0.07	0.18
Developed Areas	0.78	1.91
Total Area	**40.85**	**100.00**

Escalante, Utah (Grand Staircase-Escalante National Monument)

This National Monument study area was also examined at three points in time; implementation, a midpoint, and present day. This study area was the town of Escalante and a one mile buffer surrounding the town boundary. The results for the Utah study area can be found in Figures 9 and 10.

The amount of all other land covers varied only insignificantly. The amount of developed areas did not change significantly between the implementation of the nearby national monument and 2017. There was a slight increase between 1995 and 2008. However, this could be due to drier conditions (that would make developed areas more detectable). The analysis did detect three times less water in 2008 as compared to 1995. Developed areas did not increase substantially throughout the entire study period (2.81% to 2.83% from 1995 to 2017).

Table 6: Escalante classification results.

Land Cover	Area in Square Miles in 1995	Area in Percent in 1995	Area in Square Miles in 2008	Area in Percent in 2008	Area in Square Miles in 2017	Area in Percent in 2017
Agriculture	2.99	18.76	2.43	15.25	2.79	17.51
Water	0.37	2.34	0.13	0.84	0.18	1.13
Natural Land Covers	12.12	76.08	13.07	82.05	12.51	78.55
Developed Areas	0.45	2.83	0.30	1.86	0.45	2.81

Scottsbluff, Nebraska (Agate Fossil Beds National Monument)

These results for the Nebraska study area can be found in Figures 11 and 12. Natural areas experienced a net decrease between national monument implementation and present. Water was present at roughly the same amount in all time steps. Agricultural areas experienced a net increase through all time steps. Developed areas increased slightly between 1997 and 2008, with a decrease between 2008 and 2017. Developed areas experienced a net decrease between National Monument implementation and present day, which also shows that there was no appreciable increased in developed areas.

Table 7: Scottsbluff, Nebraska land cover results.

Land Cover	Area in Square Miles in 1997	Area in Percent in 1997	Area in Square Miles in 2008	Area in Percent in 2008	Area in Square Miles in 2017	Area in Percent in 2017
Water	1.05	4.85	0.91	4.19	0.99	4.56
Natural Land Covers	7.37	34.00	6.57	30.31	5.58	25.74
Agriculture	9.01	41.59	9.18	42.37	11.91	54.99
Developed Areas	4.23	19.55	5.01	23.13	3.19	14.72

Remote Sensing Error Assessment

Please see Table 8 below for the error assessment for 2017 classified images. Although it would have been ideal to conduct an error assessment on each image, the quality and dates of Google Earth Imagery made completing error assessments on images from the time of establishment and middle point images challenging. The quality of the historic imagery on Google Earth was low, and frequently there was no Google Earth Imagery available near the date of the chosen landsat imagery for fair comparison. In order to make up for the lack of error assessment on historic images, a visual assessment was conducted of the classifications. Differences between the images appeared to be logical, and the amount of land cover types was consistent and within believable ranges. For these reasons, the image classification is defensible.

Table 8: Error assessment results 2017 image classifications.

Study Area (National Monument)	Year	Accuracy Rate
Millinocket (Katahdin Woods & Waters), Maine	2016	93.3%
Scottsbluff (Agate Fossil Beds), Nebraska	2017	72.0%*
Escalante (Grand Staircase Escalante), Utah	2017	88.0%
Three Rivers (Newberry), Oregon	2017	83.0%

*The goal of this analysis was to have all images >80% accurate. However, this image was below that threshold. The most recent Google Earth imagery available for error assessment was 2014 (and the classification date was 2017), which very well could have contributed to this lower accuracy rate.

Discussion

This study examined three National Monuments established in the 1990's to determine if these National Monuments spurred growth in nearby communities. Consequently, this study can only speak to those three National Monuments and the changes in those selected regions. However, the fact that there was no distinguishable and statistically significant growth in these regions using a set of mixed methods and data sources, is concerning for all other National Monuments in the United States, including the Katahdin Woods & Waters National Monument.

Some things are not disputed in the context of the Katahdin Woods & Waters National Monument. One of these things is that the economy in Northern Maine has declined in recent decades due to the decline of the pulp and paper industry (Sharon & Inskeep 2016, Miller 2016).

