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Growth Management Planning's Effects on Employment Trends in Washington  
State Rural Counties

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**Abstract**

Growth Management Planning's Effects on Employment Trends in Washington  
State Rural Counties

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About half of Washington State's rural counties plan under the state's Growth Management Act (GMA) while the remainder do not. Part of Washington State's Growth Management Act (GMA) mandates comprehensive planning for rural areas to protect agricultural lands and concentrate new development within existing developed areas and townships. During a recent statewide review of the GMA, stakeholders in rural Washington State counties argued that the limitations set by GMA rural land use regulations have negatively affected the economic viability of rural counties.

This research compares employment trends between rural counties that plan under the GMA to counties that do not. It begins with a case study comparing the employment trends in Stevens County, a rural county that voluntarily opted into following the GMA planning statute,

compared to employment trends in Okanogan County, a rural county that chose not to plan under the GMA. This is followed by a comparison of combined employment data from multiple rural counties grouped by GMA planning or non-planning status.

An interrupted time series analysis (ITSA) is conducted on quarterly data from 1993 through 2017 on county level employment for both Stevens and Okanogan counties, as well as groupings of rural GMA planning and non-planning counties. The ITSA tests if the 1997 enactment of RCW 36.70A.070(5) is statistically correlated to a change in employment trends. This statute designates what is allowed to be built in Limited Areas of More Intense Rural Development (LAMIRDs), a GMA rural land use planning option used in most Washington planning counties. This analysis is done to test if the claim that GMA rural land use regulations have negatively affected economic viability in Washington's GMA planning rural counties compared to counties that do not plan.

The results of the ITSA show that the enactment of RCW 36.70A.070(5) is statistically correlated to a negative change in employment trends in Stevens County which opted in to planning under the GMA. However, when Stevens County employment data is combined with data from the other GMA planning rural counties of Douglas, Pacific, and Franklin there is no correlation with employment change. This suggests that the employment figures in Stevens County are an outlier from the general trend of GMA planning rural counties. In fact, the average employment for the combined data from GMA planning rural counties has a consistent positive trend from 1993 to 2017.

Compared to Okanogan, Lincoln, and Klickitat, the rural counties that do not plan used in this study, the GMA planning counties are performing better in employment growth. The non-planning rural counties did not see overall growth on average employment even though they are

not subject to state regulated growth management land use planning. This contradicts the argument that GMA land use planning is negatively affecting the economic viability of rural counties.

The results of this study show that rural counties planning under the GMA are having better economic outcomes than rural counties that do not plan. Thus, the non-planning rural counties are not seeing comparatively stronger employment growth and they are not protecting their lands through growth management planning.

However, this does not mean that the GMA rural land use policies are being effective at increasing employment. The ITSA model showed no correlation to employment change in either direction. For Washington State it is time to reevaluate how rural land use planning can be paired with rural economic development in order to promote new industry that is viable in exclusively rural counties. This should be done in order to encourage more rural counties in Washington to begin planning under the GMA to further protect the natural lands of the state in addition to supporting their economies and communities.

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# Chapter 1. INTRODUCTION

## 1.1 RURAL PLANNING IN WASHINGTON STATE

In the US, urban expansion claimed more than 1 million acres of rural land per year between 1960 and 1990 (Heimlich and Anderson 2001). Washington State lost 800 thousand acres in farmland between 1982 and 1992 (Washington State Census of Agriculture, 2012). This rapid urbanization of land played a part in Washington State's decision to enact statewide growth management regulation in 1990 under the Growth Management Act (GMA).

The GMA legislation addressed many facets of strategic growth and included a rural element, RCW 36.70A.070(5), which set specific limitations on rural growth and industry. This new rural element in the legislation was broad, and many counties needed more guidance on how to plan for rural areas and business. An amendment was made in 1997, RCW 36.70A.070(5)(d), to help clarify the state's goals in rural planning. These provisions acknowledged the existence of certain lands in the rural area that had already been developed with a more intense pattern, but at the same time adopted a policy of preventing these places from becoming nodes of urban development in the rural area, i.e., sprawl.

The focus of this research is on that amendment. It allows "Limited Areas of More Intense Rural Development" (LAMIRDs), a land use designation that Washington State's GMA created as an option for counties. LAMIRDs were created to help serve one of the GMA's main goals to "reduce sprawl and reduce the inappropriate conversion of undeveloped land into sprawling, low-density development" (RCW 36.70A.020) but at the same time offer economically viable land use options for rural areas.

The LAMIRD provision has been the subject of controversy and several appeals by parties alleging that certain counties have violated the Act's requirements. To date, 91 cases involving LAMIRDs have been brought to the state's Growth Management Hearings Board, a quasi-judicial agency that hears and determines findings regarding allegations that a city, county, or state agency has not complied with the goals and requirements of the GMA (State of Washington Growth Management Hearings Board, 2019). Prior to passage of the GMA in 1990, most Washington counties had existing areas of more intensive development in their rural areas, such as unincorporated hamlets, villages, crossroads, shoreline development or other areas built or vested. These places were difficult to reconcile with new GMA regulations concerned with preserving rural areas and concentrate growth. Being designated as LAMIRDs meant their boundaries and land uses permitted by the new law could not change from their 1990s form in terms of use, intensity, and area.

Grievances about the GMA's limitations on what can and cannot be developed in LAMIRDs were expressed by some parties during the preliminary phase of the "Road Map to Washington's Future" project undertaken by the William D. Ruckelshaus Center. The William D. Ruckelshaus Center is a joint effort of Washington State University and the University of Washington, created to foster collaborative public policy in the state of Washington and Pacific Northwest. The "Road Map to Washington's Future" project's purpose is to articulate a vision of Washington's future and identify additions, revisions, or clarifications to the state's growth management framework of laws, institutions, and policies needed to reach that future. The project interviewed individuals, groups, multi-sector representatives, elected officials, and regional organizations from every county in Washington State to articulate the vision for the state's future. In the "Preliminary Assessment Report" issued in 2016, a number of parties brought up issues that

were of interest or concern to them, to illustrate why a process examining Washington’s growth management framework was both timely and important. This report included over 50 issue statements. One of the issue statements that had been offered by some parties during preliminary discussions was “Regulatory limitations related to Limited Areas of More Intense Rural Development (LAMIRD) stifle reasonable development and vitality in rural counties” (Tovar and Murphy 2017)<sup>1</sup>.

The challenge for Washington’s rural areas and counties is to facilitate new economic uses that are viable in low-density, more remote rural locations that lack an urban level of services and facilities. Participants in the Road Map to Washington’s Future study commented that planning under the rural land use laws of the GMA make this more difficult due to the restrictions on land use and intensity of development. The LAMIRD provisions provide that any new development should be built in a manner compatible with rural character as well as resource and critical areas protection goals. This, some respondents in the Road Map to Washington’s Future study have argued, has hampered economic and potentially housing opportunities in these areas.

## 1.2 DESCRIPTION OF LIMITED AREAS OF MORE INTENSE RURAL DEVELOPMENT (LAMIRDS)

There are three types of LAMIRDS designated in the GMA each with specific allowable land uses. No other type of development can occur in rural areas besides what is specified in the three types. The LAMIRD land use option was not originally written into the GMA statute in 1990.

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<sup>1</sup> The characterization and phrasing of this statement is by the parties who offered them, and does not reflect any judgment by Tovar, Murphy, or other William D. Ruckelshaus Center staff regarding the merits, relative priority, or desired outcomes regarding these issues.

It was enacted in 1997 by the passage of Senate Bill 6094 Chapter 429 to clarify what type of development is allowed in rural areas.

- **Type 1 LAMIRDs** are a “rural development consisting of the infill, development, or redevelopment of existing commercial, industrial, residential, or mixed-use areas” (RCW 36.70A.070(5)(d)(i)). This type of development must be intended to serve the existing population. Most importantly “any development or redevelopment in terms of building size, scale, use, or intensity shall be consistent with the character of the existing areas” (RCW 36.70A.070(5)(d)(i)(C)).
  - “Existing areas” is the key term in this statute since it is defined as “an area or use that was in existence on July 1, 1990” (RCW 36.70A.070(5)(v)(B)). It has been interpreted to mean that in LAMIRDs no new development can be different in size, scale, or use than what was there in 1990.
- **Type 2 LAMIRDs** allow “small-scale recreational or tourist uses” but does not allow for new residential uses (RCW 36.70A.070(5)(d)(ii)). For example Douglas County, which is included in this study, designates a Type 2 LAMIRD “Rural Recreation District” in Chapter 18.27 of its municipal code which allows activities like horse riding stables, bed and breakfasts, or wineries with tasting rooms. This is just one example, many counties in Washington State designate Type 2 LAMIRDs for a variety of recreation specific to their environments.
- **Type 3 LAMIRDs** allow for “isolated cottage industry or isolated small-scale industry” that does not serve the existing population but does provide job opportunities of rural residents (RCW 36.70A.070(5)(d)(iii)). These developments must be located on sites of existing commercial or industrial uses.

The GMA also has accommodations for counties to permit fully contained “Master Planned Resorts” (RCW 36.70A.360), “Major Industrial Developments” (RCW 36.70A.365), and “New Fully Contained Communities” (RCW 36.70A.350) that can potentially be located in rural lands.

### 1.3 RESEARCH QUESTIONS

The 1997 enactment of RCW 36.70A.070(5) allowed certain permitted uses in LAMIRDs which raises the following questions.

- After the 1997 LAMIRD amendment specified permissible land uses in rural areas did Stevens County, which opted into planning under the GMA, experience employment changes in industries associated with those land uses?
- What were the trends in those same industry sectors in Okanogan County, a comparable county to Stevens in population size and geographic location, which chose not to plan under the GMA and thus serves as a control case?
- Lastly, are employment trends before and after RCW 36.70A.070(5) consistent across groups of rural counties that chose to opt-in to GMA planning and those that chose not to plan under the GMA?

The assessment of these questions will determine if GMA rural land use regulations had a correlated effect on employment trends in the industries that are allowed under the LAMIRD statute RCW 36.70A.070(5). The results will also show if these effects are county specific or occurring across rural counties of similar GMA planning status. This analysis will address the statement posed in the Road Map to Washington’s Future study: do the LAMIRD land use regulations stifle reasonable opportunity for employment rural counties?

## 1.4 METHODS

An interrupted time series analysis of employment trends before and after the passage of the 1997 statute RCW 36.70A.070(5) in the allowable industries specified for LAMIRDs was conducted.

Total employment, small business employment, and recreational employment time series data from 1993 to 2017 is used in this study. These employment numbers relate to the allowable industries described in Type 1, Type 2, and Type 3 LAMIRDs. Employment numbers will be compared between Stevens County that opted in to GMA and Okanogan County that chose not to plan under the GMA, as well as groupings of multiple rural counties that opted into GMA planning and counties that chose not to plan. This analysis will help identify if the claim of LAMIRD regulation stifling reasonable development in these counties has statistically significant support. If the research gives support to this claim, then these selected counties are potentially places where accommodations in permitted land use and form could possibly be beneficial.

## Chapter 2. LITERATURE REVIEW

### 2.1 BACKGROUND

The reasons why LAMIRDs, and rural planning in general, should be studied in Washington was identified during the preliminary phase of the “Road Map to Washington’s Future” (RMWF) project undertaken by the William D. Ruckelshaus Center. With the goal of taking a comprehensive look at the Growth Management Act (GMA), which has been in place for 25 years without a government sponsored formal assessment, the RMWF project surveyed stakeholders in every planning county in the state about the legislation. A preliminary assessment report issued by the Center in 2016 included a comment that had been offered by some parties during preliminary discussions: “regulatory limitations related to Limited Areas of More Intense Rural Development (LAMIRD) stifle reasonable development and vitality in rural counties” (Tovar and Murphy 2017)<sup>2</sup>. This shows a dissatisfaction with state policies regulating rural planning. It indicates that the GMA regulations, written in 1990, might not be meeting the emerging needs and challenges of rural counties and their communities. The goal of this study is to determine if this statement is valid. Are rural counties that use LAMIRDs experiencing economic decline while those who do not experience more prosperity?

A review of relevant literature shows the need for rural planning in the United States. Growth patterns over the past several decades have shown that the consumption of rural lands for amenity driven low density residential development is rising. This is especially true in the

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<sup>2</sup> The characterization and phrasing of this statement is by the parties who offered them, and does not reflect any judgment by Tovar, Murphy, or other William D. Ruckelshaus Center staff regarding the merits, relative priority, or desired outcomes regarding these issues.

Northwest and factored into the passage of the GMA. At the same time, jobs for traditional resource or agricultural based industries are declining and rural areas are expressing the need for new employment opportunities. In an effort to protect rural lands from being consumed by sprawling development, has Washington State hurt employment options that provide vitality to some rural communities?

## 2.2 DEFINITIONS OF RURAL

What is rural character? It is a concept that is complex and has proven difficult to understand at the many levels of government that attempt to plan for rural areas. In the US Census data utilized in this research, the geographic area analyzed is defined as a “nonmetropolitan county”. Based on the US Census, rural encompasses all population, housing, and territories not included within an urban area. Whatever is not urban is considered rural.

The simple definition of rural areas as land outside cities devalues the incredible diversity, within and across rural areas due to differences in natural landscapes and resources, economies, population and development patterns, ethnic and cultural legacies and immigration, and regional context (Hodge and Monk 2004).

The Growth Management Act takes a wider approach in its Rural Element (WAC 365-196-425) by allowing counties to construct their own definitions of rural character. However, counties must follow some GMA rural guidelines listed as:

- (i)** Allow open space, the natural landscape, and vegetation to predominate over the built environment;
- (ii)** Foster traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas;
- (iii)** Provide visual landscapes that are traditionally found in rural areas and communities;

- (iv) Are compatible with the use of land by wildlife and for fish and wildlife habitat;
- (v) Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development;
- (vi) Generally do not require the extension of urban governmental services; and
- (vii) Are consistent with protection of natural surface water flows and ground water and surface water recharge and discharge areas.

While all of these elements are connected to rural aspects, these definitions are broad and perhaps could be altered to recognize the differences between rural areas that are found in Washington State and elsewhere. Thomas Daniels and Mark Lapping identify two distinct rural regions that are important to consider in policy making. They are the rural-urban fringe and the remote rural areas (Daniels, Lapping 1996).

The rural-urban fringe regions, 10 to 40 miles (and sometimes farther) outside of major metropolitan centers, are America's primary recipients of population growth and land use change. The rural-urban fringe faces the threat of homogeneous, monotonous housing and commercial development, which can engulf entire communities and transform landscapes and local economies virtually overnight. By contrast, inhabitants in remote or "deep" rural areas lag behind the nation as a whole in income, educational attainment, quality of housing, employment opportunities, and the provision of health care and social services. Many remote communities continue to suffer from a gradual exodus of younger people and a chronic deterioration in the transportation, health, and educational services fundamental to a decent quality of life (Daniels, Lapping 1996).

Washington State could potentially benefit from considering these two different types of rural areas in its statewide GMA planning. The state is home to both rural-urban fringe communities and remote rural communities, however the GMA gives counties the same rural elements and land uses tools to plan with. A new approach that identifies the different needs of the

two types of rural communities and allows for a variety of approaches could help address the economies, land use needs, and environmental protections specific to each region.

