Building Industry Association of Washington (BIAW)

Economic Impact Research of Exempt Wells

Executive Summary

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Background Information

The Building Industry Association of Washington (BIAW) is a non-profit organization that represents the housing industry in Washington State. Its stated mission is to ensure and enhance "the vitality of the building industry for the benefit of its members and the housing needs of its citizens." BIAW aims to fight government regulation on the industry and expand free enterprise for businesses in the state. BIAW works to affect legislature and regulations (both judicial and executive) and to disseminate information on the building industry to its members and the general public.

Water rights are a top priority for BIAW, especially after the Washington Supreme Court issued its decision in the Whatcom County v. Western Washington Growth Management Hearings Board case, also known as the Hirst decision, on October 6, 2016. BIAW's Adam Frank describes the Hirst decision as "a major blow to residential development in Washington's counties," and it will likely require a legislative fix on any or all of the following. The ruling effectively limited the use of new domestic wells in certain rural areas when they may harm senior water rights. The results of the Hirst decision affect all 39 counties within Washington State. The case builds on a 2011 win by Futurewise in Kittitas County, one of the most water restrictive areas of the state, where the Washington Supreme Court upheld that the county violated the Growth Management Act (GMA) by failing to protect rural characters' water supplies when planning growth for a variety of population densities. Ironically, rural areas are among the most to be affected by increased well regulation, even though, by definition, most rural properties lie outside of municipal water supplies.

Estimates of domestic well water usage are contradictory between the Washington Department of Health (WDOH) and the Washington State Department of Ecology (WDE); the WDOH claims that many counties are decreasing usage from self-supplied water sources while the WDE says that this percentage is increasing. Statewide, permit-exempt wells account for less than 1% of all water use. In Whatcom and Kittitas counties, where Futurewise won two court cases at the State Supreme Court level, the water use by permit-exempt wells in 2009 was estimated at 0.7% and 0.2% of the total water supply, respectively (WDE, 2015).

While the Hirst decision only directly related to Whatcom County, it "appears to set legal precedent that applies in other counties where there are instream flow rules that were not intended to regulate permit-exempt water uses," according to the WDE. The WDE is currently providing technical support to counties as they try to navigate the implications of the Hirst case. There are concerns over whether the Hirst case will affect existing wells and water users in addition to new wells and related development. Moreover, Washington State is known for its geographic variation (and by extension, groundwater availability), and different regions have diverse water needs. The Hirst decision is likely to affect Washington regions disparately.

As of July 2017, Senate Republicans claim they will not pass a capital budget without legislation aimed at overturning the Hirst decision. This decision is delaying $4 billion in new construction projects and hundreds of state jobs. A current House proposal would delay the court decision by 18 months. Meanwhile, frustrated property owners have spent thousands of dollars to prepare

building lots to find that they cannot get building permits. A further concern is that property taxes in areas affected by the legislation will be shifted to current property owners to compensate for the decreased development in rural areas. The effect of delays in building development for 2017 and future years could be detrimental to the Washington State economy. As water is rapidly becoming the primary means to control growth, an economic assessment will provide a means for the legislature to subscribe decisions that are critically needed.

Washington State Counties

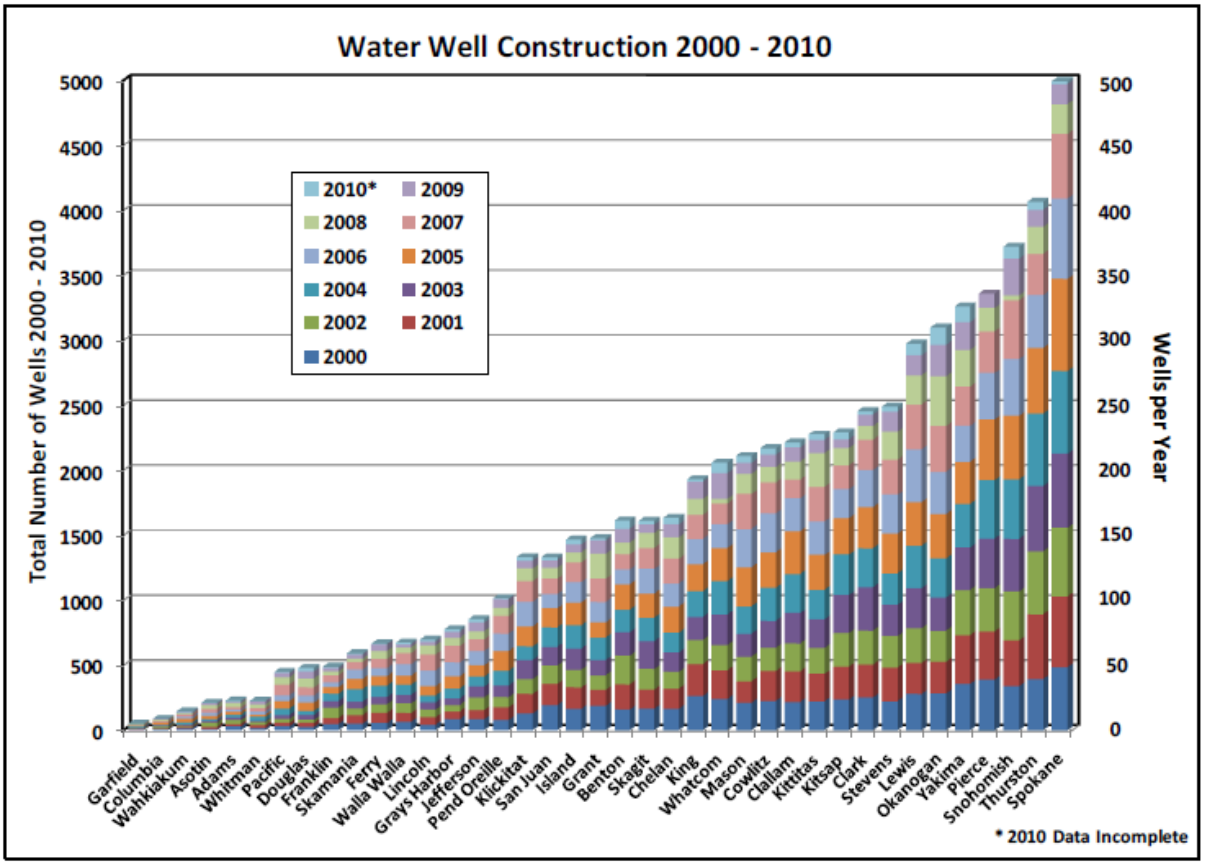
State of Washington with the outlines of Ecology's four regions

Source: Washington State Department of Ecology

In Washington State, groundwater is a function of the geological diversity, topography, precipitation, and demographics of the region. From a Gaussian statistical analysis, this includes an understanding of what is called the "P" variable, that being the sum of the GIS data points. The geology involves the types of soils, rock structures, and outflows from past and current glaciers. There are many geologic sub regions in the state, from the islands in San Juan County to the outflows in Western Washington, the Olympic and Cascade Mountain Ranges, and the desert regions east of the Cascade crest and Olympics. The recharge of ground and surface waterflows in these sub regions is determined by the precipitation in the form of rain and snowmelt.