A weak economy and rural character mean that the Katahdin Region of Maine does face a set of complex set of challenges in terms of reviving its economy and assuring its residents have a fair shake at providing for their families (Siemens 2007). The literature has identified that high labor costs and distance from the nearest interstate are strongly negatively related to business openings (Gabe 2007). The Katahdin Woods & Waters National Monument is far from the state's population, income and education hotspots (See Figure 4).

Businesses are also more likely to open in areas with at least a six month period of employment stability, which may be challenging for an area like rural Maine that experiences strong seasonality (Gabe 2007, Siemens 2007). Businesses like insurance companies, real estate, finance, and construction do not typically open in areas with unstable conditions (Gabe 2007). Mr. St. Clair expressed in his interview that one way the Katahdin region may address the problem of seasonality is pushing outdoor recreation in the winter time (St. Clair).

Another challenge of tourism in rural areas that could apply to the Katahdin region is that multiple rural communities end up competing against each other for the same tourism dollars

(Wilson et al. 2001). Some important factors to successful rural tourism identified by Dr. Suzanne Wilson in interviews with rural business owners included good community leadership, sufficient funds for tourism development, multiple tourism attractions within a community, cooperation between business owners, and widespread community support for tourism (2001). Interviews of business owners conducted by Dr. Lynne Siemens in rural areas of Vancouver Island found that self-reliance was important to rural business owners due to limited resources, and that rural business owners frequently did not have a lot of experience prior to opening their businesses (2007).

All of the above challenges are important to consider. However, they are only important to consider if people in the Katahdin region *want and support* a tourism-based economy in their communities, as was noted by Dr. Wilson's work that community support for tourism is vital (2001). Mr. St. Clair expressed in his interview that he believes the passage of time will reduce the current opposition (St. Clair). This may be true, but findings in the literature indicate that the manner in which Grand Staircase Escalante National Monument was created had a long term impact on how much the local community trusted the federal agencies involved in creating and managing it (Petrzelka & Marquart-Pyatt 2013).

The Katahdin Woods & Waters National Monument will not garner strong support without those who support the National Monument shifting their strategy. People attach meaning to their livelihoods (Bebbington 1999), and it seems as though this may have been forgotten by National Monument advocates. "Peoples' assets are not merely *means* through which they make a living: they also give *meaning* to a person's world" (Bebbington 1999, pg. 2022, author's original emphasis). A dramatic shift in the economy in Northern Maine will naturally encounter resistance due to this attachment of meaning that was identified by Bebbington (1999). The GIS findings of this study indicate that there were minimal to no increases in visible benefits in the selected communities near National Monuments, making an increase in support even less likely. Additionally, with the establishment of many National Monuments, the previously privately-held land is taken off the tax rolls which further reduces the potential for state or government investment in infrastructure (Vincent & Baldwin 2016). The literature has identified that lack of community infrastructure is one of the biggest challenges for rural business owners (Siemens

2007). Mr. St. Clair expressed in his interview that there is a payment in-lieu of taxes (or PILOT) program in place for the Katahdin Woods & Waters National Monument (St. Clair). This does address the issue of a shrinking tax base that was expressed by Vincent & Baldwin (2016), but it will only do so if the PILOT program described by Mr. St. Clair is sustained through time.

Growing up in Maine, I have become familiar with the colloquial saying 'you can't get there from here'. This phrase simply means that you're going to have to turn around to get to your desired destination. Supporters and advocates of this National Monument can't get to their goal from where they are. Across all sets of methods, data sources and study areas employed by this study, the National Monuments examined here did <u>not</u> spur physical or economic growth in nearby communities. Additionally, local residents near the Katahdin Woods & Waters National Monument have time and again expressed that they do not support this National Monument (see quotes in Introduction section). Three out of four of Maine's United States Congressional Representatives expressed their opposition to this National Monument designation, yet this local input was not taking into account by the Obama administration (Miller 2015). Continuing down the current route of hoping that the Katahdin Woods & Waters National Monument will produce visible results that will garner greater support over time is not an effective way to build this community.

So, where do we go from here?