### 2.3 RURAL PLANNING IN THE UNITED STATES

What is the appropriate balance between rural preservation and rural community development? This is a question Washington State has tried to answer through growth management regulations, though the topic dates back over a century in the USA. It is important to recognize the history of rural development in the USA since it gives context to the current state of rural lands and informs an analysis of the GMA Rural Element and LAMIRD approaches to rural planning.

The United States has a long history of being a rural nation, especially in the West. The spacious country and abundant resources encouraged expansion and colonization from coast to coast. The vast country offered many settlers land off which they could live. To most, the term rural suggests an image of spacious country, quaint settlements, farming, and ranching as the predominant industry. This bucolic image still exists in many places; however, the rural US has vastly changed in the modern era.

After WWII the American rural landscape became one of production. Industrialization was brought to farming and livestock, timber, mining and energy production, fishing areas, and manufacturing (Lapping, Daniels, and Keller 1989). Over the next several decades, changes in rural land use were driven by new economic and social factors. From 1950 to 2000 growth patterns happened in two distinct eras. 1950 to 1970 was a period marked by urban growth, with little or no rural growth (Brown et al. 2005). Rural populations were attracted by economic and social opportunities in urban centers. At the same time, there was a decline in rural job opportunities due

to the replacement to labor with the mechanization of agriculture and resource industries along with increased competition from newly globalized trade (Johnson and Fuguitt 2009).

In the 1970's rural growth outpacing urban growth for the first time in 150 years (Fuguitt and Beale 1996). This trend was attributed to the demand for natural amenities, open space, and recreational opportunities (Census of Agriculture 2005). Brown et. al. in 2005 found that the "Northwestern Forested Mountains region between 1970 and 2000 exemplifies the increasing importance of amenity driven development more than any other region in the United States." The authors state that the Northwest states "with their forested landscapes, beautiful mountains in the West and East, and plentiful inland lakes in the North, coupled with the increasing importance of non-economic factors in the location decisions made by many Americans, these regions began developing at more rapid rates than in the past". Though population gains were small, the increase in ex-urbanized area was relatively dramatic. By 2000, across the United States, the area of low-density exurban development beyond the urban fringe occupied nearly 15 times the area of higher density urbanized development (Census of Agriculture 2005).

The result has been the extensive loss of productive rural lands. A 2001 study on the impact of exurban development on agricultural and rural lands found that crops near urban areas are particularly vulnerable to development. "61 percent of U.S. vegetable production is located in metropolitan areas" (USDA Economic Research Service n.d.). Furthermore, "Nationally, farms in metropolitan areas are an increasingly important component of U.S. agriculture. In 1997, they made up a third of all farms and controlled 39 percent of farm assets." The researchers also found that farms in metro areas are generally smaller, produce more per acre, have more diverse enterprises, and are more focused on high-value production than non-metro farms. At the same time, the remote rural regions continued to lose population. According to the USDA, one in four

rural counties saw a drop in population between 1990 and 2000, primarily due to declining farm employment, remoteness from metropolitan areas, and a lack of amenities (USDA Economic Research Service n.d.).

This research gives support for the need to rethink rural planning to consider both the rural-urban fringe and the remote rural regions. Protection of agricultural lands on the metropolitan fringe from the development pressures is important to the food systems of urban areas and to employment and industry unique to rural areas. However, attention must also be given to the struggles of remote rural regions that are losing industries, employment, and population.

Literature and research were present on sustainable and community focused rural planning, though rural areas were rapidly being consumed by urban development. In 1970 “Planning in Rural Areas” (Hahn 1970) was published in *The Journal of the American Planning Association*. In 1980, the American Planning Association (APA) started its Small Town and Rural Planning Division which is still active today. In addition, books documenting rural planning across the nation were published like Lapping, Daniels, and Keller’s *Rural Planning and Development in the United States* (1989), the same authors who have published multiple editions of the *Small Town Planning Handbook* (1988, 1995). However, in a 2014 review of rural planning literature by Kathryn Frank and Sean Riess, the researchers found that “the number of rural planning articles published in planning journals has remained flat since the 1980s, at less than ten per decade, including the projected level for the 2010s” (Frank and Reiss 2014). It is apparent that there is a foundation in literature and practice for rural planning, however, it has not found its way into mainstream planning thought. Frank and Reiss conclude that planning largely approaches rural communities as scaled down cities, as cities-in-waiting, or as obsolete, dying places (Frank and Reiss 2014).

There is potential for rural planning to experience a renaissance due to the intensifying needs in rural communities and regions, and associated movements toward sustainability. Currently, rural planning lies at the margins of a discipline that largely identifies with cities. The rural landscape is a location for a range of important planning issues including climate change, food and energy security, biodiversity, amenity for recreation and tourism, and environmental justice (Frank and Hibbard 2017). In practice, it seems like these potentials have yet to be realized and the lack of planning for rural areas, both near cities and in remote areas, have resulted in the conversion of rural, agricultural, and open space landscapes into sprawling suburban and exurban housing development.

## 2.4 RURAL PLANNING IN WASHINGTON STATE

Washington State has legislation aimed to address rural community planning and open space preservation with varied success. It mandates local planning as part of statewide growth management legislation, established in part to protect rural resources, economies, and lifestyles. Washington's Growth Management Act requires that counties planning under the GMA to designate rural areas (neither metropolitan nor primarily working lands) for which they craft a "rural element" in their comprehensive plans for the purpose of shaping development patterns in these areas (Washington State 1994).

However, the subsequent comprehensive plans created by Washington counties have not completely contained urban development. In a study of the GMA's effect on urban growth it was found that the Puget Sound region "underwent a large increase in urban land between 1986 and 2007, at the expense of grass, agriculture, and lowland deciduous and mixed forest.... Consistently across all dates, the percentage of new urban land that fell outside of the UGB was larger than the

percentage of new urban land that fell within the UGB (Urban Growth Boundary)"(Hepinstall-Cymerman, Coe, and Hutyra 2013). This trend could be attributed to the continued demand for the natural amenity-led development that was identified in by Brown et. al. in 2005.

Another reason for continued development outside urban growth areas could be that counties have struggled to enact state mandated GMA legislation, and the desired gains from growth management planning are lagging. As found in a 1997 report on rural areas in Washington, "many counties have found it difficult to interpret the requirements of the Growth Management Act (GMA) regarding permissible rural growth or to satisfy the Growth Management Hearings Boards that they have correctly planned for rural areas"(Kosterlitz 1997). There appears to be a disconnect in the rural planning goals of the GMA and how it is being applied by some Washington counties in their comprehensive plans.

The same report found that many of the resource industries that have traditionally provided jobs and income to rural residents have cut back operations or even disappeared (Kosterlitz 1997). This conclusion is supported by findings in the 2017 Road Map to Washington's Future study where many rural residents expressed a need for more employment opportunities and convenient services in rural areas (Tovar and Murphy 2017). These two studies suggest that there are changing economic and social factors in some of Washington's rural areas. The problems experienced by rural areas on the periphery of urban areas are very different than the problems experienced in the deep rural regions of the state. The former is fighting off the development pressures from urban residents while the latter is struggling to find economic opportunities and maintain population. These apparent differences should solicit different planning approaches.

The pressures on rural lands around urban areas seem to be the defining factor in Washington State's rural land use regulations. The huge loss of agricultural land around the Puget

Sound and other metropolitan counties in the latter half of the 20<sup>th</sup> century was indeed a concern and required strict regulatory action when the GMA was passed in 1990. The creation of growth boundaries to rein in development and protection of rural areas was important for sustainable growth in the state. Yet, it seems to be that the statewide legislation was written with a focus on growth patterns in metropolitan regions around the Puget Sound and perhaps has hampered reasonable development in rural counties that are not experiencing similar growth pressures, as expressed in the comments in the “Road Map to Washington’s Future” report.

The literature suggests there is a need to evaluate the results of rural planning regulations in land preservation and economic development. The costs in farming and forest lands on the urban fringe is concerning in light of the findings by Heimlich and Anderson that urban expansion claimed more than 1 million acres of rural land per year between 1960 and 1990. It is these rural lands, character, and agricultural lifestyle that the GMA’s rural element intended to protect. At the same time, the loss of traditional rural job opportunities shown in the Kosterlitz article reveals a changing economic reality that needs to be considered in determining what the future of industry and development for rural areas can be. An analysis of how GMA regulations are affecting deep rural counties is warranted to determine if regulation focused on protecting rural lands around metropolitan regions has potentially limited reasonable employment opportunities in predominantly rural counties which are not facing the same growth pressures.

The challenge of rural planning in Washington under the GMA is how to accommodate the demand for a rural lifestyle near metropolitan centers without diminishing the rural setting in the process. At the same time, deep rural counties struggle to attract economic growth and residents because traditional rural industries have declined and it is difficult to locate new industry in low density areas with less infrastructure. This is not exclusive to Washington State; rural areas around

the USA are experiencing the same phenomenon. There is a large portion of the nation that is getting left behind in the shifting modernized economy of the 21<sup>st</sup> century. Thus, the GMA does not hold all the responsibility for the economic decline of rural areas of the state. However, the GMA could play a part in addressing rural disparities by strategically planning for the location of infrastructure, flexible land uses, and incentives that could be paired with economic development programs. There is a need to rethink rural planning in Washington to realize the differences between metropolitan county and rural county development as to bolster the protection for rural land while supporting economic opportunity.

This study evaluates the effects of the GMA's LAMIRD policy on employment in predominantly rural regions of Washington State to see if there is support to the claim that the policy is hampering economic development in these areas. The purpose is to shed light on the outcomes of the GMA and offer new approaches that accommodate the differences between rural regions of the state. However, as noted by many sources in rural planning literature, employment is only one aspect of rural planning. The preservation of open space, natural areas, agricultural lands, rural aesthetics, and community values are all important in rural planning.

## Chapter 3. METHODS

### 3.1 DATA

Data was obtained from the US Census Center for Economic Studies, specifically the Quarterly Workforce Indicators (QWI<sup>3</sup>) in the Longitudinal Employment-Household Dynamics dataset, is used for this study. Unlike any other local labor market series produced in the US, QWI measure employment flows for workers, jobs (creations and destructions), earnings, NAICS industry groups, detailed geography (national, state, county, Core-Based Statistical Area, and Workforce Investment Area), and private or public ownership. The current QWI data cover 47 states, about 98% of the private workforce in those states, and about 92% of all private employment in the entire economy. QWI is widely used to evaluate employment and economic trends at various levels (Abowd and Vilhuber 2011).

This research analyzes the effects of the LAMIRD rural land use regulation on rural employment, thus only rural employment data is used. Due to the collection methods of the US Census, it is difficult to separate urban area employment from rural employment. Any county that has a Census designated micro or metropolitan area uses employment statistics from those areas to create estimations for rural and county level employment numbers. This is referred to as a Core Based Statistical Areas or CBSA. Thus, for this study any county with a micro or metropolitan area could not be used because the presence of these areas distorts the exclusively rural employment numbers this study analyzes. Furthermore, some of the counties did not have complete data sets and had to be excluded. Counties that had incomplete data sets were among the

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<sup>3</sup> QWI data is produced and released every quarter by the United States Census Bureau.

least populated in the state (ie, Garfield, Columbia, Pend Orielle, Wahkiakum, ect.) and consistent data dating back to 1993 was not available.

For these reasons, this study focuses on data from the opt-in planning rural counties of Stevens, Douglas, Pacific, and Franklin as well as the non-planning rural counties of Okanogan, Lincoln and Klickitat. Stevens and Okanogan counties were selected as a case study comparison since each has similar geographic location and populations. The results of the Stevens and Okanogan case study led to the comparison of combined employment data from all the opt-in planning counties (Stevens, Douglas, Pacific, and Franklin) to all the non-planning counties (Okanogan, Lincoln and Klickitat). This comparison determines if employment trends seen in Stevens and Okanogan counties are similar to that of other counties with similar planning status.

### 3.2 VARIABLES

The independent variable in this study is the passage of RCW 36.70A.070(5) in 1997 which gave counties planning under the GMA the option to have limited areas of more intense rural development (LAMIRDs). It is hypothesized that its enactment in 1997 negatively affected employment trends in counties that plan under the GMA compared to counties that do not. Variables used to operationalize this event are explained in the Research Design section since they are specific to the interrupted time series method used.

The dependent variable in this study is employment in industries that are allowed by the LAMIRD regulation. Rural areas can have **Type 1 LAMIRDs** with “rural development consisting of the infill, development, or redevelopment of existing commercial, industrial, residential, or mixed-use areas” with “any development or redevelopment in terms of building size, scale, use,

or intensity shall be consistent with the character of the existing areas”. “Existing areas” are defined as “an area or use that was in existence on July 1, 1990”.

The effects of Type 1 LAMIRDs are measured by the sum of private employment across all NAICS industry sectors. Since new development or redevelopment must be consistent with the size, scale, use, and intensity in the area as it was in 1990, then it is expected that new industries that attract new employees will have trouble locating in Type 1 LAMIRDs. This is because new industries may need different land use characteristics than what was present in 1990. In addition, industries that want to expand use might have difficulty under this regulation. By measuring total private employment over the time series, this study attempts to measure whether industries have changed or remained consistent with the built character of rural areas as of 1990 in GMA planning rural counties.

Type 2 LAMIRDs with “small-scale recreational or tourist uses” as well as “Master Planned Resorts”, specified as a rural land use option in RCW 36.70A.360, are measured by private employment in NAICS 71 sector “Arts, Entertainment, and Recreation”. This sector takes a broad view of what could be included in master planned resorts or recreational and tourist uses. Under this industry sector code examples could include employment in areas like casinos, museums, golf courses, or outdoor recreational companies. This study attempts to determine if specifically allowing rural recreational land use as one of few land use options provided for rural planning counties changed the employment in recreational industries.

Type 3 LAMIRDs that allow “isolated cottage industry or isolated small-scale industry” will be measured by total employment in industries with 20 employees or less. This is the smallest industry employment record offered by the US Census Bureau’s QWI data and is used in evaluating small business industry and employment regularly in Washington State (Office of

Advocacy 2000). This study attempts to determine if specifically allowing a small-scale industry land use as one of few land use options provided for rural planning counties changed the employment in small business employers.

Washington State's model for implementing its Growth Management Act gives a unique opportunity to set a control for this study. The Growth Management Act (GMA) was adopted by Washington State in 1990. Its general purpose is to require counties experiencing population growth to comprehensively plan to manage that growth. Based on the growth requirements in RCW 36.70A.040(1), 18 counties of Washington's 39 counties are required to plan under the GMA.

RCW 36.70A.040(2) allows counties that are not experiencing substantial growth to voluntarily opt-in to planning under GMA regulations. Ten counties adopted resolutions to plan under the GMA even though they were not required to. The remaining eleven counties that are not experiencing population growth have decided to not plan under the GMA.