Demographic densities are a result of economic opportunity and water/wastewater facilities. One of the descriptors of demographics comes for the statistical concept of clusters. This means that

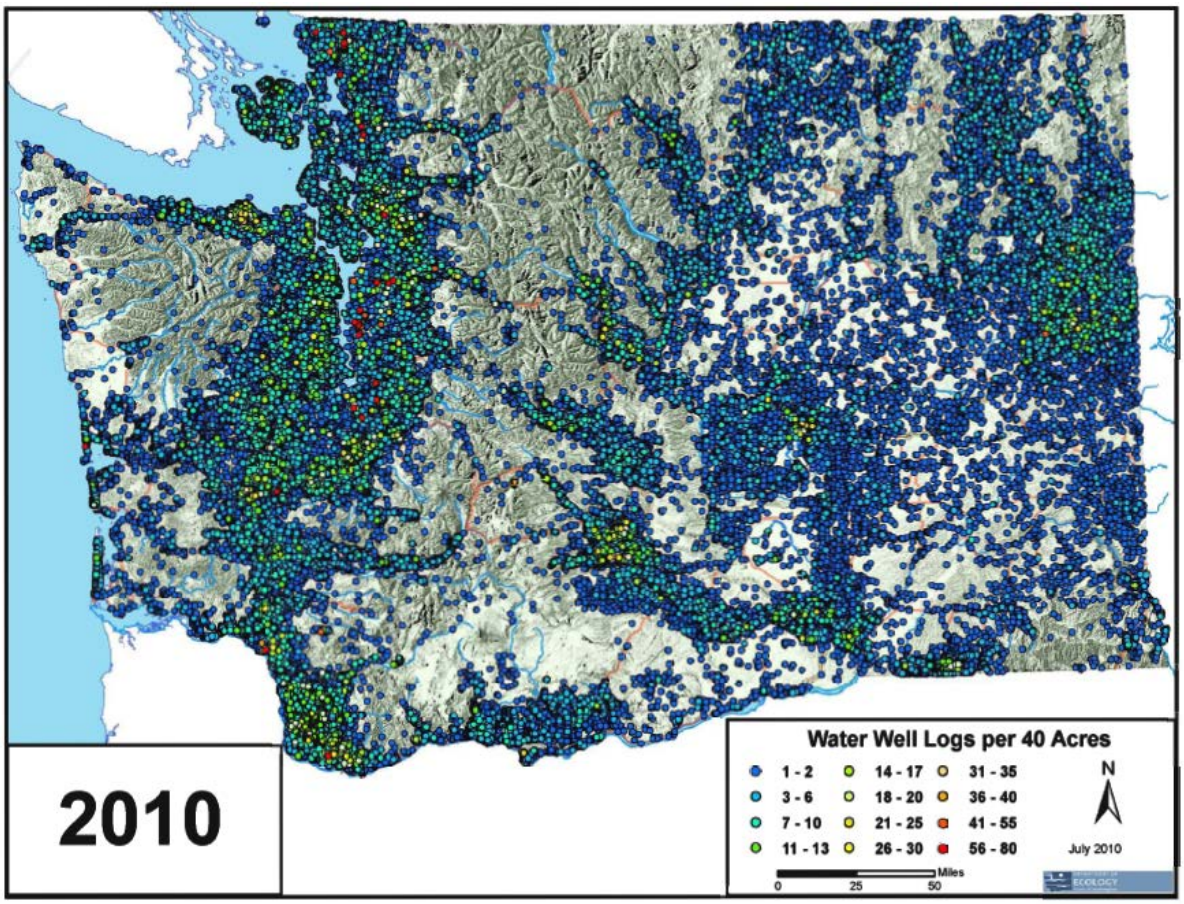
community clusters are correlated with location and the demographics of age, occupation, and income.



Yearly well construction in Washington by County, 2000-2010.
Source: WDE, taken from online Jan. 30, 2017

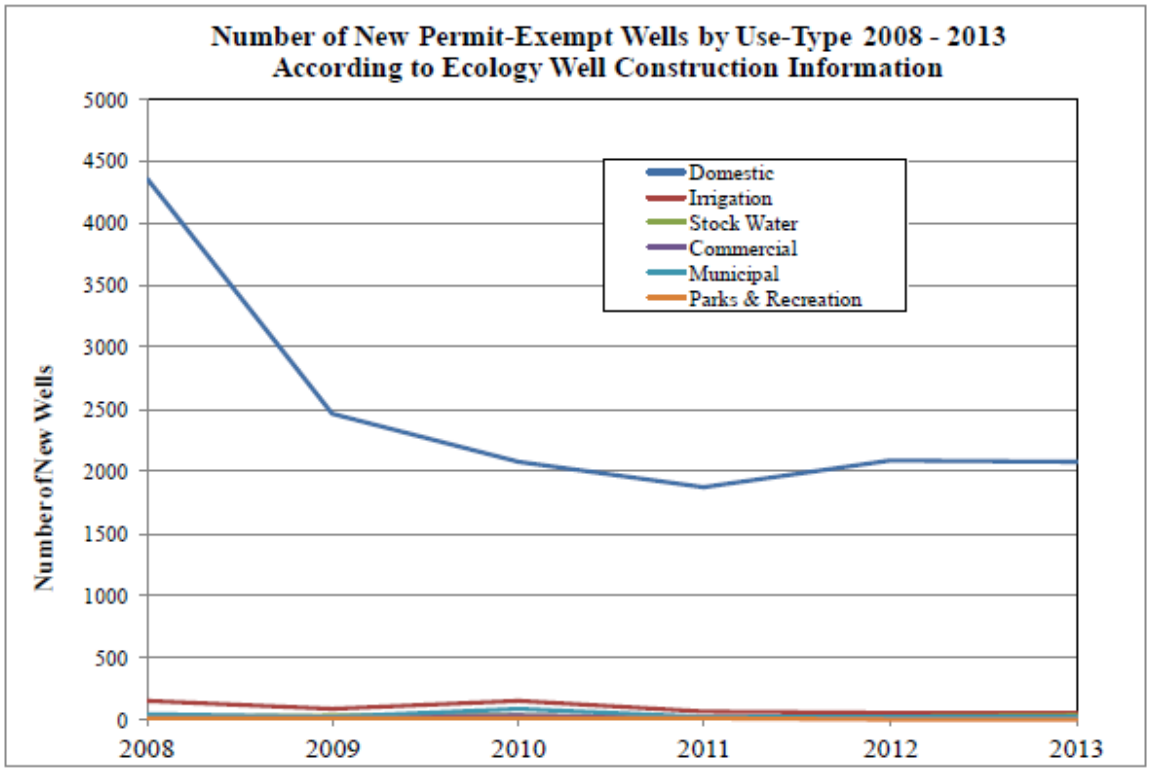
One of the major controls of population was the result of the Growth Management Act, adopted by the Washington State legislature in 1990. The theory behind the act was to determine growth in major cities and smaller towns. The act required each county to develop and update their specific growth management planning. The water well construction for Washington reveals important trends. Water well construction during the early 2000s reflected a high growth rate largely because of this policy and the reduced lot availability in urban and suburban markets.

The current lot supply has been for the most part fully developed in many urban areas, such as Seattle. The result is an increased demand for single family housing on land that is outside the urban and suburban growth boundaries. There is emerging evidence that this is part of the political and cultural agenda of the State. One of HR^2's long term findings reflects an orthogonal trend of homeownership, and political, social, and cultural values. This is the trend that is served in other areas of the nation often called the gentrification of rural areas.