Secretary Zinke's recommendations included allowing timber harvesting on in the National Monument (Miller 2017). Allowing timber harvesting could be a way to encourage economic growth in this area, but with the recent downturn of the pulp and paper industry in this area (Sharon & Inskeep 2016), this recommendation is unlikely to have any resoundingly strong and sustained economic effect. Zinke also recommended allowing snowmobiles on the property, which would also address local opposition of that activity being restricted on this land (Miller 2017). There are hopes for increases in foot traffic and business in the area (Miller 2017), but these hopes do not line up with the data supported findings of this report. It is possible that the

controversy and news coverage has brought in some temporary visitors (Miller 2017), but based on the results of this report, long term, sustainable, economic improvement due solely to the presence of the Katahdin Woods & Waters National Monument is unlikely.

Secretary of the Interior Ryan Zinke expressed during his visit to Maine to review the National Monument that "...the solutions should be made-in-Maine solutions, not made-in-Washington solutions" (Miller 2017). This suggestion of local solutions (Miller 2017) is promising.

There is a chance, perhaps not under the current administration, that the Katahdin Woods & Waters National Monument could become a National Park, since many National Monuments do become National Parks (Sanders 2016, Vincent & Baldwin 2016). Afterall, Acadia National Park, now one of Maine's biggest tourist attractions, began as Acadia National Monument (Miller 2017, Sambides 2016). However, a future change from National Monument to National Park could stir up all this controversy once again. Mr. St. Clair is currently running for United States Congress (Floyd 2017), and expressed a desire in his interview to support changing the Katahdin Woods & Waters National Monument into a National Park (St. Clair).

Only three presidents have opted out of creating a National Monument since the Antiquities Act was passed: Presidents Ronald Reagan, Richard Nixon and George H.W. Bush (Sanders 2016). Given the Trump Administration's review of National Monuments (Miller 2017) and President Trump's conservative platform, it is not likely that this country will get any new National Monuments during his administration. This gives policy makers (i.e. the United States Congress) time to reconsider previously suggested reforms to the Antiquities Act of 1906, like requiring greater public participation or Congressional approval (Sanders 2016), before more communities have to muddle through this challenge.

Figures

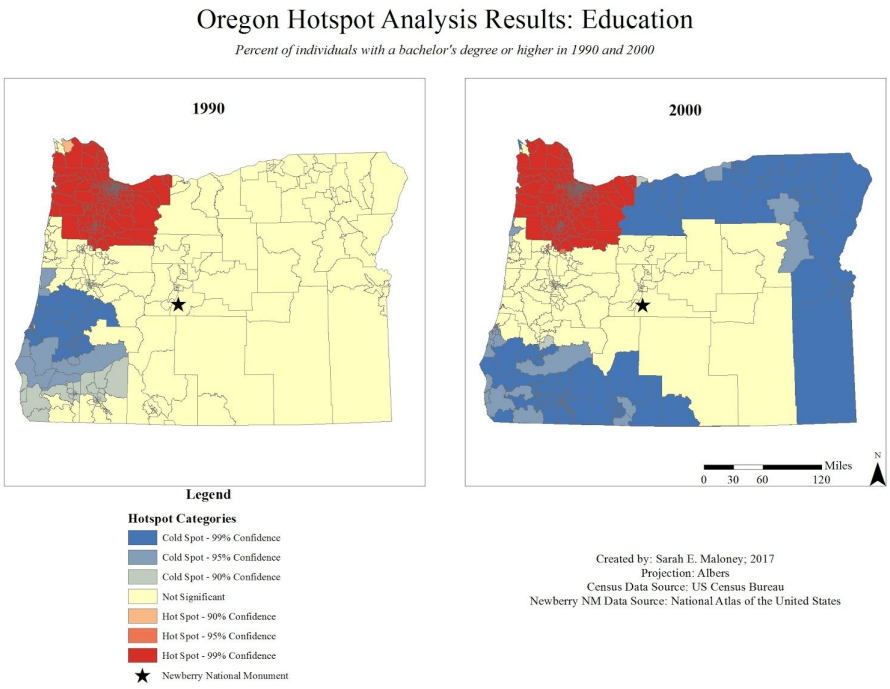

Figure 1: Oregon hotspot analysis results for education variable (percent of individuals with a bachelor's degree or higher).