This configuration creates an opportunity to conduct a controlled study of some of the effects of the GMA. The counties that are not experiencing population growth are considered by Washington State as similar, and thus will be considered similar in this study. A test group was created when some of those counties volunteered to plan under GMA regulation, while a control group was created when the rest of the counties did not. This research begins with a case study of Stevens and Okanogan counties, the former planning and the latter non-planning. They were chosen because both have similar populations and geographical locations. This case study compares the two counties, employment between 1993 to 2017 to determine if their respective planning status had an effect on employment trends. Next, the study is expanded to determine if

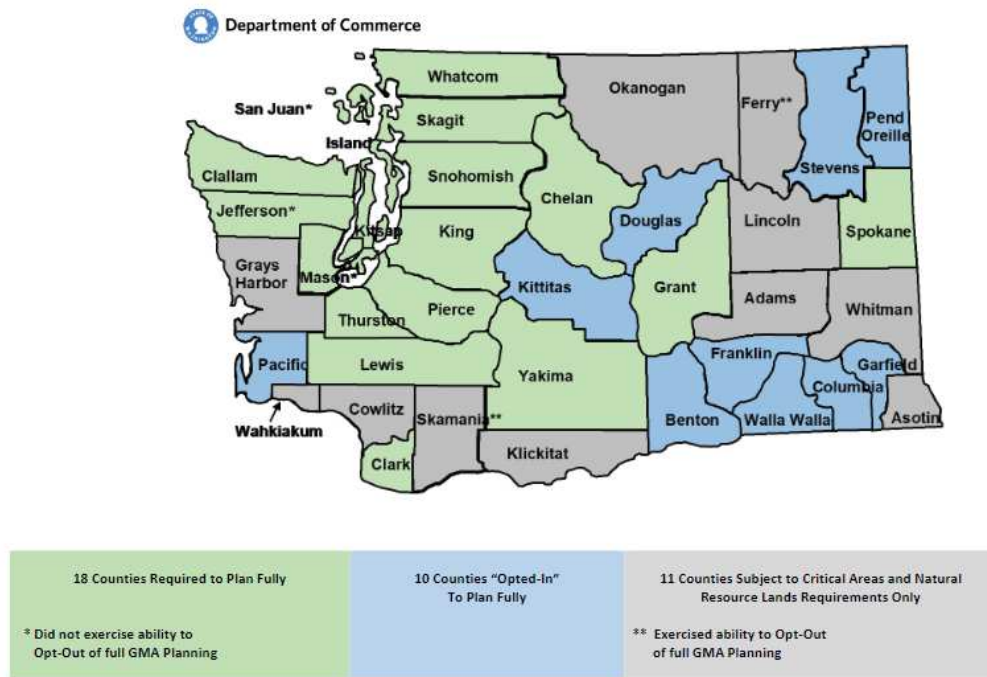
the trends in the combined data of the GMA planning counties of Stevens, Douglas, Pacific, Franklin are different than the non-planning counties of Okanogan, Lincoln, and Klickitat.

A controlled approach is important in testing a research question because, “when the treated group's outcomes can also be contrasted with those of one or more comparison groups, the internal validity is further enhanced by allowing the researcher to potentially control for confounding omitted variables” (Linden 2015).

### 3.3 COUNTY SELECTION CRITERIA

When the GMA passed in 1990, the law gave counties that were not experiencing substantial growth an option to volunteer to plan under the GMA or choose not to. Counties that had populations of less than 50,000 and were experiencing slow or no population growth were given the option to choose whether to plan under the GMA in 1990.

Figure 1 below shows the GMA planning status of each county in Washington State.



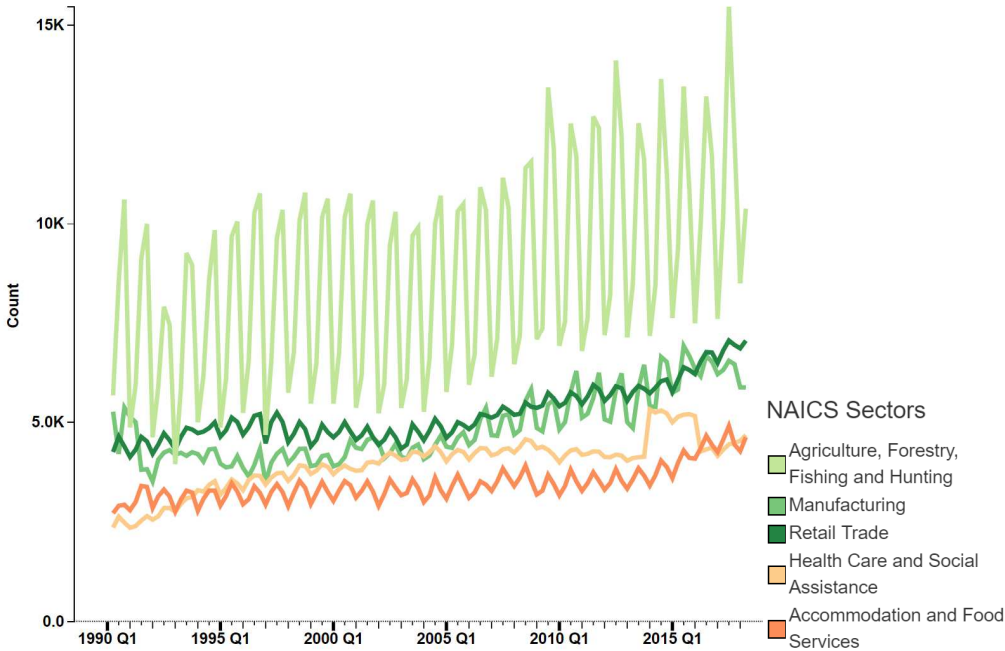
**Figure 1 - Washington Counties' Planning Status**

Of the ten GMA counties that opted in to GMA planning Benton, Kittitas, and Walla Walla counties have micro or metropolitan areas and rural employment data was not available due to Census data collection methods. Columbia, Garfield, and Pend Oreille counties did not have complete Census data sets due to their small population. The remaining opt-in GMA planning counties that had sufficient rural employment data and did not have micro or metropolitan areas were Franklin, Douglas, Pacific, and Stevens counties. These counties act as the test group in this study.

The top five industries with the highest employment in Franklin, Douglas, Pacific, and Stevens counties, seen in Figure 2, show economies based mainly in agricultural industries with some manufacturing, retail, health care, and accommodation/food service employment. There is significant quarterly variability in agricultural employment due to the increasing demand for labor

during harvesting seasons. This is using the two-digit NAICS classifications which are the most broadly defined.

*Employment by Industry: Stevens, Douglas, Pacific, Franklin*



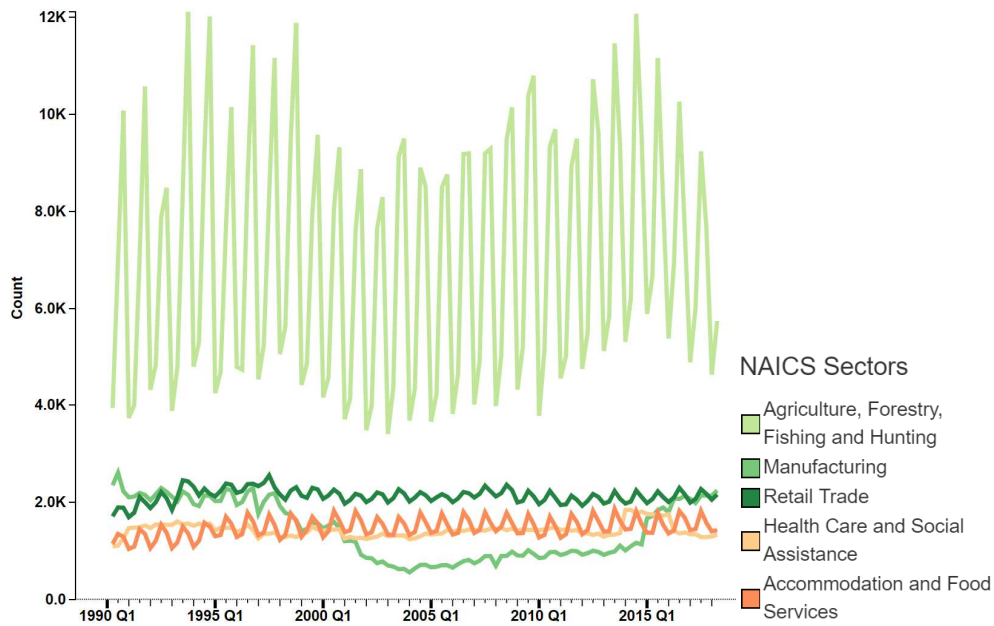
**Figure 2: Top 5 Industries with Highest Employment Among Opt-In GMA Planning Rural Counties (Stevens, Douglas, Pacific, Franklin)**

The eleven counties that did not choose to plan under the GMA underwent the same selection criteria. Adams, Asotin, Cowlitz, Grays Harbor, and Whitman counties all have micro or metropolitan areas and rural employment data was not available due to Census data collection methods. Ferry, Skamania, and Wahkiakum counties did not have complete Census data sets due to their small population. The remaining non-planning counties that had sufficient rural employment data and did not have micro or metropolitan areas were Okanogan, Lincoln, and Klickitat. These counties act as a control comparison group in this study.

The top five industries with the highest employment in Okanogan, Lincoln, and Klickitat counties, seen in Figure 3, show economies very heavily based in agricultural industries with low employment in other industries. There is significant quarterly variability in agricultural employment due to the increasing demand for labor during harvesting seasons. The data used is

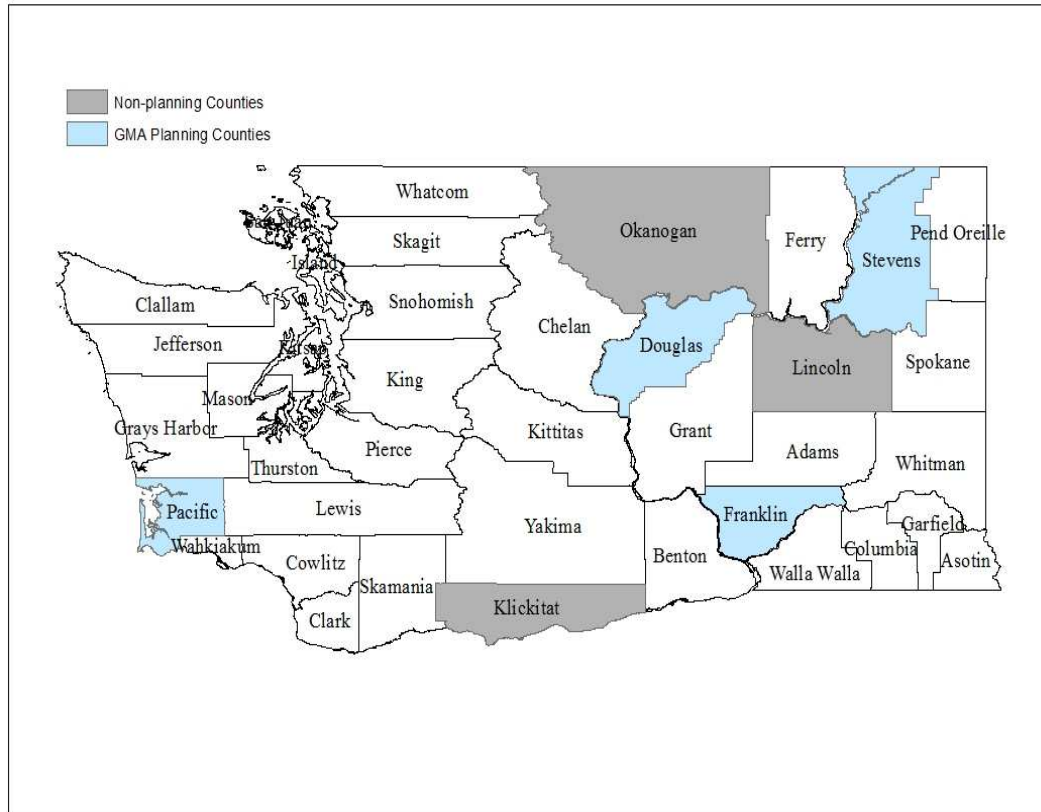
the two-digit NAICS classifications, which are the most broadly defined and encompass several more specific industries.

*Employment by Industry: Okanogan, Lincoln, Klickitat*



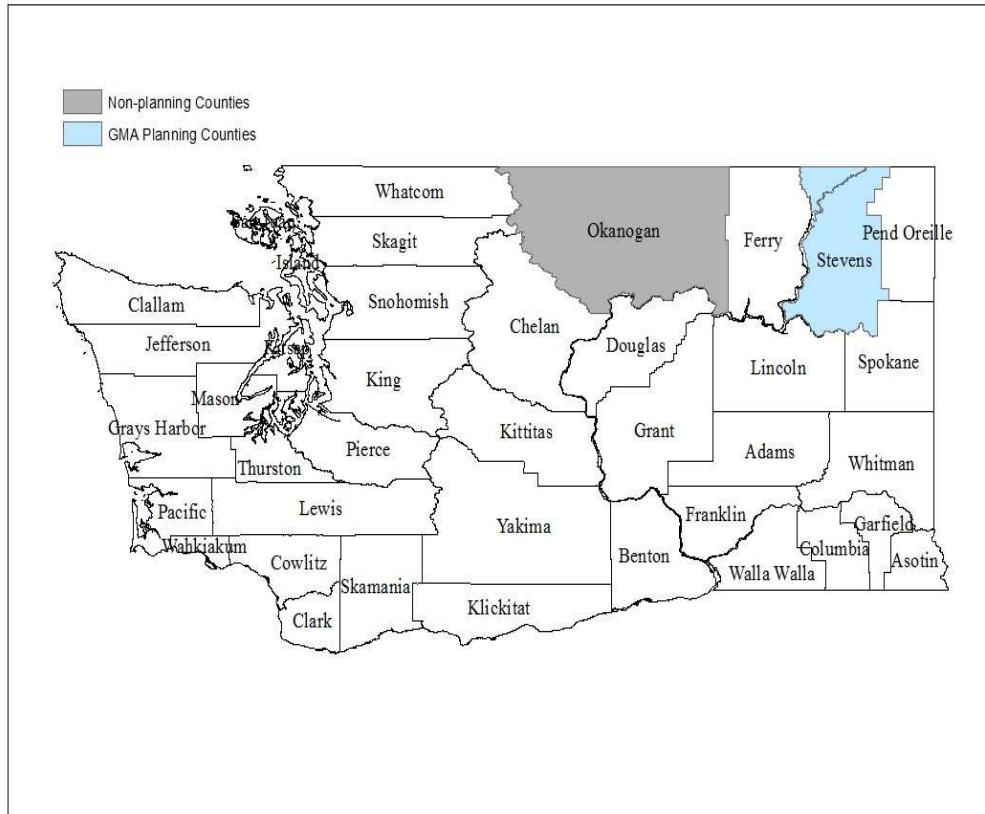
**Figure 3: Figure 4: Top 5 Industries with Highest Employment Among Non-Planning Rural Counties (Okanogan, Lincoln, Klickitat)**

The location of the opt-in GMA planning (green) and non-planning rural (blue) counties used in this study are seen in Figure 5.