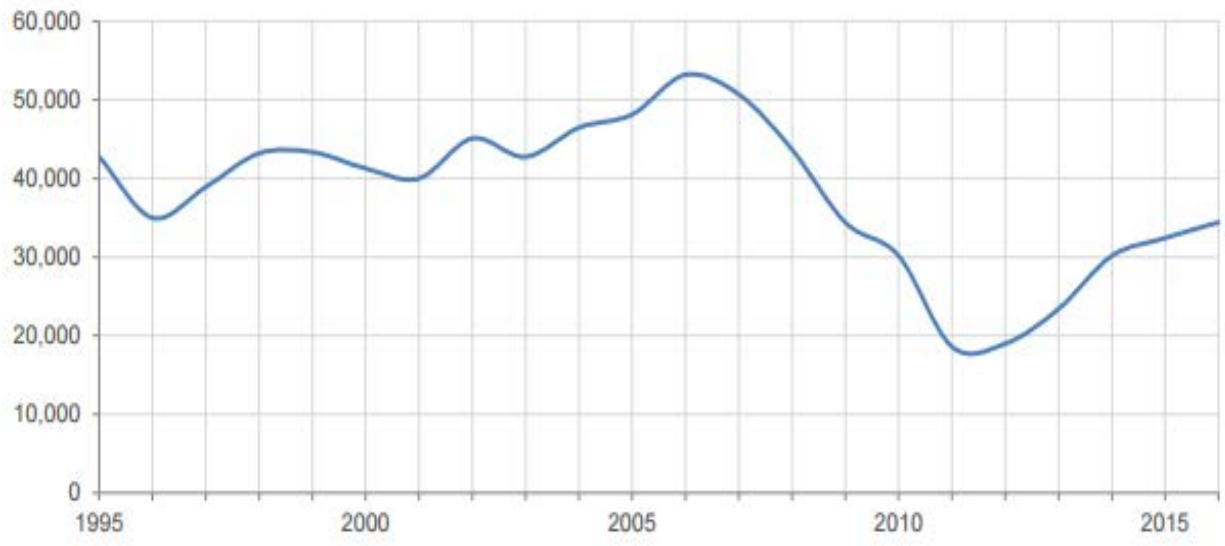
Washington well density as determined by well logs per 40 acres.
Source: WDE

This is a map of well density in Washington State as of 2010. High densities of wells are along the I-5 corridor, the islands, around Spokane, as well as the valleys on the eastern slopes of the Cascades, stretching from Klickitat to Okanagan County.



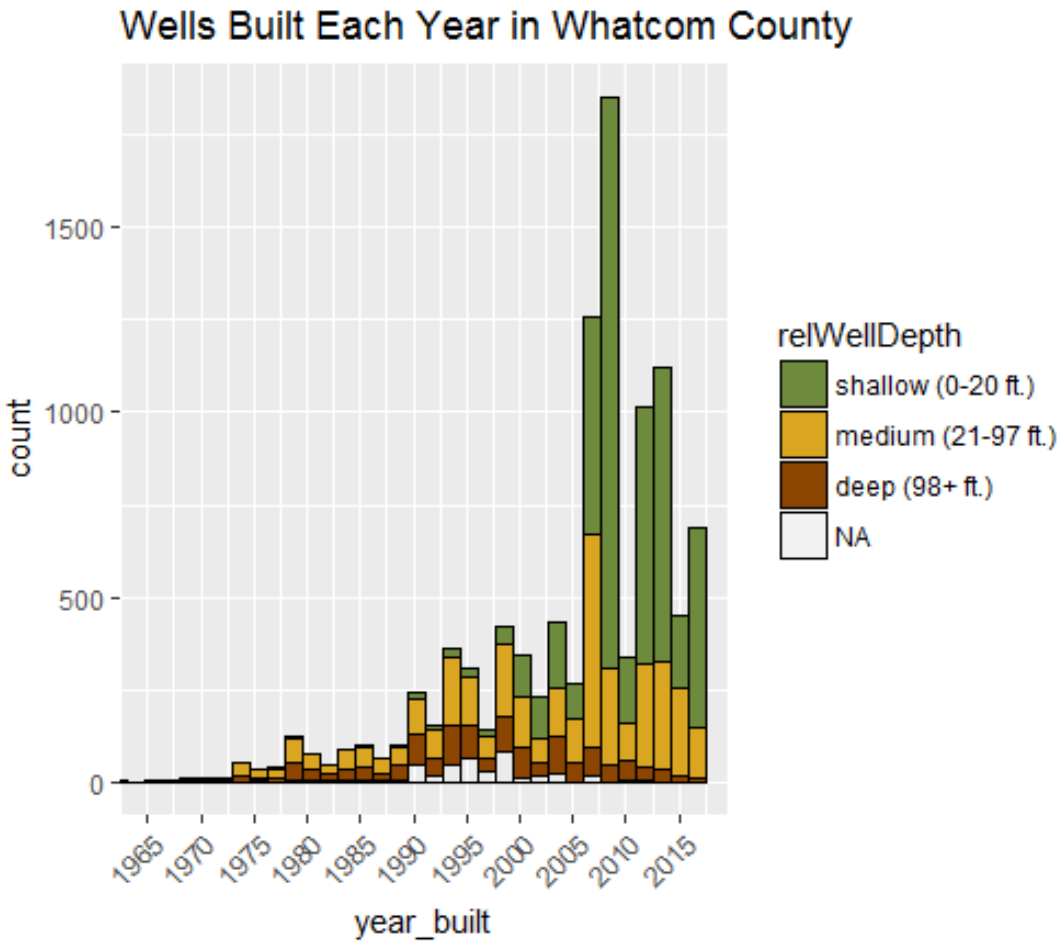
Source: WDE, *Permit-Exempt Domestic Well Use in Washington State*, 2015 report

This graph shows a decline in domestic new permit-exempt wells (in blue) following 2008. The number of new wells stabilized after 2011 at just under 2,000 new wells annually. Well construction has not returned to 2008 levels, which was near 4,500. From 2011 onwards, real estate prices, especially in urban areas, significantly increased as the availability of buildable lots declined. In contrast, homes in rural markets have not demonstrated the same growth rate in prices. Except for permit-exempt domestic wells, those with other types of usage are constrained by expense and the length of time, and have been stochastic from 2008-2013.