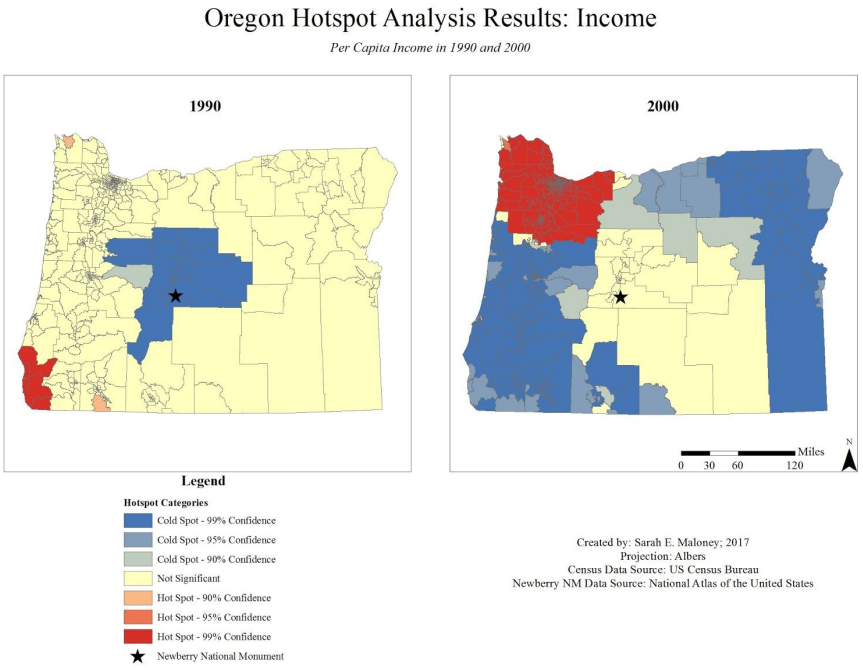

Figure 2: Oregon hotspot analysis results for the income variable (per capita income).

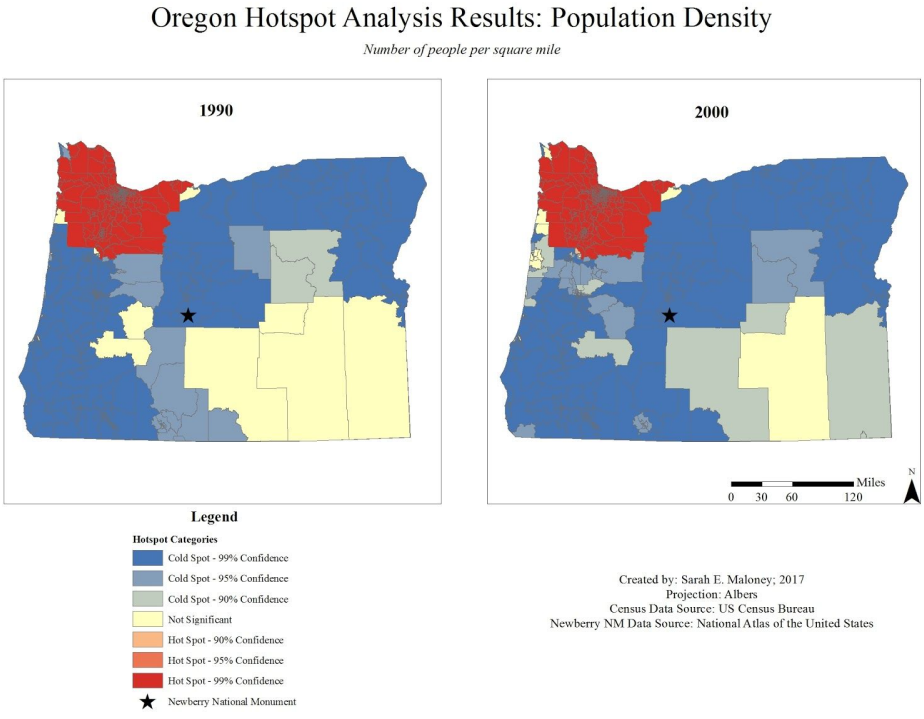

Figure 3: Oregon hotspot analysis results for population variable (people per square mile).