**Figure 5: Opt-In GMA Planning and Non-planning Rural Counties**

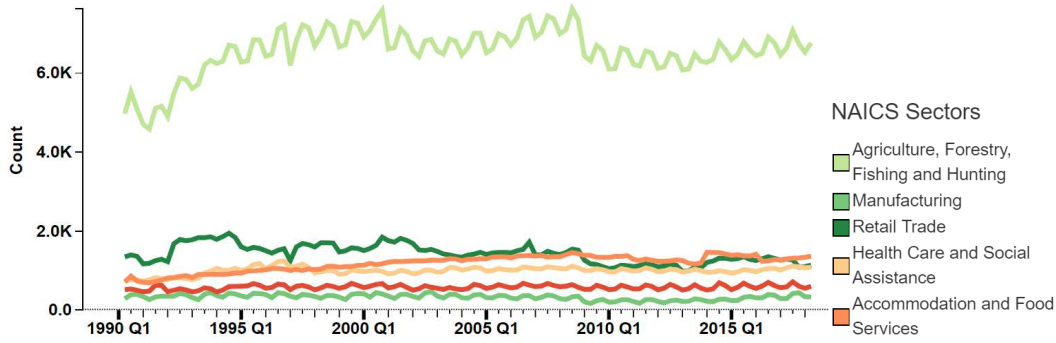
Stevens County, which opted into GMA planning, and Okanogan County, which chose not to plan under the GMA, are used as the preliminary case study in this research since they have similar populations (Stevens – 45,020, Okanogan – 42,490) and similar location in the North Central part of Washington State, as seen in Figure 6.



**Figure 6: Stevens and Okanogan Counties**

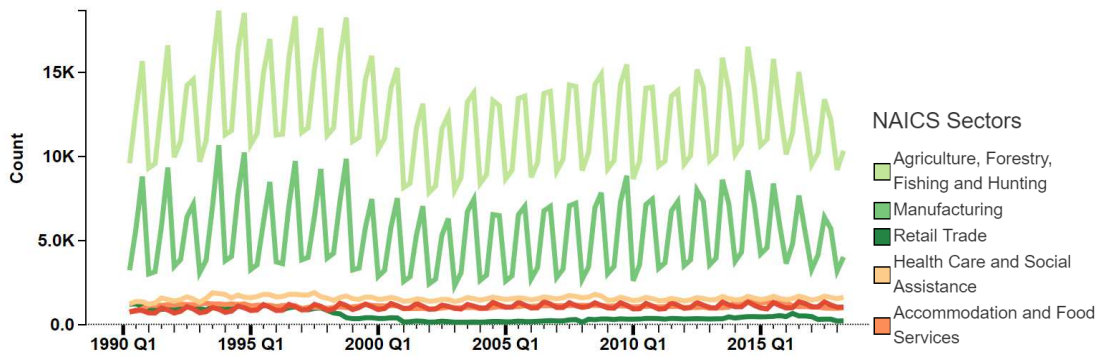
The top five industries with the highest employment in Stevens and Okanogan counties, seen in Figure 7 and 8, show economies very heavily based in agricultural industries. Okanogan County has significant employment in manufacturing industries while Stevens County does not have much diversity in its employment sectors.

*Employment by Industry: Stevens County*



**Figure 7: Top 5 Industries with Highest Employment – Stevens County**

*Employment by Industry: Okanogan County*



**Figure 8: Top 5 Industries with Highest Employment – Okanogan County**

**3.4 RESEARCH DESIGN**

This study seeks to answer the question: has Washington State’s LAMIRD land use regulation had a statistically significant effect on employment in counties that have opted into comprehensive planning under the GMA compared to counties that do not plan under the GMA?

Evaluation of social policies is complex since there is a variety of possible variables that could contribute to changes in an observed trend. Randomization and control are the gold standards in scientific research measuring the effectiveness of a treatment. The former is not possible in this case and the latter is attempted with a comparison group of counties.

There are established research designs for time series data. The interrupted time series analysis (ITSA), also known as segmented linear regression, is used to measure the effects of policy intervention, using time series data, in a variety of fields. This design is simply defined as “a study that uses routine data collected at equally spaced time intervals and evaluated before and after an intervention”(Lagarde 2012). It has been used to study policy implications on rural business trends (Shonkwiler and Harris 1993), the effects of growth management policy on housing price (Anthony 2003), on agricultural transformation and rural development (Uilah 2013), targeted investments for neighborhood revitalization (Galster, Tatian, and Accordino 2006), and is included in social research design instructional books (Babbie 2016).

The time series for this study consists of quarterly employment data for each of the selected counties from 1993 to 2017, which is the extent of the available data set. The interruption is in the third quarter of 1997, when the Legislature adopted RCW 36.70A.070(5) specifying the uses allowed in LAMIRDs. ITSA directly tests the underlying trend in the data and the change in trend related to a policy change, in this case the passage of RCW 36.70A.070(5). This is done by creating independent variables representing time elapsed, pre- and post-interruption, and a post-interruption slope, as presented in the segmented regression equation in Table 1. The pre- RCW 36.70A.070(5) (no LAMIRDs) period is defined as quarter 1 of 1993 through quarter 2 of 1997 and the post-RCW 36.70A.070(5) (LAMIRD option created) period as quarter 3 of 1997 through quarter 4 of 2017.

This study added three segmented regression variables to the final cumulative data file. First, the “time” indicator variable coded 1 through 100, representing each quarter in the study period, was added. This variable measures the baseline trend for employment. Second, a RCW 36.70A.070(5) enactment indicator variable was added where the pre-law time points were coded 0 and the post-law time points were coded 1. This variable, named “law”, calculates if there was an immediate effect on employment numbers in the quarter directly after RCW 36.70A.070(5) was enacted. Third, a post-slope trend variable named “post-slope” was added to the model where time points 1-18 were coded 0 and time points 19-100 were left coded 19-100. The “post-slope” variable measures the deviation from the baseline employment trend after RCW 36.70A.070(5) is enacted. Analyzing this deviation from the baseline trend allows us to describe the pattern of change in employment after the law is enacted and if the law had statistical significance in creating change. The ITSA segmented regression equation and variables are shown in Table 1.

**Table 1: An Interrupted Time Series model analyzing the employment trend outcomes after the enactment of RCW 36.70A.070(5).**

<b>Segmented Linear Regression Equation:</b> $Y_t = \beta_0 + \beta_1 \text{time}_t + \beta_2 \text{intervention}_t + \beta_3 \text{time\_after\_intervention}_t + \beta_4 \text{quarter1} + \beta_5 \text{quarter2} + \beta_6 \text{quarter4} + E_t$	
<b>Coefficient</b>	<b>Description</b>
<b>Baseline Intercept (<math>\beta_0</math>)</b>	Baseline level of the outcome variable at time 0
<b>Baseline Trend (<math>\beta_1</math>)</b> “time”	Baseline trend, estimates the structural trend or growth rate in employment independently from the policy change
<b>LAMIRD RCW passed (<math>\beta_2</math>)</b> “law”	Passage of RCW 36.70A.070(5) effect, estimates the immediate impact of the intervention on employment after the policy change
<b>Post-LAMIRD Trend (<math>\beta_3</math>)</b> “post-slope”	The change in trend, or growth/decline rate in employment variable, after the policy change

<b>Seasonality (reference category: quarter 3 (July – September))</b>	
<b>Quarter 1 (<math>\beta_4</math>)</b>	January – March
<b>Quarter 2 (<math>\beta_5</math>)</b>	April – June
<b>Quarter 4 (<math>\beta_6</math>)</b>	October – December

Autocorrelation, also known as serial correlation, is one source of error in ITSA designs. It occurs when data points close to each other are correlated and not random. In the case of employment data used in this study, autocorrelation occurs in times of economic growth or decline when quarters close to each other have similar trends. Using the Durbin-Watson statistic, it was determined that the data for each county and each employment category is autocorrelated. Autocorrelation was corrected for in the model using the Prais-Winsten method of adjusting a linear model for autocorrelation.

Seasonality is another source of error in ITSA design. It occurs when data at one point of the year is correlated with the same point in other years. In the case of employment data used in this study, seasonality occurs in seasonal employment cycles. This effect was routinely seen in quarter 3 of each employment time series showing increased job growth in summer crop harvesting and tourism seasons. Seasonality was assessed by visually analyzing quarterly box and whisker plots, which show employment variability per quarter, as well as the time series plots of county employment data. Seasonality was adjusted for by only selecting data from quarters with similar trends, thus using data only from quarters 1, 2 and 4. This method excludes the seasonal employment increases of quarter 3 that skew the model's results. By only using quarters 1,2, and 4 a more consistent trend line of employment is attained.

R statistical software was used to conduct this analysis. A significance level of 0.05 is used in this study.

## Chapter 4. RESULTS

### 4.1 TOTAL EMPLOYMENT – STEVENS AND OKANOGAN COUNTY

Results from the ITSA model for Stevens County total employment data give support to the claim that the enactment of RCW 36.70A.070(5), creating the LAMIRD land use option, is statistically correlated to a decrease in total employment. However, it is explained later in this subsector that this could be an outlying result due to a major employer leaving the county near the time RCW 36.70A.070(5) was passed.

The baseline employment trend, measured by the “time” variable, shows average total employment growing by 66 per quarter on average. After the RCW 36.70A.070(5) was enacted, average total employment is 74 less per quarter on average than the baseline trend. This is shown by the “post-slope” variable, which has a two-tailed p-value of 0.000414 meaning there is over 99.9% confidence that this variable had a significant effect on the dependent variable of employment. The “law” variable, which measures the immediate effect on employment numbers in the quarter directly after RCW 36.70A.070(5) was enacted, was not significant. Public policy takes a significant amount of time to implement and immediate changes are not likely.

Overtime, this difference in quarterly employment means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 7% less total employment by the end of 2017.

The Adjusted R-squared of this model highlights that 84.7% of the variation in Stevens County total employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.3626. When the

Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 2.125 showing that autocorrelation was controlled for.

**Table 2:** Stevens County Total Employment ITSA

```

Call:
prais_winsten(formula = stevens_total_emp ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = stevens_co)

Residuals:
    Min       1Q   Median       3Q      Max
-527.94 -233.50  -38.89  131.30  697.04

AR(1) coefficient rho after 4 Iterations: 0.824

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  6130.93    260.74  23.514 < 2e-16 ***
time          66.19     19.04   3.477 0.000774 ***
law          -14.95    153.58  -0.097 0.922671
post_slope   -74.96     20.47  -3.663 0.000414 ***
dummy_q1     -525.30    33.23 -15.808 < 2e-16 ***
dummy_q2     -449.17    28.99 -15.493 < 2e-16 ***
dummy_q4     -69.06     28.65  -2.411 0.017891 *
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 150.9 on 93 degrees of freedom
Multiple R-squared:  0.8571, Adjusted R-squared:  0.8478
F-statistic: 92.94 on 6 and 93 DF, p-value: < 2.2e-16

Durbin-watson statistic (original): 0.3626
Durbin-watson statistic (transformed): 2.125

```

Results from the ITSA model for Okanogan County total employment data show that the enactment of RCW 36.70A.070(5) was not statistically correlated to a change in the county’s total employment. Okanogan County does not plan under the GMA and is not subject to LAMIRD land use regulations and this result was expected. The baseline employment trend, measured by the

“time” variable, shows total employment growing by 31 per quarter on average. After the RCW 36.70A.070(5) was enacted, total employment is 40 less per quarter on average than the baseline trend.

The Adjusted R-squared of this model shows that 86.8% of the variation in Okanogan County total employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.9616. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 2.229 showing that autocorrelation was controlled for.

**Table 3: Okanogan County Total Employment ITSA**

```

Call:
prais_winsten(formula = okanogan_total_emp ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = okanogan_co)

Residuals:
    Min       1Q   Median       3Q      Max
-2682.4  -701.8   -91.6    813.3   3487.3

AR(1) coefficient rho after 6 Iterations: 0.5249

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) 15603.52    952.76  16.377 <2e-16 ***
time         31.54      81.62   0.386  0.7001
law        -1752.62    877.56  -1.997  0.0487 *
post_slope  -40.02     83.36  -0.480  0.6323
dummy_q1   -4924.77    266.61 -18.472 <2e-16 ***
dummy_q2   -4302.20    235.19 -18.292 <2e-16 ***
dummy_q4     405.01    233.78   1.732  0.0865 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1060 on 93 degrees of freedom
Multiple R-squared:  0.8769, Adjusted R-squared:  0.8689
F-statistic: 110.4 on 6 and 93 DF, p-value: < 2.2e-16

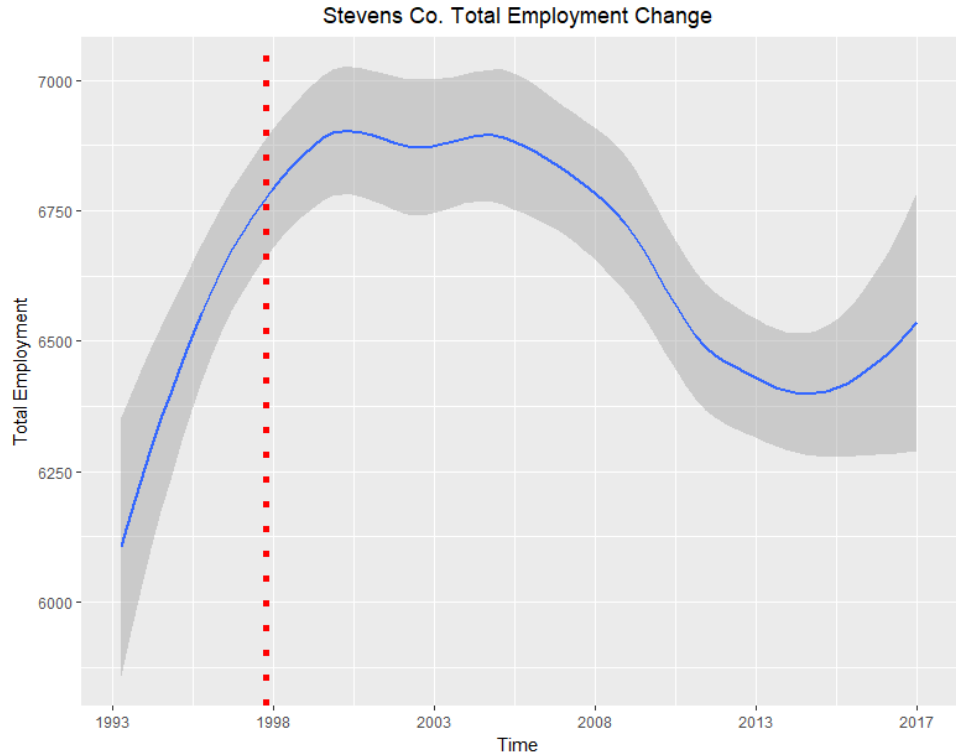
Durbin-watson statistic (original): 0.9616
Durbin-watson statistic (transformed): 2.229

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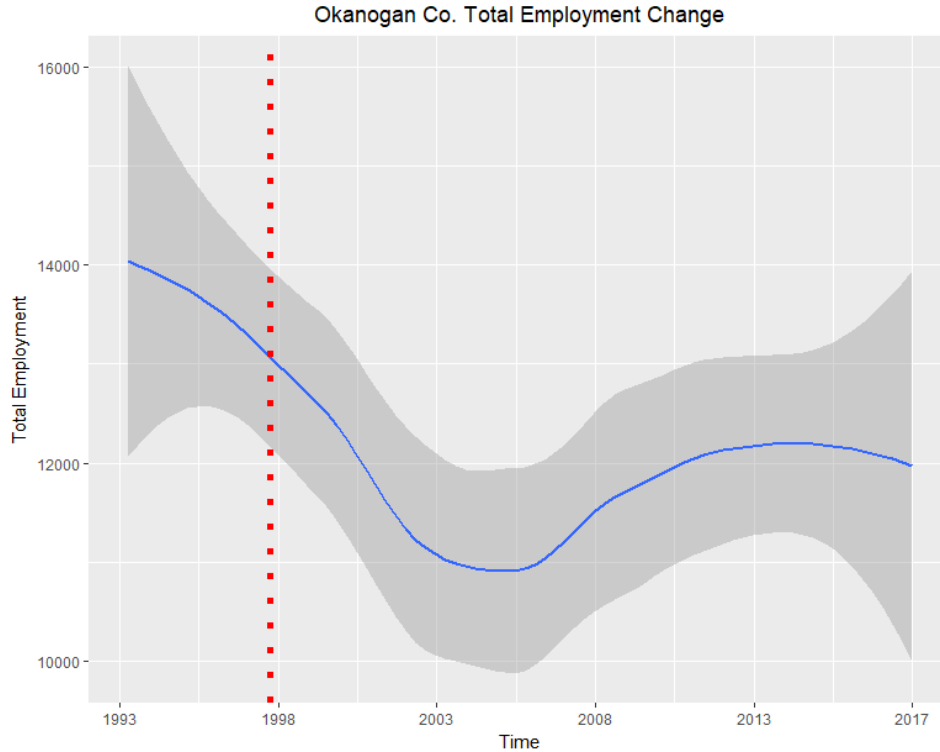
When analyzing the plotted employment numbers over the time period of this study, seen in Figures 9 and 10, the baseline trend can be visualized for both counties. Stevens County had strong total employment growth from 1993 to 2000, with a leveling off from 2001 to 2005, then a sharp decline thereafter until a recent uptick in the past few years.

One potential explanation for this effect is that Alcoa, the USA’s largest aluminum producer, shut down its magnesium smelter in Addy, Stevens County in 2001 with a loss of 325 jobs and a \$19 million annual payroll (Nelson 2001). The loss of a large basic sector employer can have significant negative effects on employment in non-basic sector local businesses since they often depend on the spending from the larger business and its employees.

Okanogan County’s total employment declined from 1993 to 2006, with modest growth from 2007 to 2015, and slight decline in recent years.



**Figure 9: Stevens Co. Total Employment Time Series**



**Figure 10: Okanogan Co. Total Employment Time Series**

#### 4.2 SMALL BUSINESS EMPLOYMENT – STEVENS AND OKANOGAN COUNTY

Results from the ITSA model for Stevens County small business employment data give support to the claim that the enactment of RCW 36.70A.070(5), creating the LAMIRD land use option, was statistically correlated to a decrease in small business employment. The baseline employment trend, measured by the “time” variable, shows the average small business employment growing by 25 per quarter on average. After the RCW 36.70A.070(5) was enacted, average small business employment is 27 less per quarter on average than the baseline trend. This is shown by the “post-slope” variable, which has a two-tailed p-value of 0.00363 meaning there is over 99% confidence that this variable had a significant effect on the dependent variable of employment.

Overtime, this difference in quarterly employment means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 2.2% less small business employment by the end of 2017.

The Adjusted R-squared of this model shows that 94.37% of the variation in Stevens County small business employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.3974. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 2.392 showing that autocorrelation was controlled for.

**Table 4: Stevens County Small Business Employment ITSA**