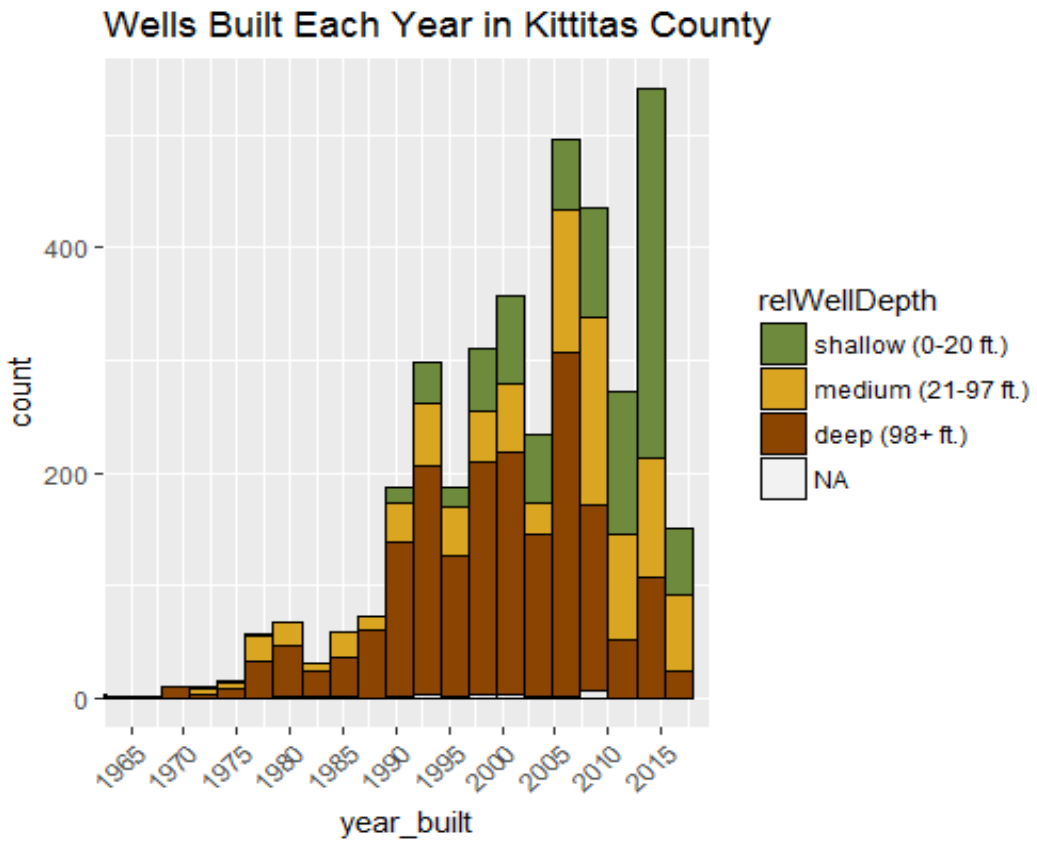
Yearly new housing units built in Washington, 1995-2016.
Source: Washington State Office of Financial Management, Forecasting & Research Division, *2016 Population Trends*, 2016 report.

Similar to decline in new well construction, new housing developments also significantly declined, and reached a low point in 2011 with about 20,000 new housing units created. However, whereas new well construction largely stabilized following 2011, housing rebounded and is again growing, and about 35,000 new housing units were built in 2016. Some of this renewed growth can be attributed to counties implementing water banking policy, as in Kittitas County, that mitigate some of the loss in new home construction due to water rights issues.



Yearly well construction in Whatcom County, 1965-2017, by relative well depth.
Source data: WDE, Jan. 30, 2017

The bar chart above shows well construction in Whatcom County by well depth. New well construction took off in 2006, and peaked in 2007 and 2008, at about 1,800 new wells. Most wells are shallow, and under 20 feet deep, though medium depth wells made up a substantial portion in 2008. New well building declined sharply following the peak in 2008, though made a recovery in subsequent years. New deep well construction has declined since 2010.



Yearly well construction in Kittitas County, 1965-2017, by relative well depth.
Source data: WDE, taken from online Jan. 30, 2017

Kittitas County has seen growth in new well construction since the early '90s. Most new well construction in the county was over 98 feet deep up until 2010. These wells are considerably more expensive than shallow wells of less than 20 feet. The years 2013-2015 saw further growth in well construction, with over 500 new wells. Most of this construction was driven by a substantial increase in shallow wells. Following this peak, new well drilling has fallen considerably.

Research Goals and Objectives

1. Provide a quantification of the economic impact resulting from the Hirst decision by the Washington State Supreme Court, as well as the lack of Legislative consideration of the significance of the decision on the State's homeowners and residents.

2. Determine the number of lot parcels that would be affected by the Hirst decision.

3. Determine the economic opportunity loss through the direct, indirect, and induced impact on housing, employment, taxes, and similar developments in rural areas affected by water rights.
    i. Loss of property value
    ii. Changes in employment or construction
    iii. Redistribution of taxable revenues (excise, sales, property tax)
    iv. Mortgage interest and closing costs
    v. Housing affordability
    vi. Well drilling companies and labor
4. Entify the prescriptive variables involved in the Artificial Intelligence algorithms and equations.

5. Identify data sources and input for model.

6. Identify economic variables impacting single family properties not served by water districts.

7. Identify the variables impacting the decision to develop property and select a site location.

8. Analyze the univariate distributions and the categorical binomials. The type of distributions and patterns is critical to the development of the economic model.

9. Determine the total economic impact from current well restriction policies on the state of Washington.

10. Assess the potential risk to employment in rural county areas.

11. Determine the potential property tax shifts from well-dependent properties to other sources of tax revenue in Washington State.

Research Methodologies

Four Methodologies Were Used:

1. Key Person Interviews With

- Members of BIAW
- Well Drillers of Washington State
- Washington State Department of Ecology
- Washington Association of Realtors
- Washington Land Title Association

2. Secondary Research

Secondary research was used to provide data not obtained by key person interviews. Our secondary research included basic searches through the databases maintained by our sources. From there we pulled relevant data for the purposes of this project.

Sources of Data

- *U.S. Census Bureau*
- *Washington State Department of Ecology*
- *Washington State Department of Health*
- *Washington State Department of Revenue*
- *Washington State Department of Labor and Industries*
- *U.S. Bureau of Labor Statistics*
- *County Tax Assessors Offices*
- *Real Estate Companies*
- *State of Washington Tax Data*
- *Washington County and City Records*
- *Building Permit Records*
- *Planning Departments*
- *Washington Association of Realtors*
- *Washington Land Title Association*

3. <u>Input Output Model</u>

In order to properly assess the economic impacts of increased permit-exempt well regulation, a comprehensive Input-Output economic model is required. This model assesses the total impact of increased permit-exempt well regulation on the overall Washington economy. The key concept behind the model is called a multiplier. The program calculates how each dollar will affect all other industries in the area. Because of the linear nature of the multiplier, the economic impact multiplier can easily be scaled to account for inputs of different sizes. The economic impact multiplier was 2.251, and can be applied to the entire state of Washington

The goal of this primary research is to provide such a model that would predict impact of permit-exempt well policies under two scenarios: a mitigation solution that has an impact on development and one that does not. To conduct this study, HR² and BIAW must define, within regional, statewide, or selected counties' models, the areas that would be affected by permit-exempt well regulation *directly, indirectly,* and through *induced* effects under each scenario. HR²'s null hypothesis is that with increased permit-exempt well regulation, the demand for housing development in the affected region will decrease.