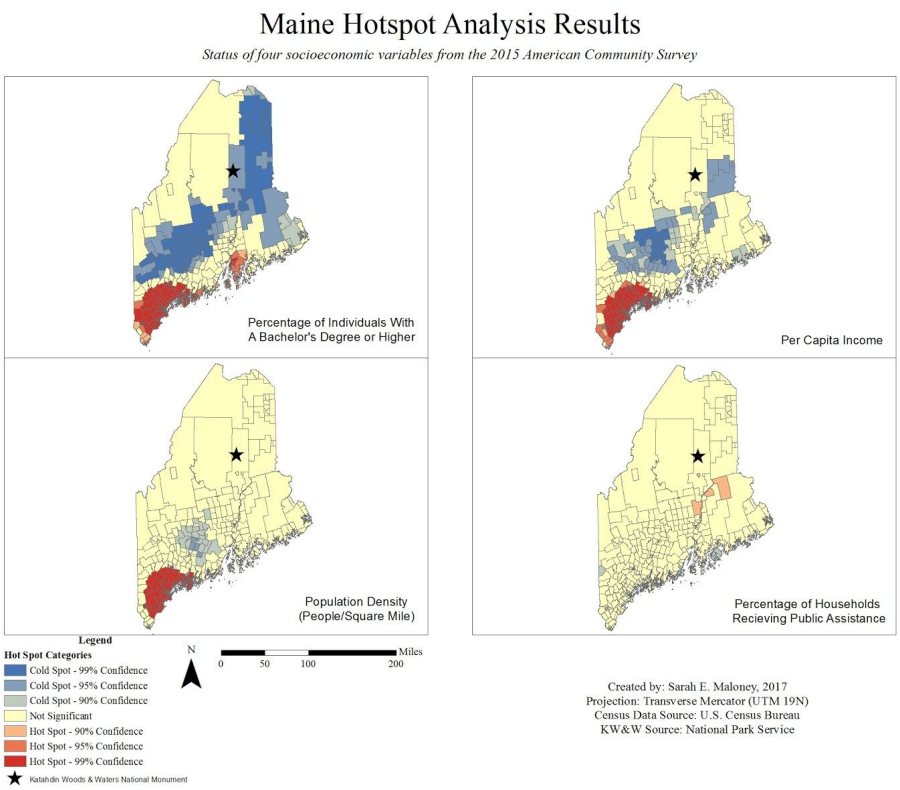

Figure 4: Maine Hotspot Analysis results.

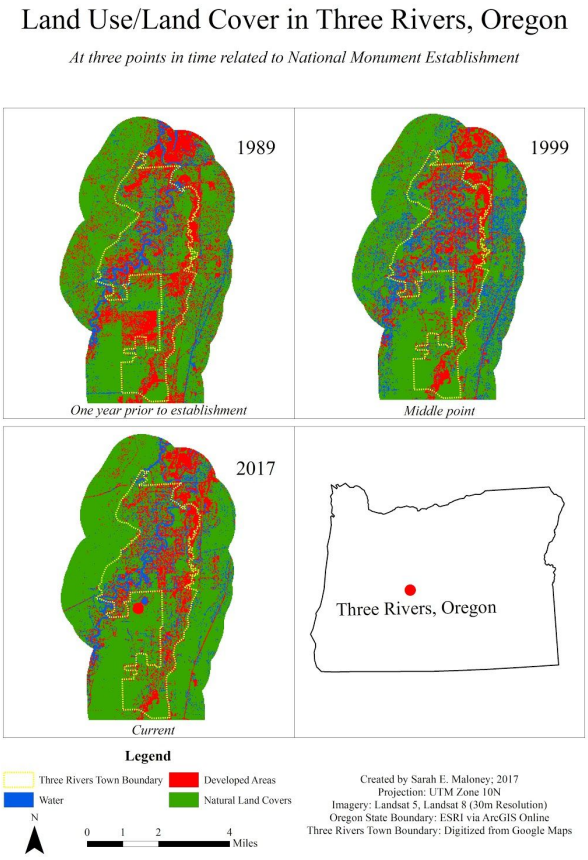

Figure 5: Three River Oregon remote sensing classification. Three Rivers Oregon is located near Newberry National Monument. Imagery data sourced from USGS Earth Explorer.