```

Call:
prais_winsten(formula = stevens_small_business ~ time + law +
  post_slope + dummy_q1 + dummy_q2 + dummy_q4, data = stevens_co)

Residuals:
    Min       1Q   Median       3Q      Max
-206.276  -82.414   -8.306   77.495  271.030

AR(1) coefficient rho after 6 Iterations: 0.8346

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) 2550.604    117.112  21.779 < 2e-16 ***
time         25.658     8.483   3.024 0.00322 **
law          38.785    66.702   0.581 0.56234
post_slope  -27.298     9.147  -2.984 0.00363 **
dummy_q1    -468.942    14.315 -32.759 < 2e-16 ***
dummy_q2    -384.755    12.488 -30.811 < 2e-16 ***
dummy_q4    -73.124    12.337  -5.927 5.19e-08 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 65.34 on 93 degrees of freedom
Multiple R-squared:  0.9471, Adjusted R-squared:  0.9437
F-statistic: 277.4 on 6 and 93 DF, p-value: < 2.2e-16

Durbin-watson statistic (original): 0.3974
Durbin-watson statistic (transformed): 2.392

```

Results from the ITSA model for Okanogan County small business employment data show that the enactment of RCW 36.70A.070(5) was not statistically correlated to a change in small business employment. Okanogan County does not plan under the GMA and is not subject to LAMIRD land use regulations and the lack of correlation was expected. The baseline employment trend, measured by the “time” variable, shows average small business employment growing by 28 per quarter on average. After the RCW 36.70A.070(5) was enacted, average small business employment is 35 less per quarter on average than the baseline trend. The Adjusted R-squared of this model shows that 86.9% of the variation in Okanogan County small business employment can be explained by this model.

The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 1.734. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 1.889 showing that autocorrelation was controlled for.

**Table 5: Okanogan County Small Business Employment ITSA**

```

Call:
prais_winsten(formula = okanogan_small_business ~ time + law +
  post_slope + dummy_q1 + dummy_q2 + dummy_q4, data = okanogan_co)

Residuals:
    Min       1Q   Median       3Q      Max
-1100.24  -306.47    20.85   255.06  1358.32

AR(1) coefficient rho after 4 Iterations: 0.1086

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  6262.90    242.28  25.850  <2e-16 ***
time          28.32     21.33   1.328  0.1876
law          -461.32    237.10  -1.946  0.0547 .
post_slope   -35.77     21.47  -1.666  0.0990 .
dummy_q1    -2116.71    120.19 -17.611  <2e-16 ***
dummy_q2    -1942.89    114.83 -16.919  <2e-16 ***
dummy_q4     255.22    114.69   2.225  0.0285 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

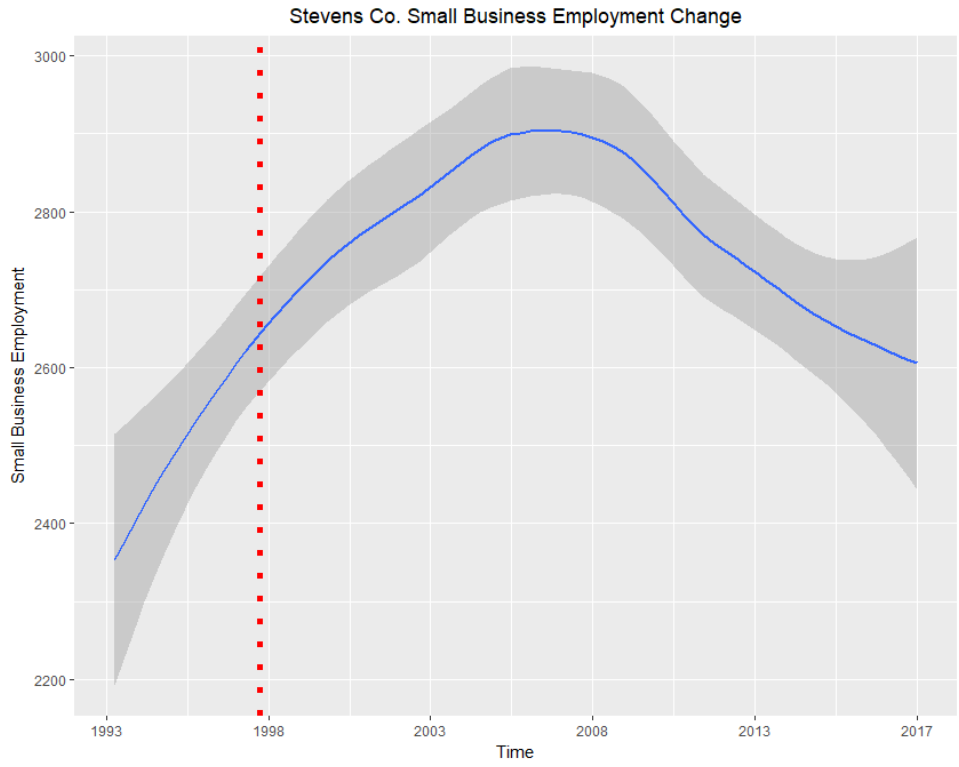
```

Residual standard error: 427 on 93 degrees of freedom Multiple R-squared: 0.8769, Adjusted R-squared: 0.869 F-statistic: 110.4 on 6 and 93 DF, p-value: < 2.2e-16  Durbin-watson statistic (original): 1.734 Durbin-watson statistic (transformed): 1.889
--

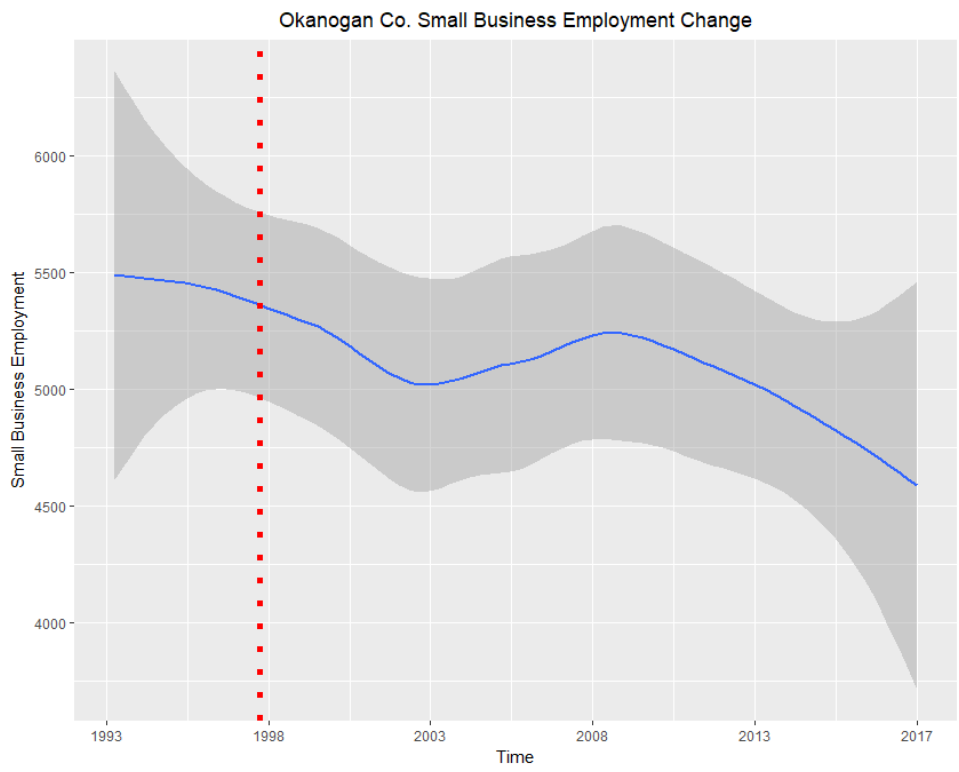
When analyzing the plotted small business employment numbers over the time period of this study, seen in Figures 11 and 12, the baseline trend can be visualized for both counties. Stevens County average small business employment had strong growth from 1993, where 2,400 are employed in small business industries, until 2007, where 2,900 are employed. From 2008 to 2017, Stevens County saw a decline in the number of people employed in small business with close to 2,600 people employed by 2017.

Similar to the case of total employment, one potential explanation for why this decrease in small business employment is that Alcoa, the USA's largest aluminum producer, shut down its magnesium smelter in Addy, Stevens County in 2001 with a loss of 325 jobs and \$19 million annual payroll (Nelson 2001). The closing could have had a significant impact on small business employment in the county.

Okanogan County has an overall declining trend in small business employment. The county's number of people employed in small business industries has gone from a high of 5,500 in 1993 to close to 4,500 by 2017.



**Figure 11: Stevens Co. Small Business Employment Time Series**



**Figure 12: Okanogan Co. Small Business Employment Time Series**

### 4.3 RECREATIONAL EMPLOYMENT – STEVENS AND OKANOGAN COUNTY

Results from the ITSA model for Stevens County recreational employment data does not give support to the claim that the enactment of RCW 36.70A.070(5), creating the LAMIRD land use option, was statistically correlated to a decrease in recreational employment. The baseline employment trend, measured by the “time” variable, shows recreational employment growing by 1.5 per quarter on average. After the RCW 36.70A.070(5) was enacted, recreational employment is 1.3 less per quarter on average than the baseline trend. This trend is shown by the “post\_slope” variable, which has a two-tailed p-value of 0.17 meaning that it did not fall within the 95% confidence interval. This result means that the enactment of RCW 36.70A.070(5) is not statistically correlated to the dependent variable of recreational employment. This result is different from the other two employment categories studied, total employment and small business employment, in which the enactment of RCW 36.70A.070(5) is statistically correlated to a decrease in the employment trend in Stevens County.

Overtime, this difference in quarterly employment means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 5.6% less recreational employment by the end of 2017.

The Adjusted R-squared of this model shows that 55.6% of the variation in Stevens County recreational employment can be explained by this model. This is much lower than the other models, showing that additional independent variables need to be included to account for the variation. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.9451. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 1.872 showing that autocorrelation was controlled for.

**Table 6: Stevens County Recreation Employment ITSA**

```

Call:
prais_winsten(formula = stevens_recreation ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = stevens_co)

Residuals:
    Min       1Q   Median       3Q      Max
-31.852  -7.351  -0.026   5.489  71.393

AR(1) coefficient rho after 3 Iterations: 0.5276

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  45.0009    11.2449   4.002 0.000126 ***
time          1.5901     0.9626   1.652 0.101919
law          -10.1621    10.3423  -0.983 0.328364
post_slope   -1.3576     0.9833  -1.381 0.170722
dummy_q1     -30.7831     3.1310  -9.832 4.65e-16 ***
dummy_q2     -24.8324     2.7615  -8.992 2.77e-14 ***
dummy_q4      -8.4749     2.7449  -3.088 0.002660 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 12.46 on 93 degrees of freedom
Multiple R-squared:  0.5829, Adjusted R-squared:  0.556
F-statistic: 21.66 on 6 and 93 DF, p-value: 8.839e-16

Durbin-watson statistic (original): 0.9451
Durbin-watson statistic (transformed): 1.872

```

Results from the ITSA model for Okanogan County recreation employment data shows that the enactment of RCW 36.70A.070(5) is not statistically correlated to a change in recreation employment. This result was expected since Okanogan County does not plan under the GMA and is not subject to LAMIRD land use regulations. The baseline employment trend, measured by the “time” variable, shows that total employment was growing by 2.7 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted, recreational employment is 1.8 jobs less per quarter on average than the baseline trend.

The Adjusted R-squared of this model shows that 61.86% of the variation in Okanogan County recreation employment can be explained by this model. This variation is much lower than the other models, showing that additional independent variables need to be included to account for

the variation. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 1.186. When the Prais-Winsten method was applied to the model, the Durban-Watson statistic changed to 1.873 showing that autocorrelation was controlled for.

**Table 7: Okanogan County Recreation Employment ITSA**

```

Call:
prais_winsten(formula = okanogan_recreation ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = okanogan_co)

Residuals:
    Min       1Q   Median       3Q      Max
-55.915 -14.126  -0.514   8.779  74.258

AR(1) coefficient rho after 5 Iterations: 0.4004

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   48.293    16.193   2.982  0.00365 **
time           2.795     1.420   1.967  0.05212 .
law          -13.271    15.619  -0.850  0.39769
post_slope    -1.802     1.440  -1.251  0.21399
dummy_q1     -43.116     5.606  -7.690 1.49e-11 ***
dummy_q2     -46.172     5.010  -9.217 9.29e-15 ***
dummy_q4     -25.409     4.989  -5.093 1.84e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