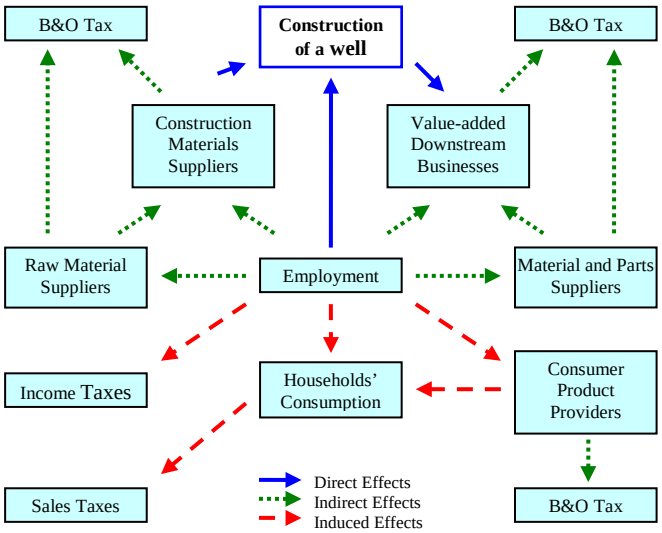
The impact of an economic stimulus can be broken down into three components: direct effects, indirect effects, and induced effects. To illustrate each of these concepts, suppose that a person decides to construct a new house and files a notice of intent with the Department of Ecology to drill a well in King County.

- **Direct effects** represent the immediate impact of an economic change on the industry directly involved. In the well construction example, direct effects would include gross revenues earned by the contractors working on the project.

- **Indirect effects** represent the changes in inter-industry purchases as the economy responds to the new demands of the directly affected industries. Following the same example, local suppliers of construction materials would increase their economic activities in order to meet new demand by the contractors.

- **Induced effects** represent the changes in spending from households as income increases due to the changes in production. In the example, construction workers would receive additional wages by working on the new housing project. They would then spend a portion of those wages on consumer goods, such as food, clothing, and entertainment, from other Washington businesses.

The effects stimulated by an example construction project are illustrated below:



*Note: This diagram is for illustration purposes only, and is by no means an exclusive list of all economic effects.

Key Model Parameters:

The input–output model is based on several parameters and algorithm attributes:

1. **Constant Returns to Scale**: Return on production is linear. If additional inputs increase, outputs increase proportionately. Because the model is reported on a year-by-year basis within this report, linearity is not considered an assumption.

2. **No Supply Constraints**: Supplies are unlimited. Industries have unlimited access to raw materials. Bellevue is a major trading hub within Western Washington. Neither short nor long term forecasts predict supplies will be a constraint to industries within the city.

3. **Fixed Commodity Input Structure**: This structure assumes that changes in the economy will affect the industry's output, but not the mix of commodities and services it requires to make its products. Thus, price changes do not cause a firm to buy substitute goods for use in production. The exogenous economic conditions are not included within this model but, if necessary, could be included. These would include major changes in inflation, interest rates, employment and consumer confidence, as well as others.

The Input-Output model estimated the citywide (regional), countywide, and statewide economic impact stimulated by a change in permit-exempt well regulation in Washington. The Input-Output Model identifies and evaluates the "expenses" of a specific economic activity and assesses the direct, indirect, and induced demand for the goods and services stimulated by such expenses. The expenses are treated as an economic initial "Input", to examine the total demand for goods and services stimulated by permit-exempt well regulation, called the "Output". The relationships between the economic input and output are measured by a term called the "Multiplier", which can be written as:

(Input) x (Multiplier) = (Output)

In this study, the Input (x variables) are the costs associated with labor, materials, and services that go into new housing development. The Output (y variable) is the total economic impact, including value added, after direct, indirect, and induced effects are accounted for.

Value Added

Value added is the difference between an industry's total output and the cost of its intermediate inputs, such as raw materials and labor. Value added may be distributed in the form of compensation of employees, tax revenues, and the surplus earned by the business (e.g. proprietor's income, shareholder's equity, etc.). Hence, value added is a comprehensive

measure of the economic benefit accruing to the community, and can be considered a one-time or annual return on community investment.

4. Artificial Intelligence Modeling

Artificial Intelligence Modeling was used for developing a predictive model. A predictive model forecasts the total impact of an economic event on the overall economy of the area being studied. The development of a predictive model will include multipliers generated from the Input Output Model, prescriptive and predictive variables, univariate/multivariate testing, and linear regression algorithms. The developed predictive model and variables will be tested with respect to their prediction and specifying the residuals and errors terms. This predicts future impacts on the economy for further development projects. This will then allow legislators and stakeholders to better understand how permit-exempt well regulation will affect economies across the state.

Use of Findings

HR^2 Research and Analytics has made every effort to produce the highest quality research product within the agreed specifications, budget, and schedule. BIAW understands that HR^2 Research and Analytics uses statistical techniques, which, in its opinion, are the most accurate possible. However, inherent in any statistical process is a possibility of error, which must be taken into account in evaluating the results. Statistical research can reveal information regarding community perceptions only at the time of the sampling, within the parameters of the project, and within the margin of error inherent in the techniques used.

Evaluations and interpretations of statistical research findings and decisions based on them are solely the responsibility of BIAW, legislators and stakeholders, and not HR^2 Research and Analytics. The conclusions, summaries and interpretations provided by HR^2 Research and Analytics are based strictly on the analysis of the data gathered, and are not to be construed as recommendations. Therefore, HR^2 Research and Analytics neither warrants their viability nor assumes responsibility for the success or failure of any legislative actions subsequently taken. HR^2 is non-partisan and does not fund political campaigns, as is well documented in the Washington State public disclosure commission.

Key Definitions

1. **Groundwater Well:**

   Groundwater is the water present beneath the Earth's surface in soil pore spaces and in the fractures of rock formations. A water well is an excavation or structure created in the ground by digging, driving, boring, or drilling to access groundwater in underground aquifers.

2. **Permit-Exempt Wells**

   Per state law (RCW 90.44.050), wells that withdraw less than 5,000 gallons per day of groundwater for domestic use such as a single home or group of homes are exempt from obtaining a formal water rights permit from the state. However, these wells are not exempt from other water-use policies, rules, and regulations. In light of the Hirst Decision, proposals to make use of permit-exempt wells may require a showing of legal water availability.

   Modifications to the existing residence and accessory buildings are allowed on the condition that a new domestic permit-exempt well is not required.

3. **Senior Water Rights:**
   A water right is the authorization to divert or withdraw some portion of waters of the state for a beneficial purpose, subject to the specific terms and conditions of a water right permit, certificate, or claim. Water use is subject to the "first in time, first in right" clause that is part of the state's water law. This means that in times of shortage, a senior water right has its needs satisfied first and a senior right cannot be impaired by a junior right. The date of a water right establishes its seniority relative to other water rights. If a water right was established prior to the water codes, the priority date is the date the water was first put to use. If a water right was acquired through the permitting process, the priority date is the date the application for a water right was filed with the WDE. Between two water rights from a single source, a senior water right is a right that has the earlier priority date.

4. **Water Banking and Mitigation:**

   Water mitigations are measures that offset potential adverse effects on a water source from a proposed water use. Water banking is one method of mitigation, which is the practice of forgoing water deliveries during certain periods, and "banking" either the right to use the forgone water in the future, or saving it for someone else to use in exchange for a fee or delivery in kind.

   For example, in Kittitas County, they enforce something called a water budget neutral mitigation (WBN). This means that water withdrawals that impact area streams are then offset by the water from existing water rights being left in the area streams. For new domestic uses, one must purchase WBN mitigation for their new homes. They can buy mitigation from either a private water bank or the Kittitas County Water Bank.