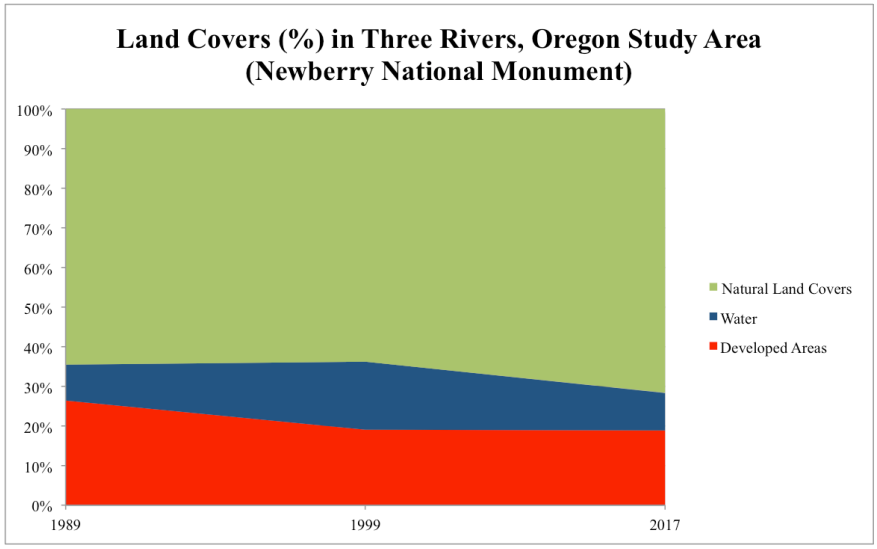

Figure 6: Land cover types (by percentage) in Oregon study area.

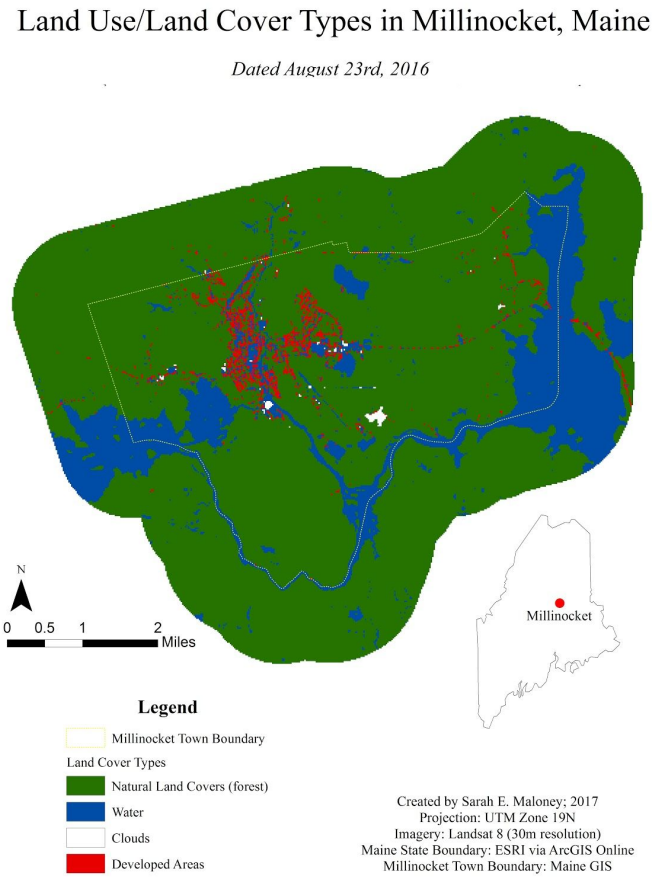

Figure 7: Land Use/Land Cover classification of Millinocket plus a one mile buffer around the town boundary. Imagery sourced from USGS Earth Explorer.