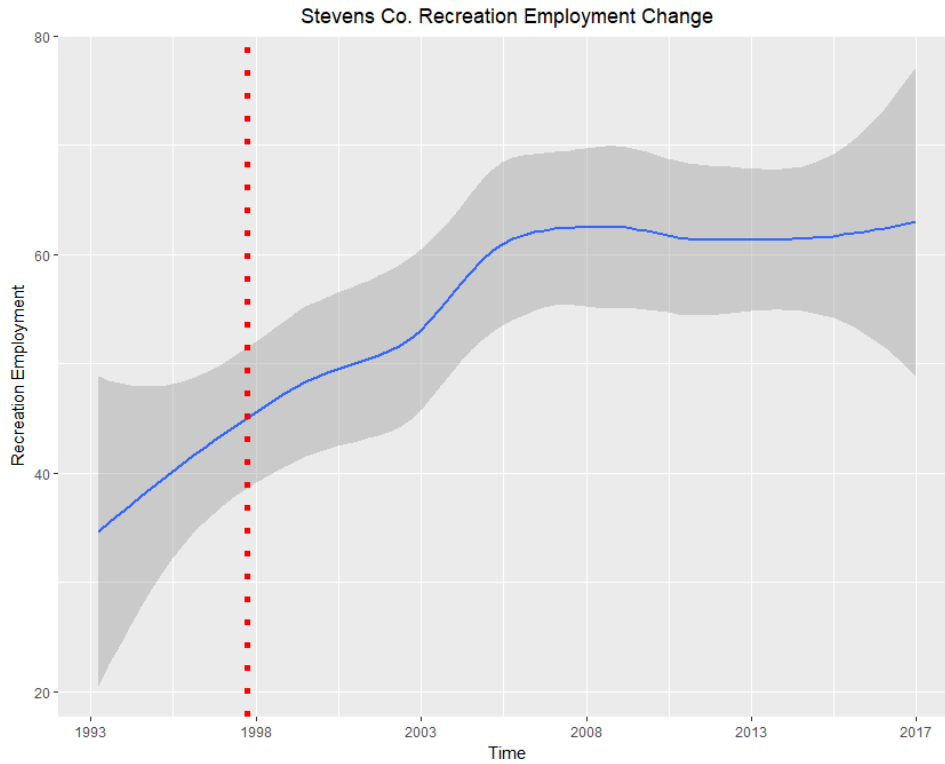
Residual standard error: 21.29 on 93 degrees of freedom
Multiple R-squared:  0.6417, Adjusted R-squared:  0.6186
F-statistic: 27.76 on 6 and 93 DF, p-value: < 2.2e-16

Durbin-watson statistic (original): 1.186
Durbin-watson statistic (transformed): 1.873

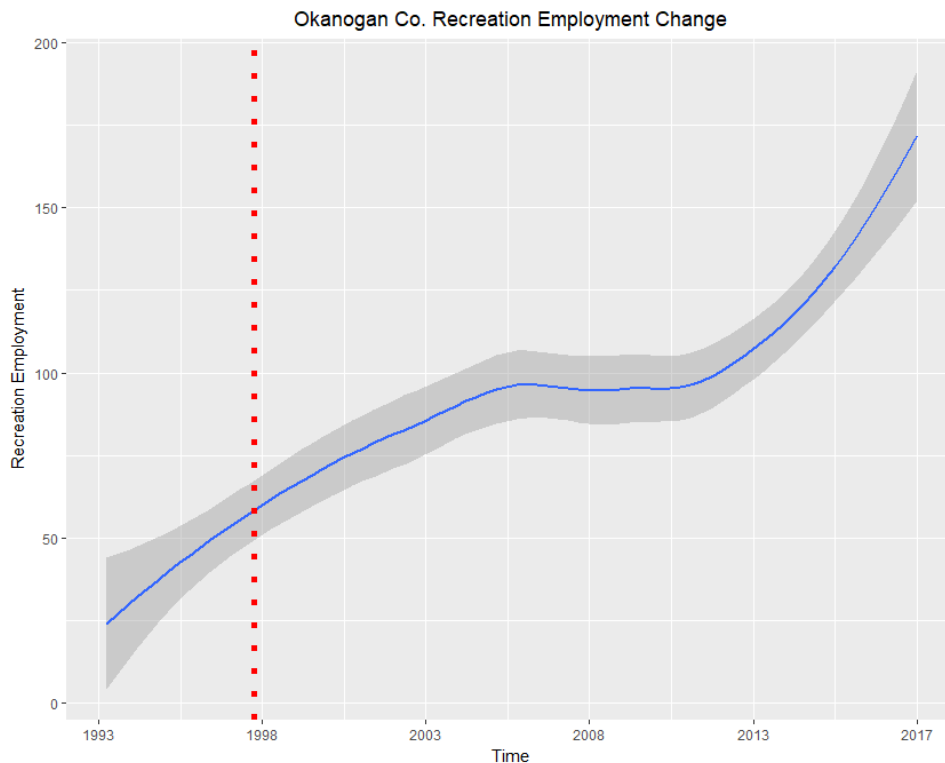
```

When analyzing the plotted employment numbers over the time period of this study, seen in Figures 13 and 14, the general trends can be visualized for both counties. The graphs show that recreational employment is relatively small, with the number of people employed in recreation industries below 70 in Stevens County and below 175 in Okanogan County. Stevens County experienced recreational employment growth from 1993 to 2008, however, employment has

remained flat since then. Okanogan County has shown consistent growth over the entire time series.



**Figure 13: Stevens Co. Recreation Employment Time Series**



**Figure 14: Okanogan Co. Recreation Employment Time Series**

#### 4.4 TOTAL EMPLOYMENT – PLANNING AND NON-PLANNING RURAL COUNTIES

Results from the ITSA model for the combined total employment data of GMA planning rural counties (Stevens, Douglas, Pacific, Franklin) does not give support to the claim that the enactment of RCW 36.70A.070(5), creating LAMIRD land use regulations, is statistically correlated to a decrease in total employment. The baseline employment trend, measured by the “time” variable, shows total employment growing by 113 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted, total employment is 55 jobs less per quarter on average than the baseline trend. This is shown by the “post-slope” variable, which has a two-tailed p-value of 0.7563 which is far outside the 0.05 threshold of significance in this study. This result means the independent variable did not have a statistically significant effect on the dependent variable of employment. The “law” variable, which measures the immediate effect on employment numbers

in the quarter directly after RCW 36.70A.070(5) was enacted, was not significant. This finding is expected because public policy takes a significant amount of time to implement and immediate changes are not likely.

Overtime, this difference in quarterly employment seen in the “time” and “post\_slope” variables means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 2.5% less total employment by the end of 2017.

The Adjusted R-squared of this model shows that 49.52% of the variation in the GMA planning rural counties’ total employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model, the Durban-Watson statistic was 0.05162. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 1.974 showing that autocorrelation was controlled for.

**Table 8: GMA planning rural counties (Stevens, Douglas, Pacific, Franklin) Total Employment ITSA**

```

Call:
prais_winsten(formula = total_emp ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_in_counties)

Coefficients:
(Intercept)  Estimate Std. Error t value Pr(>|t|)
time          113.89    149.61   0.761  0.4470
law          -401.18    719.73  -0.557  0.5776
post_slope   -55.98    180.23  -0.311  0.7563
dummy_q1    -2110.16    142.87 -14.770 <2e-16 ***
dummy_q2    -1556.61    124.53 -12.500 <2e-16 ***
dummy_q4     -296.22    122.87  -2.411  0.0164 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1398 on 393 degrees of freedom
Multiple R-squared:  0.5028, Adjusted R-squared:  0.4952

```

F-statistic: 66.22 on 6 and 393 DF, p-value: < 2.2e-16

Durbin-watson statistic (original): 0.05162  
Durbin-watson statistic (transformed): 1.974

Results from the ITSA model for non-planning rural counties' (Okanogan, Lincoln, Klickitat) total employment data show that the enactment of RCW 36.70A.070(5) was not statistically correlated to a change in the county's total employment. The lack of correlation was expected since these counties do not plan under the GMA and are not subject to LAMIRD land use regulations. The total employment baseline trend is not similar to GMA planning counties. The baseline employment trend, measured by the "time" variable, shows total employment declining by 55 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted, total employment is 27 jobs more per quarter on average than the baseline trend.

The Adjusted R-squared of this model shows that 40.46% of the variation in non-planning rural counties' total employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.1286. When the Prais-Winsten method was applied to the model, the Durban-Watson statistic changed to 2.093 showing that autocorrelation was controlled for.

**Table 9: Non-planning Rural Counties (Okanogan, Lincoln, Klickitat) Total Employment ITSA**

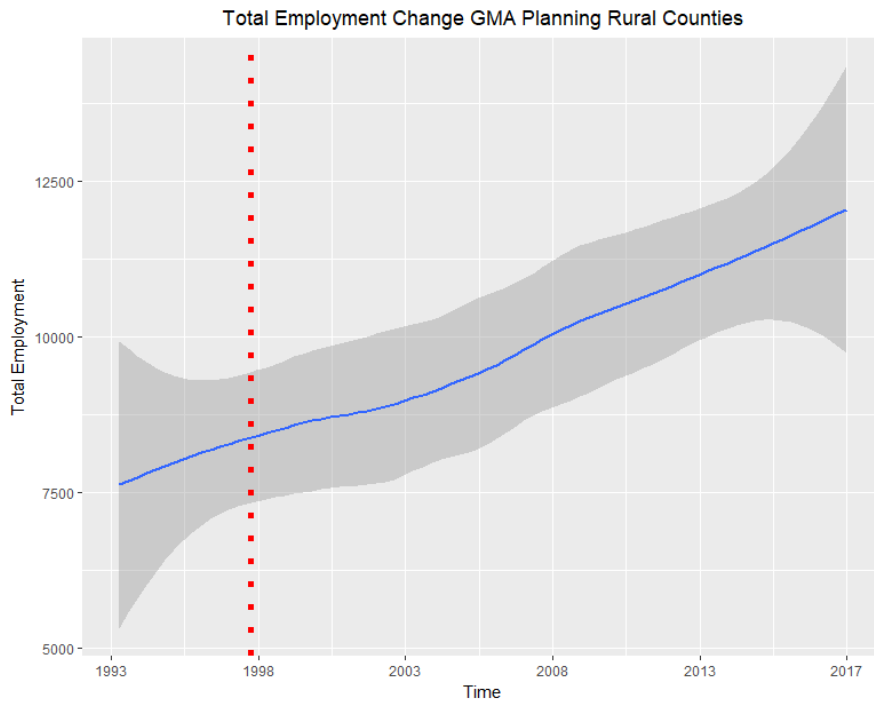
```
Call:
prais_winsten(formula = total_emp ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_out_counties)
```

```
Coefficients:
      Estimate Std. Error t value Pr(>|t|)
```

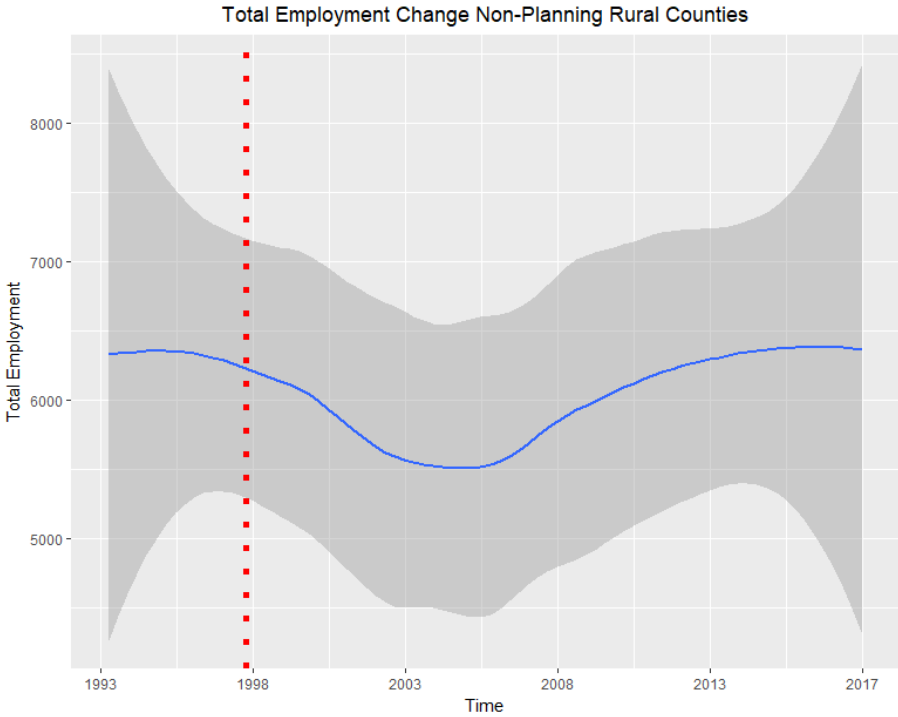
(Intercept)	9390.585	2309.385	4.066	6.14e-05	***
time	-55.523	178.029	-0.312	0.755	
law	-334.815	992.689	-0.337	0.736	
post_slope	27.114	212.643	0.128	0.899	
dummy_q1	-2205.001	199.580	-11.048	< 2e-16	***
dummy_q2	-1835.338	173.981	-10.549	< 2e-16	***
dummy_q4	-5.673	171.678	-0.033	0.974	
---					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 1662 on 293 degrees of freedom					
Multiple R-squared: 0.4165, Adjusted R-squared: 0.4046					
F-statistic: 34.86 on 6 and 293 DF, p-value: < 2.2e-16					
Durbin-watson statistic (original): 0.1286					
Durbin-watson statistic (transformed): 2.093					

When analyzing the plotted total employment numbers over the time period of this study, the baseline trend can be visualized. It is evident that there has been consistent job growth in GMA planning rural counties from 1993 to 2017. Though the ITSA results show that the average employment trend after the 1997 RCW 36.70A.070(5) amendment is slightly less than the entire time series average trend, overall the total employment grew from near 7,500 in 1993 to almost 12,500 in 2017 – a 60% increase.

Non-planning rural counties have a different trend in total employment. Average total employment numbers were near 6,500 in 1993, dipped close to 5,500 by 2005, then returned to 6,500 by 2017. Comparison of the average trend lines of GMA planning and non-planning rural counties, seen in Figures 15 and 16, shows that GMA planning counties have had consistent positive total employment growth between 1993 and 2017 while non-planning counties have not experienced total employment growth. In fact, the non-planning counties of Okanogan, Lincoln, and Klickitat declined from 1993 to 2005, however experienced growth through the Great Recession. This growth brought total employment back to 1993 levels but has flattened out in recent years. Over the entire time series the average total employment has not exceeded 1993 levels for non-planning rural counties.



**Figure 15: Total Employment change in GMA Planning Rural Counties (Stevens, Douglas, Pacific, Franklin)**



**Figure 16: Total Employment Change in Non-planning Rural Counties (Okanogan, Lincoln, Klickitat)**

#### 4.5 SMALL BUSINESS EMPLOYMENT – PLANNING AND NON-PLANNING RURAL COUNTIES

Results from the ITSA model for the combined small business employment data of GMA planning rural counties (Stevens, Douglas, Pacific, Franklin) give support to the claim that the 1997 enactment of RCW 36.70A.070(5), creating LAMIRD land use regulations, was statistically correlated to a decrease in small business employment. The baseline employment trend, measured by the “time” variable, shows small business employment growing by 32 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted, small business employment is 32 jobs less per quarter on average than the baseline trend. This result shown by the “post-slope” variable,

which has a two-tailed p-value of 0.562 which is outside the 0.05 threshold for statistical significance. This result means the 1997 enactment of RCW 36.70A.070(5) did not have a statistically significant effect on the dependent variable of small business employment.

Overtime, this difference in quarterly employment seen in the “time” and “post\_slope” variables means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 0.06% less small business employment by the end of 2017.

The Adjusted R-squared of this model shows that 62.87% of the variation in GMA planning rural counties’ small business employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model, the Durban-Watson statistic was 0.1137. When the Prais-Winsten method was applied to the model, the Durban-Watson statistic changed to 2.03 showing that autocorrelation was controlled for.

**Table 10: GMA planning rural counties (Stevens, Douglas, Pacific, Franklin) Small Business Employment ITSA**