Kittitas County offers two mitigation packages in the Green and Yellow zones of the Kittitas County Water Bank. The package available to each customer will be determined by the parcel's irrigation availability. Package A, only available to folks with access to other outdoor irrigation, will offer 275 gallons per day for indoor domestic use only and Package B, only available to folks without access to outdoor irrigation, will offer 275 gallons per day for indoor domestic use only, with 25 gallons per day for outdoor use up to 500 square feet. The packages offered through the Kittitas County Water Bank were determined by a Citizen's Advisory Committee and adopted by the Board of County Commissioners.

5. **Notice of Intent:**

According to the Department of Ecology, a property owner seeking to have a well-constructed or decommissioned is required to submit a Notice of Intent (NOI) to Ecology.

The NOI is not a permit, certificate, or application for a water right. Your NOI does not represent approval or permission to use water from the well. Once the well is drilled, the water may only be withdrawn if it is legally available and then NEEDS TO BE put to beneficial use to establish a "right" to use of the water.

The property owner must submit an NOI to Ecology at least 72 hours prior to well construction or decommissioning, along with a possible fee.

6. **Completed Well:**

For our purposes, a completed well is a water well that has actually been constructed for which a report, or "well log", has been submitted and filed in the Washington State Department of Ecology records.

7. **Labor and Industries Tax (L & I):**

According to Washington States Labor and Industries, L&I is a tax levied for workers compensation, workplace safety, labor, and consumer protection, based on the number of hours worked by employees. Different industries pay different rates based upon that industries risk classification.

8. **Real Estate Excise Tax (REET):**

According to the Washington State Department of Revenue (WDOR), it is a tax on the sale of real estate. The real estate excise tax is typically paid by the seller of the property, although the buyer is liable for the tax if it is not paid. The tax applies to the seller. The tax also applies to transfers of controlling interests (50% or more) in entities that own property in the state.

9. **Business and Occupation Tax (B&O):**

According to WDOR, Washington's business and occupation (B&O) tax is levied on the gross receipts of business operations. This means there are no deductions for labor, materials, taxes or other costs of doing business. This is different from an income tax which is applied to the net income of business operations. The nature of the business activity determines appropriate B&O tax reporting. There are different B&O tax classifications for extracting, manufacturing, wholesaling, government contracting, public road construction, service and other activities, retailing and others. Each classification has its own tax rate. Businesses performing more than one activity may be subject to tax under one or more B&O tax classifications.

10. **Retail Sales Tax:**

According to WDOR, businesses selling goods at retail or performing retail services (such as custom prime construction) must also collect and remit retail sales tax on their total charges unless a specific exemption applies. This taxable amount includes charges for permits and other fees, labor, profit, materials and charges for subcontractors. Sales tax rates vary around the state. Contractors performing retail services must collect sales tax based on the tax rate of the jurisdiction in which they perform their services.

11. **Use Tax:**

According to WDOR, in general, use tax is due on items "used as a consumer" upon which retail sales tax has not been paid. If sales tax has not been paid on purchases of tools, supplies, and materials used in the construction but not incorporated into the real estate improvements, use tax is due. Use tax is also due on items extracted (such as rock) or produced (such as tooling) and used by the contractor in performing the construction. The use tax and sales tax rates are the same. The applicable tax rate is determined by the location where the item is first used or where the construction service is performed.

12. **Real Property Tax:**

State law requires that county assessors appraise all property at 100% of its true and fair market value in money, according to the highest and best use of the property. Fair market value or true value is the amount that a willing and unobligated buyer is willing to pay a willing and unobligated seller. The county assessor values real property using one or more of three professional appraisal methods. The tax levied on this assessed value of the property is the real property tax.

13. **Standard Deviation**

Standard deviation is a measure used in statistics to quantify the variation in a dataset. It is an aggregate measure of how far each data point is from the mean of the dataset. A smaller standard deviation indicated that there is little dispersion in the dataset, while a larger standard deviation indicates that values differs substantially from the mean.

14. **Kurtosis**

Kurtosis is a measure of outlier values within a data set. Higher values of kurtosis indicate that either the data is clustered around the mean with some values far from the mean, or, there is a high concentration of values on either ends of the mean.

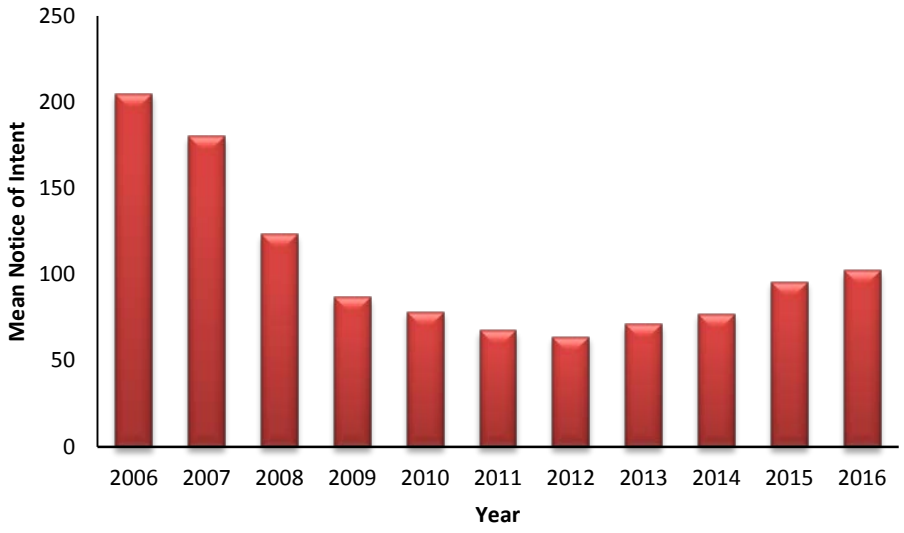
15. **Correlation Coefficient**

The correlation coefficient measures the linear relationship between two variables. The value can range from -1, to 1. A value of 1 indicates a perfectly linear relationship, a value near 0 indicates no linear relationship, and a value of -1 represents a negative linear relationship. If for every unit increase in A, B decreases one unit, then the correlation coefficient *r*, would be -1.