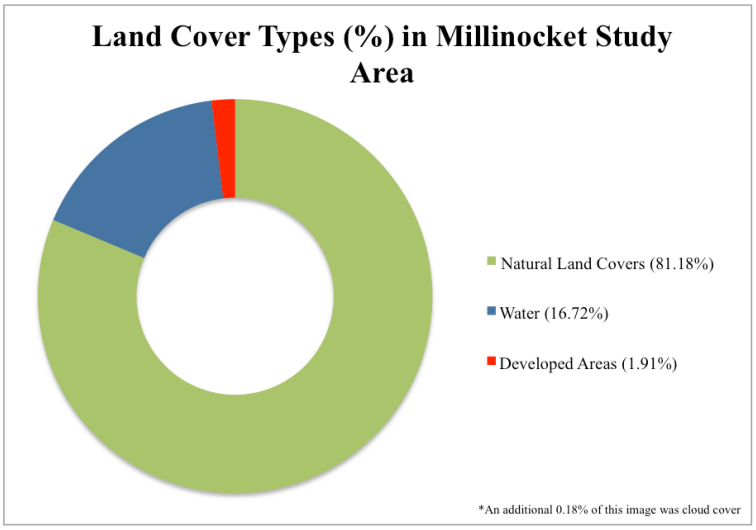

Figure 8: Land cover types by percent in Millinocket study area (clouds excluded).

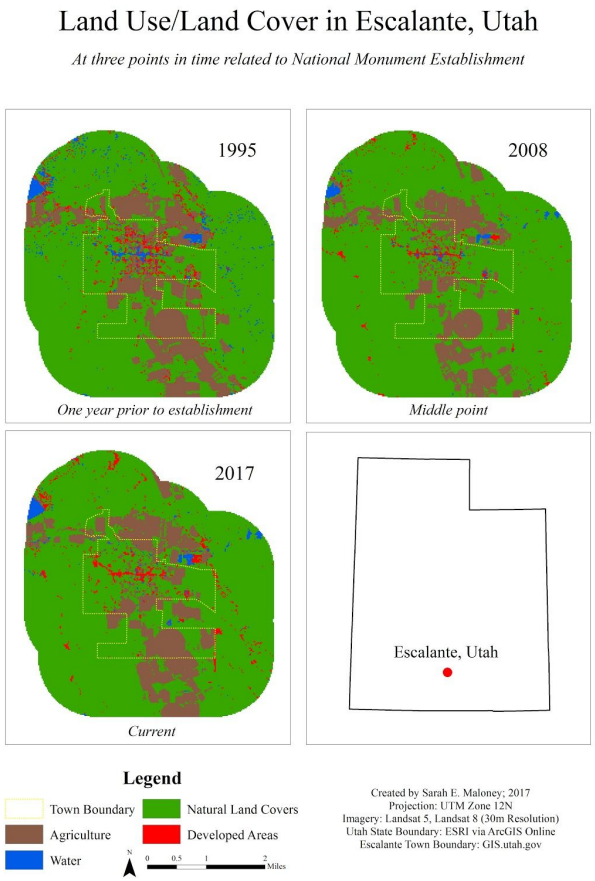

Figure 9: Land use/land cover classifications for the Escalante, Utah study area. Imagery sourced from USGS Earth Explorer.

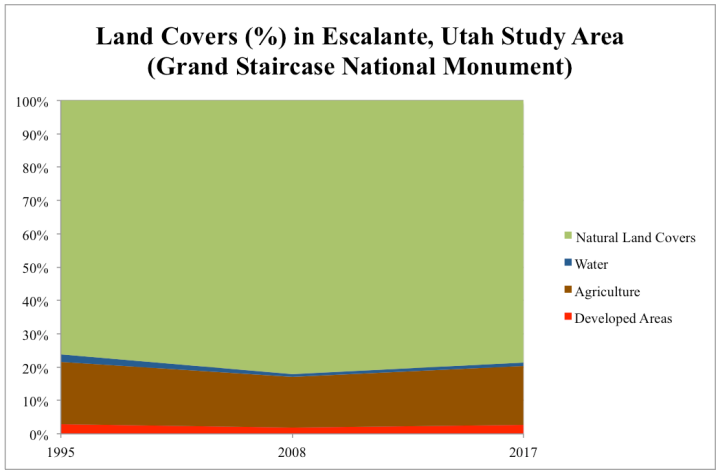

Figure 10: Summary of Escalante, Utah, land covers by percentage.