```
Call:
prais_winsten(formula = small_business ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_in_counties)

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  3440.71    619.33   5.556 5.11e-08 ***
time          32.29     46.81   0.690  0.491
law          -12.00    256.17  -0.047  0.963
post_slope   -32.47     56.01  -0.580  0.562
dummy_q1    -1152.91    51.43 -22.416 < 2e-16 ***
dummy_q2    -862.79    44.84 -19.243 < 2e-16 ***
dummy_q4    -227.95    44.24  -5.152 4.08e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 495.1 on 393 degrees of freedom
Multiple R-squared:  0.6343, Adjusted R-squared:  0.6287
F-statistic: 113.6 on 6 and 393 DF, p-value: < 2.2e-16

Durbin-watson statistic (original): 0.1137
Durbin-watson statistic (transformed): 2.03
```

Results from the ITSA model for non-planning rural counties, (Okanogan, Lincoln, Klickitat) small business employment data shows that the 1997 enactment of RCW 36.70A.070(5) is not statistically correlated to a change in small business employment. This result was expected since these rural counties do not plan under the GMA and are do not use the LAMIRD land use option. The baseline employment trend, measured by the “time” variable, shows small business employment growing by 20 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted, small business employment is 22 jobs less per quarter on average than the baseline trend. The Adjusted R-squared of this model shows that 50.71% of the variation in non-planning rural counties’ small business employment can be explained by this model.

The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.1354. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 2.064 showing that autocorrelation is controlled for.

**Table 11: Non-planning Rural Counties (Okanogan, Lincoln, Klickitat) Small Business Employment ITSA**

```

Call:
prais_winsten(formula = small_business ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_out_counties)
Coefficients:
      Estimate Std. Error t value Pr(>|t|)
(Intercept)  3379.94    547.43   6.174 1.13e-09 ***
time          20.46     43.03   0.475 0.634633
law          -32.74    246.22  -0.133 0.894241
post_slope   -22.53     51.35  -0.439 0.660945
dummy_q1    -1103.85    49.69 -22.215 < 2e-16 ***
dummy_q2     -881.65    43.32 -20.353 < 2e-16 ***
dummy_q4     -156.04    42.75  -3.650 0.000282 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

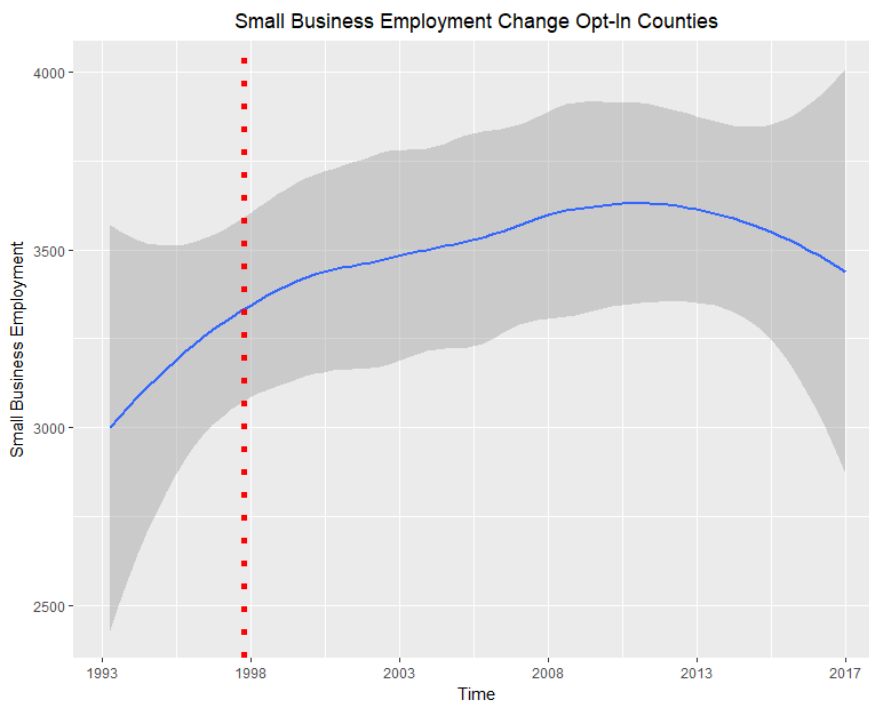
Residual standard error: 629.1 on 693 degrees of freedom
Multiple R-squared:  0.5113, Adjusted R-squared:  0.5071
F-statistic: 120.8 on 6 and 693 DF,  p-value: < 2.2e-16

```

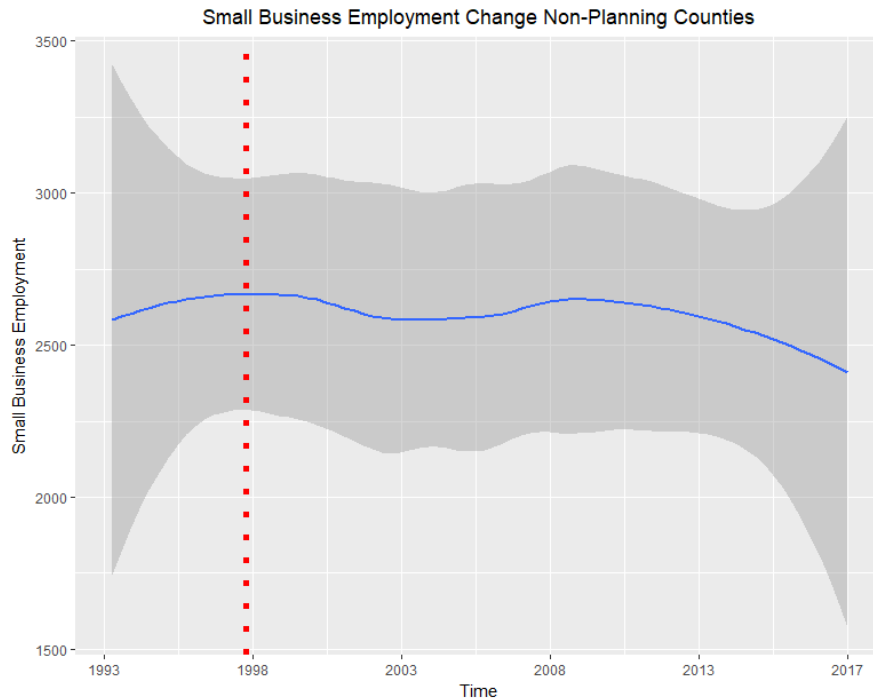
Durbin-watson statistic (original): 0.1354  
Durbin-watson statistic (transformed): 2.064

When analyzing the plotted small business employment numbers over the time period of this study, seen in Figures 17 and 18, the baseline trend can be visualized. The average small business employment trend for GMA planning rural counties is consistently positive from 1993 until 2010, growing from 3,000 jobs to close to 3,600 jobs during that time period. Since 2010, there has been consistent decline in average small business employment with under 3,500 jobs by 2017.

Non-planning rural counties have a flat average small business employment trend from 1993 to 2010, with the number of people employed in that sector averaging around 2,600 during that period. From 2010 to 2017, non-planning rural counties have had a consistent decline in the number of people employed in small business, with under 2,500 employed by 2017.



**Figure 17: Small Business Employment Change in GMA Planning Rural Counties (Stevens, Douglas, Pacific, Franklin)**



**Figure 18: Small Business Employment Change in Non-planning Rural Counties (Okanogan, Lincoln, Klickitat)**

#### 4.6 RECREATIONAL EMPLOYMENT – PLANNING AND NON-PLANNING RURAL COUNTIES

Results from the ITSA model for the combined recreational employment data of GMA planning rural counties (Stevens, Douglas, Pacific, Franklin) does not give support to the claim that the enactment of RCW 36.70A.070(5), creating LAMIRD land use regulations, was statistically correlated to a decrease in recreational employment. The baseline employment trend, measured by the “time” variable, shows recreational employment growing by 1.2 people employed per quarter on average. After the RCW 36.70A.070(5) was enacted, recreational employment is 1.1 people employed less per quarter on average than the baseline trend. This result is shown by

the “post\_slope” variable, which has a two-tailed p-value of 0.247 which does not fall within the 95% confidence interval. This finding means that the enactment of RCW 36.70A.070(5) is not statistically correlated to the dependent variable of recreational employment.

Overtime, this difference in quarterly employment seen in the “time” and “post\_slope” variables means the relative effects of the enactment of RCW 36.70A.070(5) resulted in an estimated 3.2% less recreation employment by the end of 2017.

The Adjusted R-squared of this model shows that 46.75% of the variation in non-planning rural counties’ recreational employment can be explained by this model. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 1.102. When the Prais-Winsten method was applied to the model, the Durban-Watson statistic changed to 2.125 showing that autocorrelation was controlled for.

**Table 12: GMA planning rural counties (Stevens, Douglas, Pacific, Franklin)  
Recreation Employment ITSA**

```

Call:
prais_winsten(formula = recreation ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_in_counties)

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  70.7420    11.0115   6.424 3.83e-10 ***
time          1.2181     0.9687   1.258  0.209
law           7.4294    10.6973   0.695  0.488
post_slope   -1.1507     0.9920  -1.160  0.247
dummy_q1     -59.4576     3.6228 -16.412 < 2e-16 ***
dummy_q2     -50.4982     3.2186 -15.690 < 2e-16 ***
dummy_q4     -37.3498     3.2070 -11.646 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 28.03 on 393 degrees of freedom
Multiple R-squared:  0.4755, Adjusted R-squared:  0.4675
F-statistic: 59.38 on 6 and 393 DF,  p-value: < 2.2e-16

Durbin-watson statistic (original): 1.102
Durbin-watson statistic (transformed): 2.125

```

Results from the ITSA model for non-planning rural counties, (Okanogan, Lincoln, Klickitat) recreation employment data shows that the enactment of RCW 36.70A.070(5) is not statistically correlated to a change in recreation employment. This result was expected since these counties do not plan under the GMA and are not subject to LAMIRD land use regulations. The baseline employment trend, measured by the “time” variable, shows that total employment was growing by 0.3 jobs per quarter on average. After the RCW 36.70A.070(5) was enacted in 1997, recreational employment grew 0.1 jobs per quarter on average compared the baseline trend.

The Adjusted R-squared of this model shows that 50% of the variation in Okanogan County recreation employment can be explained by this model. This value is much lower than the other models, showing that additional independent variables need to be included to account for the variation. The Prais-Winsten method had a significant effect on the autocorrelation of the model, as seen by the change in the Durban-Watson statistic. In the original linear regression model the Durban-Watson statistic was 0.5703. When the Prais-Winsten method was applied to the model the Durban-Watson statistic changed to 2.251 showing that autocorrelation is controlled for.

**Table 13: Non-planning Rural Counties (Okanogan, Lincoln, Klickitat) Recreation Employment ITSA**

```

Call:
prais_winsten(formula = recreation ~ time + law + post_slope +
  dummy_q1 + dummy_q2 + dummy_q4, data = opt_out_counties)

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  79.4714    17.0222   4.669 4.62e-06 ***
time          0.3735     1.4248   0.262  0.793
law          -18.5270    14.0340  -1.320  0.188
post_slope    0.1120     1.5528   0.072  0.943
dummy_q1     -48.6480     3.2870 -14.800 < 2e-16 ***
dummy_q2     -44.8341     2.8709 -15.617 < 2e-16 ***
dummy_q4     -28.6489     2.8441 -10.073 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