Notice of Intent

Total number of **Notice of Intent** filed during **2006-2016: 44,888**

Annual Mean of Notices of Intent Filed in Washington State Counties: 2006-2016



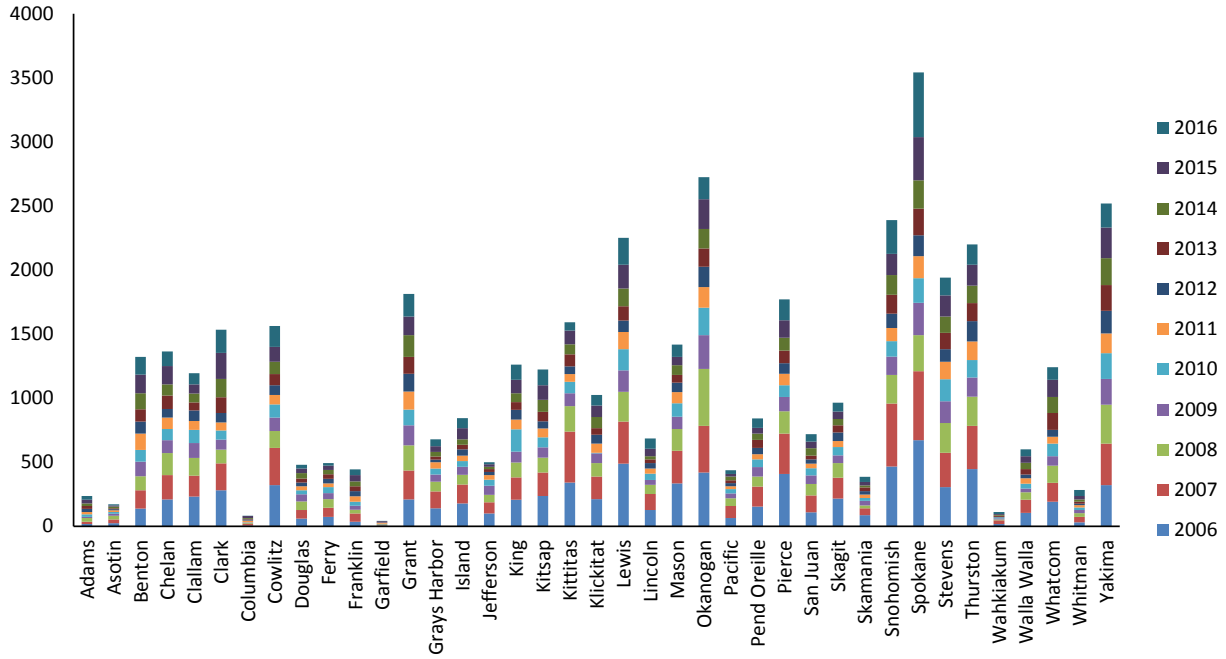
Notice Of Intent	*Values*
State Annual Mean	4,080.73
Annual Mean per County	104.63
Standard Deviation	97.37
Kurtosis	5.58

The graph above shows the mean of notice of intents filed for wells for Washington State counties. This data only includes the filing of notice of intents in this period. The highest county mean for notice of intents filed was in 2006, and this declined until 2012, when the annual mean started to increase again. This sharp drop in the county mean of notices of intent filed explains the high standard deviation, at 97.37. Over this 11-year period, the mean annual notices of intent filed per county was 104.63.

Total Notices of Intent by County (2006-2016)

Sr. No	County	Notice of Intent
1	Adams	237
2	Asotin	172
3	Benton	1,321
4	Chelan	1,365
5	Clallam	1,194
6	Clark	1,535
7	Columbia	80
8	Cowlitz	1,562
9	Douglas	479
10	Ferry	493
11	Franklin	444
12	Garfield	42
13	Grant	1,813
14	Grays Harbor	679
15	Island	843
16	Jefferson	499
17	King	1,262
18	Kitsap	1,223
19	Kittitas	1,591
20	Klickitat	1,025
21	Lewis	2,252
22	Lincoln	684
23	Mason	1,418
24	Okanogan	2,724
25	Pacific	438
26	Pend Oreille	842
27	Pierce	1,771
28	San Juan	719
29	Skagit	965
30	Skamania	386
31	Snohomish	2,389
32	Spokane	3,543
33	Stevens	1,941
34	Thurston	2,200
35	Wahkiakum	112
36	Walla Walla	600
37	Whatcom	1,241
38	Whitman	284
39	Yakima	2,520
	Total	**44,888**

Total Number of Notices of Intent by County: 2006-2016



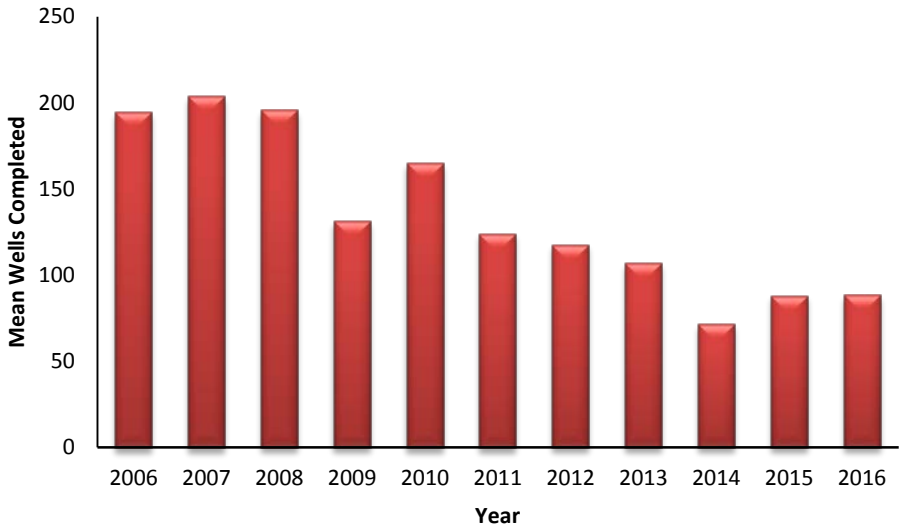
Washington Counties

The chart on page 23, and the graph above, show the total notices of intent filed by each county from 2006-2016. Spokane county saw the most notices of intent, with over 3,500 in the 11-year period. Spokane also differs from other counties with a high amount of notices of intent filed in 2016. This surge in notice of intent filings for Spokane resulted from the anticipation of limits on well construction related to the Hirst decision. The blue and red segments in the bottom of the graph reflect the high annual county mean for 2006 and 2007. Totals declined in 2008, and continued to decline until 2012. Overall, notices of intent have increased in the last few years.

Wells Completed

Total number of **Wells Completed** during **2006-2016**: **57,946**

Annual Mean of Number of Wells Completed in Washington State: 2006-2016



Wells Completed	
State Annual Mean	5,268
Annual Mean per County	135.07
Standard Deviation	166.91
Kurtosis	14.56

The variance between notice of intents and wells completed cannot be compared, because they are separate and distinct. With the lack of an expiration date on notices of intents, well drilling does not necessarily occur in the same year as the filing. For instance, an owner of a property may file a notice of intent in 2005, and could actually drill the well in 2012. Also, a well drilled does not indicate a building permit.