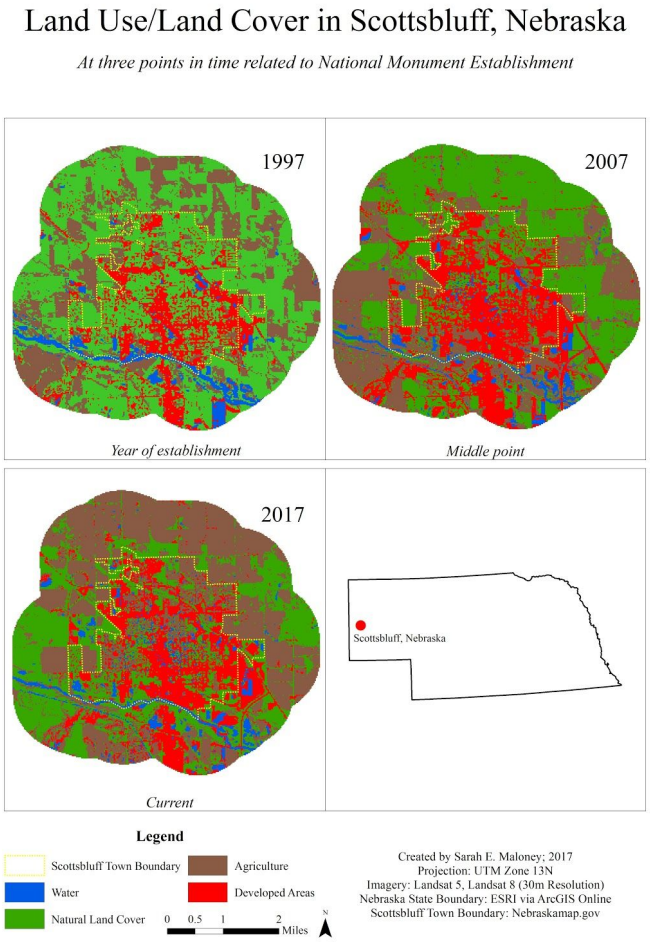

Figure 11: Scottsbluff, Nebraska land use/land cover classifications. Imagery sourced from USGS Earth Explorer.

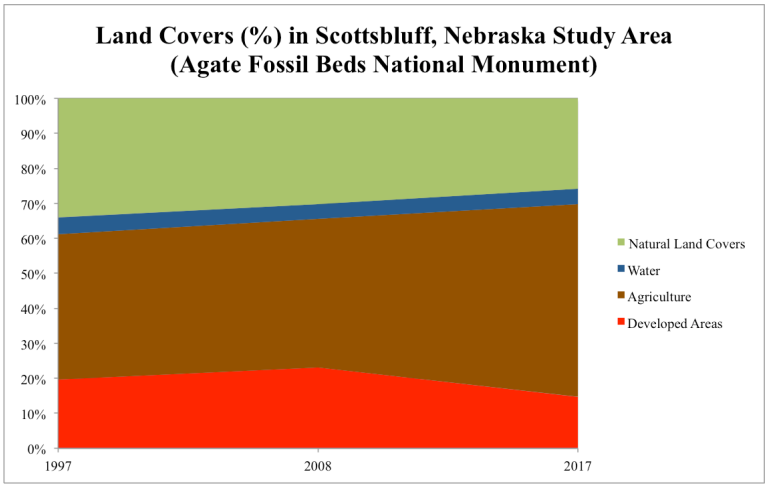

Figure 12: Scottsbluff, Nebraska land cover by percentage.

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Appendix

Table A1: Vector Data Sources

Data	Source
Oregon Census Tracts & Socioeconomic Data (1990, 2000)	US Census Bureau via National Historic GIS (nhgis.org)
Maine Census Tracts & Socioeconomic Data (2015)	US Census Bureau via National Historic GIS (nhgis.org)
Scottsbluff, Arizona town boundary	Digitized from Google Maps & ESRI Basemap
Millinocket, Maine town boundary	MaineGIS (maine.gov/megis)
Escalante, Utah town boundary	Utah AGRC (gis.utah.gov)
Three Rivers, Oregon town boundary	Oregon Spatial Data Library (spatialdata.oregonexplorer.info)
Katahdin Woods & Waters National Monument Location	National Park Service (park boundaries from irma.nps.gov/DataStore/)
Newberry National Monument Location	National Atlas of the United States (federal lands shapefile)