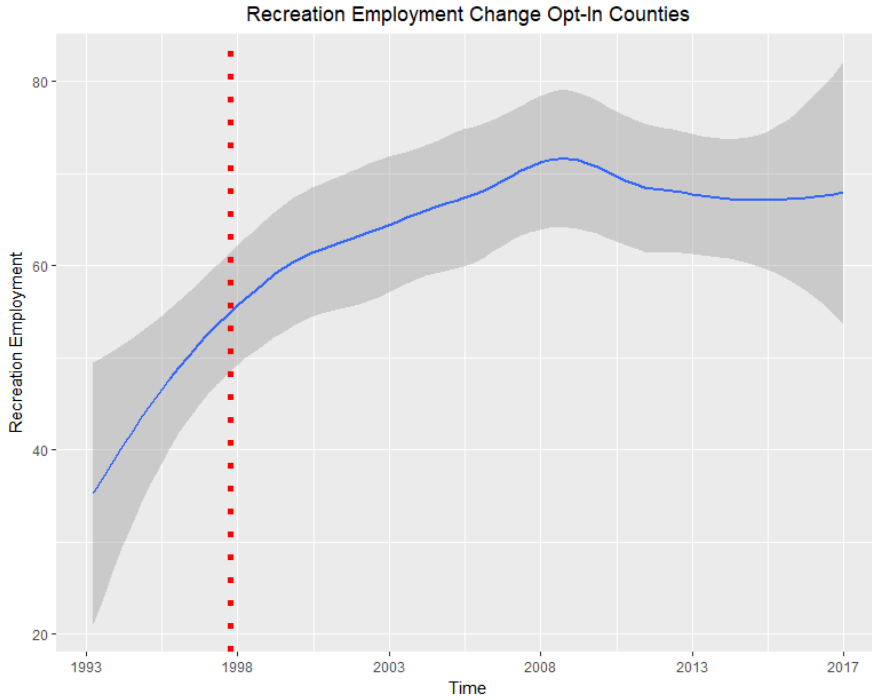
```

Residual standard error: 24.93 on 293 degrees of freedom  
Multiple R-squared: 0.5104, Adjusted R-squared: 0.5004  
F-statistic: 50.92 on 6 and 293 DF, p-value: < 2.2e-16

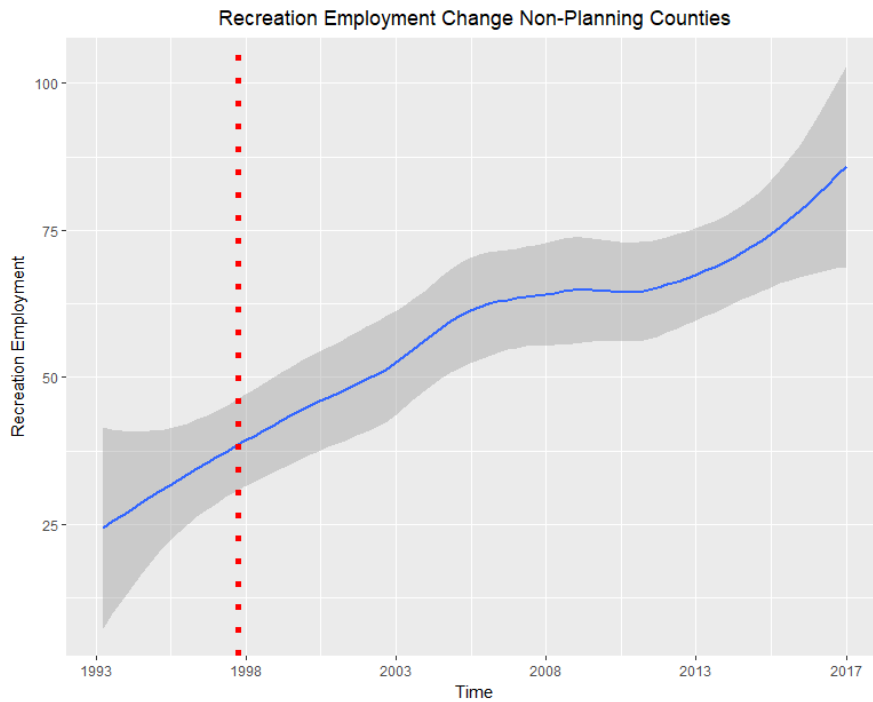
Durbin-watson statistic (original): 0.5703  
Durbin-watson statistic (transformed): 2.251

When analyzing the plotted employment numbers over the time period of this study, seen in Figures 19 and 20, the general trends can be visualized. It is evident that this employment sector is on average very small for each group of counties, with the average number employed in recreational industries in each group under 90 people.

The plotted average employment trend for the selected GMA planning rural counties shows that there was consistent recreational employment growth from 1993 to 2009, at which time recreational employment numbers leveled off through 2017 averaging near 70 people employed. Non-planning rural counties have had steady recreational employment growth through out the entire time series, starting at 25 people employed in recreational industries on average in 1993 and growing to 90 by 2017.



**Figure 19 - Recreation Employment Change GMA Planning Rural Counties (Stevens, Douglas, Pacific, Franklin)**



**Figure 20: Recreation Employment Change in Non-planning Rural Counties (Okanogan, Lincoln, Klickitat)**

## Chapter 5. DISCUSSION

### 5.1 MAIN FINDINGS

The focus of this research began with determining the impact of RCW 36.70A.070(5) on employment trends in Stevens County and rural counties that plan under the GMA, compared to Okanogan County and rural counties that do not plan. This case study was done first to see if there were significant differences in employment outcomes between Washington counties with similar geographical location and total population, but with different planning status.

The results of the interrupted time series analysis (ITSA) on employment data shows that RCW 36.70A.070(5) is statistically correlated to a decrease in average total and small business employment growth in Stevens County. Recreational employment in Stevens County showed a trend of almost no growth across the study period.

One potential reason for why this happened is Alcoa, the USA's largest aluminum producer, shut down its magnesium smelter in Addy, Stevens County in 2001 at the cost of 325 jobs with a \$19 million annual payroll (Nelson 2001). The loss of a large basic sector employer can have significant negative effects on employment in non-basic sector local businesses since they often depend on the spending from the larger business and its employees.

The second phase of this research analyzes employment trends among the combined employment numbers of GMA planning rural counties and non planning rural counties. The results from this analysis gave another reason to suspect the Stevens County individual results are outlying. When employment data is combined between Stevens, Douglas, Pacific, and Franklin counties, there is no statistical correlation present between the 1997 enactment of RCW 36.70A.070(5) and employment change. This finding is true for total, small business, and recreational employment which can locate in Type 1, 2, and 3 LAMIRDs respectively.

Furthermore, amongst all the GMA planning rural counties the trend in average total employment growth is positive through out the entire time series. Small business and recreational employment growth is positive until around 2008, when the Great Recession began, and have struggled to recover since. The results of this study are in opposition to the statement made in the “Roadmap to Washington’s Future” preliminary report: “Regulatory limitations related to Limited Areas of More Intense Rural Development (LAMIRD) stifle reasonable development and vitality in rural counties” (Tovar and Murphy 2017)<sup>4</sup>.

As expected, the enactment of RCW 36.70A.070(5) is not statistically correlated to a change in employment trends in Okanogan County since they do not plan under the GMA and are not subject to the law. This result is also true for the average employment trend amongst all the non-planning rural counties of Okanogan, Lincoln, and Klickitat.

A major finding is that the trend in average total employment in non-planning counties from 1993 to 2017 does not show employment growth. These counties experienced average total employment decline during the first half of the time series, 1993 to 2005, a slight increase from 2008 to 2014, and stagnant growth in recent years. Overall, average total employment levels never exceed 1993 levels. Conversely, the GMA planning rural counties experienced continuous growth during the entire time series. Again, these results are contrary to the statement in the “Roadmap to Washington’s Future” preliminary report that LAMIRDs are stifling reasonable development in rural counties. This result shows rural counties that plan under the GMA have had more economic viability, represented by average employment growth, compared to rural counties that do not plan.

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<sup>4</sup> The characterization and phrasing of this statement is by the parties who offered them, and does not reflect any judgment by Tovar, Murphy, or other William D. Ruckelshaus Center staff regarding the merits, relative priority, or desired outcomes regarding these issues.

The average small business employment trends during the time series are very similar between both GMA planning and non-planning counties, showing that for rural counties, planning status did not influence trends in this employment sector. The average recreational employment trends are different between the rural counties that plan under the GMA and those that do not plan. Neither group's recreational employment trend is statistically correlated to the enactment of RCW 36.70A.070(5). Both planning and non-planning groups of rural counties had positive trends in the average recreational employment numbers until 2008, when GMA planning counties have had declining numbers and non-planning counties continued to grow.

The primary goal of the GMA's rural element and LAMIRD land use option is to minimize sprawl and maintain rural character. The creation of growth boundaries, around LAMRIDs and other built areas, by the GMA planning rural counties helps accomplish this.

An important aspect in the creation of LAMIRDs as a land use option for rural counties was to increase flexibility in economic land uses for rural areas. However, land uses corresponded to employment sectors defined by state lawmakers as appropriate for rural areas – Type 1, 2, and 3 LAMIRDs. This study shows that the enactment of this legislation is not statistically correlated to growth in those employment sectors – total employment, small business employment, and recreational employment. Thus, as a tool for increasing employment in these specific industries, LAMIRDs are not successful in Stevens, Douglas, Pacific, and Franklin counties. However, LAMIRD land uses, along with the GMA rural element, are important tools for limiting the conversion of open space into sprawling development and preserving rural character.

The non-planning rural counties of Okanogan, Lincoln, and Klickitat did not outperform the GMA planning counties in employment growth, even though these are counties that do not have state level oversight in land use decision making. This finding is important because these counties are

risking sprawling development and the loss of open space through uncoordinated land use decision making with the intention of encouraging more economic activity. However, they did not see relatively stronger employment growth compared to GMA planning counties.

This study only looks at one goal of the LAMIRD statute, creating employment opportunity. The other goal of protecting rural lands from being converted into sprawling development is not evaluated in this study. It is assumed that the presence of GMA regulation that requires growth boundaries for all built areas is protecting open space in these rural counties. Another point of future research would be to evaluate the rate of open land conversion to developed land between GMA planning and non-planning rural counties to see how effective GMA land use regulations have been at limiting that conversion.

## 5.2 LIMITATIONS

The main limitation of this study is the number of counties included. Only having usable rural employment data from a handful of GMA planning and non-planning rural counties, and not every single rural Washington State county, this research cannot be generalized. RCW 36.70A.070(5) applies to 28 counties in Washington, 10 of which opted into GMA planning, and there are 11 non-planning counties that could be used as comparison. Each county has unique attribute and use LAMIRD land uses differently. An interesting point of further research would be to apply the ITSA model to rural employment data in all counties that are required to plan, those that opted in to planning, and those that do not plan. However, the Census QWI data does not separate urban and rural employment numbers and a different data set would be required to be able to analyze LAMIRD impacts across all counties in the state using this data set.

Data limitations also restricted the creation of a more robust model for the counties used in this study. First, quarterly employment data only dated back to 1993. While this gave enough data points to establish a pre-RCW 36.70A.070(5) employment trend line, having employment numbers that date back further would provide a more reliable trend. In addition, the interrupted time series model used could benefit from additional independent variables added to its regression equation, like total county population or a variety of demography variables. While the adjusted r-squared values were quite high for most of the models, there is some room for addition of other variables that could account for variation. The effect of variables not included in the statistical model was evident in how the 2001 closure of the Alcoa plant in Stevens County potentially had an effect on employment in that county.

Furthermore, several industries are grouped into the NAICS 71 sector “Arts, Entertainment, and Recreation” industry sector data used for measuring recreational employment. This NAICS employment sector was chosen for this study since it gives a broad look at what could be defined as recreational employment. A more specific type of outdoor recreational employment that is likely to be classified as a Type 3 LAMIRD is more difficult to access time series data for since the number employed in that sector in the rural counties used for this study is very small. Many of the rural counties in this study have several casinos within their boundaries, thus casino employment could likely be contributing to the employment numbers represented in this category. If this is the case, then it can be said that the Type 3 LAMIRD is not producing much employment at all in GMA planning rural counties.

### 5.3 POLICY IMPLICATIONS

The ITSA model shows that the policy of LAMIRDs is not statistically correlated with a decline in employment in deep rural GMA planning Washington counties. Instead, GMA planning rural counties have stronger total employment growth, and similar small business and recreation employment growth as non-planning counties from 1993 to 2017. Growth management and the LAMIRD land use policies are not negatively affecting economic viability in rural counties. However, the LAMIRD policy is not statistically correlated to increased employment in the specific industries mentioned in the policy. Thus, as a tool for employment growth the policy has not been effective, but as a tool for protecting open lands it is very important.

This research is very relevant for rural counties that are currently not planning under the GMA. This study shows that average employment growth is stronger in rural counties that have growth management planning as compared to counties that do not plan. Along with stronger employment, GMA planning counties have better mechanisms for protecting open space compared to non-planning counties. The protection of open lands is extremely valuable to rural ecosystems, aesthetics, and livelihoods. These two facts should be encouragement for more rural counties in Washington State to plan under the GMA.

However, it is worth considering how to improve the LAMIRD policy, and approaches to rural planning in general. Rural areas need to protect their lands and adapt to the changing economic landscape of the 21<sup>st</sup> century, and planning can help. One impediment could be the specificity in what types and scales of development can happen in rural areas. While maintaining the rural character of these communities is important, rural character does not necessarily have to be a static idea. A seemingly problematic part of RCW 36.70A.070(5) is the fact that any new development needs to be in the same use, scale, and intensity as the land use was in 1990 when

the GMA was passed. The law attempts to protect rural lands by emphasizing what must be preserved and left unchanged. This approach is understandable considering the agricultural land being lost to sprawling development at the time. However, as this study shows the economic vitality of rural communities is still struggling regardless. With growth boundaries and rural lands being recognized and preserved, perhaps it is time to consider what can be changed in rural community land use planning to strengthen rural economies. The focus of RCW 36.70A.070(5) is on what is negative or cannot happen in rural areas and does not approach how to encourage growth that communities could possibly want.

Another possibility for change is in the state's Rural Element (WAC 365-196-425). It defines rural areas as places that generally do not require the extension of urban governmental services. However, the extension of high speed internet connections, electricity generation, and appropriate sewer and water services are critical to the vitality of most business. If rural areas do not have these services, businesses will not locate there. Managing the extension of more service is in effect managing how much growth can happen there, thus achieving in part a goal of protecting rural areas. However, if investment in increased service is located in specific business districts of concentrated areas, then the risk of sprawling growth can be mitigated. At the same time, public resources and investments will potentially spur private investments and business to locate in these areas.

This study is limited in that it offers a county level view of employment trends. Local trends and needs are likely different and it is important to recognize and address these needs. Examples of a community driven approach to rural planning is seen in relevant literature. Scholars Frank and Hibbard (2017) interviewed rural residents of Oregon counties in search of how to approach rural planning in a growth management state. In their study many rural residents expressed rural

planning should be concerned with problem-solving and empowerment, focusing on rural employment needs and opportunities. Respondents also stressed that the rural context necessitates a higher degree of integration among physical, economic, and social development, including the traditional sectors of land use planning, design of the built environment, and economic development. Respondents across the board expressed a multilevel governance view, a need to stimulate connections among market, governmental, and nonprofit institutions, and for public and private subsidization of rural areas as public goods. Currently Washington State's GMA regulations on rural land use planning seems prescriptive. It could potentially benefit from allowing for collaboration across institutions and levels of government in land use decision making and economic development.

In a separate 2014 study, Frank and Reiss suggest "the emphasis of rural planning is on practices to holistically understand and value specific rural places, empower their residents, and coordinate their constituencies". This conclusion could be applied to Washington to recognize the diversity of rural areas and allow for a flexibility of land uses within existing growth boundaries that can empower residents to expand or create new economic opportunity.

## Chapter 6. CONCLUSION

The ITSA results shows that RCW 36.70A.070(5) is not statistically correlated to a decrease in employment in GMA planning rural counties, which contradicts the claim that LAMIRD regulations are hampering economic vitality in those counties. In fact, the GMA planning rural counties of Stevens, Douglas, Pacific, and Franklin had on average a consistent positive total employment growth from 1993 to 2017. Okanogan, Lincoln, and Klickitat, the non-

planning rural counties in this study, had average total employment that did not increase overall during the 1993 to 2017 time period. These results lead to a primary conclusion that the total employment trends in GMA planning rural counties show more growth compared to the non-planning rural counties.

However, in both types of counties small business and recreational employment have similar trends with stagnant or negative average employment since the Great Recession. Thus, neither comprehensive land use planning with state provided LAMIRD guidelines nor county or local level land use decision making is creating fruitful environments for this type of employment. Though the GMA's Rural Elements are geared more to the protection of lands than economic development, these results suggest new approaches could be considered to offer rural counties more planning options. This change could show non-planning counties the benefits of comprehensive land use planning, thus encouraging more areas of Washington State to thoughtfully manage their growth and strategically support sustainable industries.

Through the review of relevant literature, it is seen that rural planning has been on the periphery of the planning field. This lack of consideration for rural planning has in part led to the rapid consumption of rural lands by urban sprawl and slow or nonexistent adaption to changing economic trends. Washington's GMA has protections to limit the loss of open space. However, Washington State is offering specific land uses for industries deemed by state lawmakers as appropriate for rural areas, LAMIRDs, for all rural areas planning under the GMA. While this might be appropriate for some places, there is a wide diversity of rural lands across the state that could benefit from land use approaches crafted to their specific needs.

The deep rural areas of Washington are currently at a vital transition point. Their economies are experiencing fundamental shifts with employment declining in some traditional industries.

Rural communities, and those who plan for them, should reconsider what are viable industries in rural areas and what can be done to encourage their development. What is at risk is losing their economic existence altogether. To be able to do this rural counties need the ability to adapt their land uses to these new realities, something that RCW 36.70A.070(5)'s LAMIRD options is not necessarily doing. This study shows that now is the time to reconsider rural land use planning in Washington State to empower rural areas to adjust to changing economic realities. Emphasis must be on both protecting rural lands and the livelihoods of rural communities.

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