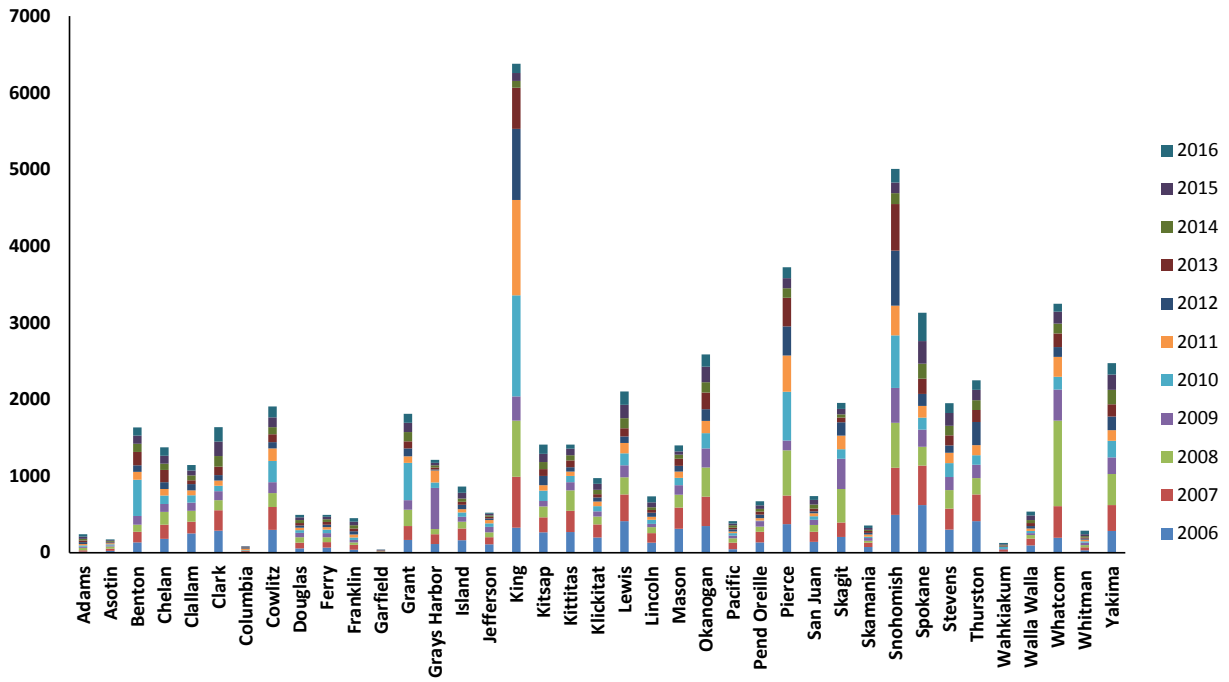
This chart reflects the annual mean of wells completed for Washington State counties. Overall, there were more wells completed in this span than there were notices of intent filed. Well completion has shown a steady decline from the 2006-2008 period. In these years, the mean annual well completion was about 200 for all Washington counties. This declined to a low of about 75 in 2014, though increased to around 100 in 2015-2016. This variance is largely

explained by the conversion coefficient from the notice of intent to wells completed. The wells drilled includes only those for single family homes.

Total Wells Completed by County (2006-2016)

Sr. No	County	Wells Completed
1	Adams	242
2	Asotin	175
3	Benton	1,635
4	Chelan	1,374
5	Clallam	1,145
6	Clark	1,637
7	Columbia	84
8	Cowlitz	1,907
9	Douglas	492
10	Ferry	493
11	Franklin	452
12	Garfield	42
13	Grant	1,811
14	Grays Harbor	1,213
15	Island	863
16	Jefferson	521
17	King	6,379
18	Kitsap	1,412
19	Kittitas	1,410
20	Klickitat	974
21	Lewis	2,103
22	Lincoln	736
23	Mason	1,401
24	Okanogan	2,586
25	Pacific	412
26	Pend Oreille	671
27	Pierce	3,724
28	San Juan	738
29	Skagit	1,954
30	Skamania	353
31	Snohomish	5,006
32	Spokane	3,131
33	Stevens	1,951
34	Thurston	2,249
35	Wahkiakum	126
36	Walla Walla	537
37	Whatcom	3,247
38	Whitman	286
39	Yakima	2,474
	Total	**57,946**

Total Number of Wells Completed by County: 2006-2016



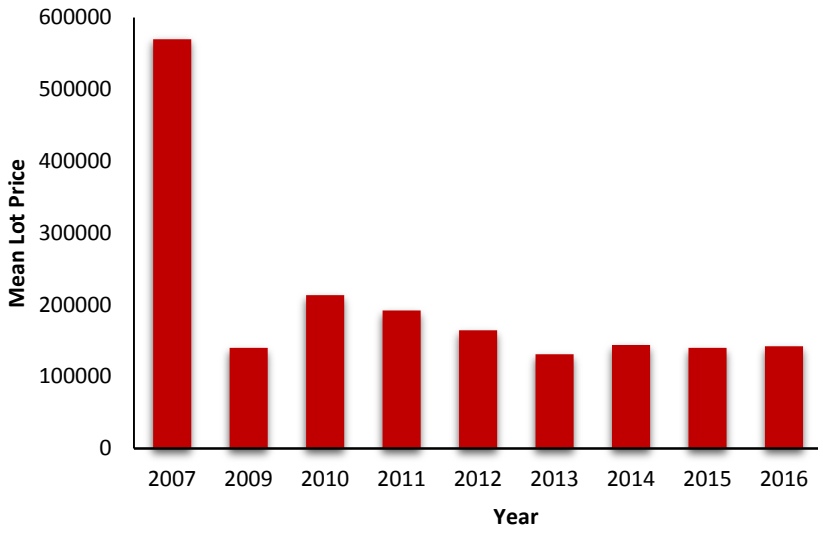
Washington Counties

The above graph and the chart on page 26 show the total wells completed by county from 2006-2016. These sums only include drilled wells, and do not have a relation to building permits. Most of the properties of these drilled wells are owned by individuals for later retirement purposes, or as an investment. Washington saw high numbers of wells completed from 2006-2008. King County saw the most wells completed by far in this period, with 6,379. Whereas most counties saw sharp declines following 2008, King County experienced its highest rate of well completion between 2010 and 2012. Two other Western counties, Pierce and Snohomish, also saw relatively similar rates of well completion during this time. The high number of wells completed during this time breaks from the trend for the rest of the state.

Mean Sale Price of Buildable Lot

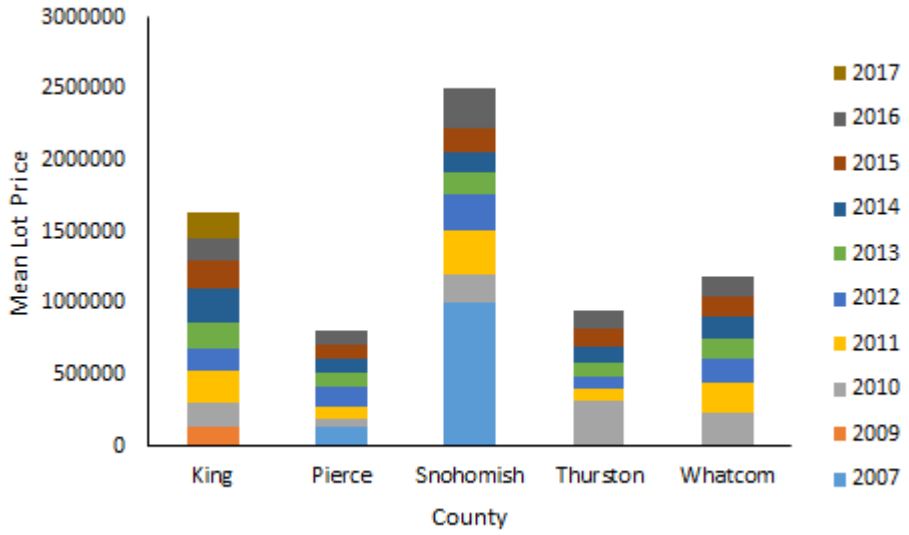
Annual Mean of **Lot price** in Washington State (2007-2016): **$193,612**

Annual Mean Price of Buildable Lots in Washington State: 2007-2016



The chart above displays the sharp decline in price of buildable lots after 2007. That year saw a mean lot price of just under $600,000. The next 10 years saw much lower lot prices, with the mean price for most years under $200,000. Building lot prices stabilized from 2014-2016. There is a high probability of increases in lot prices based on the changes in the demand equation, as a result of legislative policies. It is important to note that the owners of single family lots with a well are largely explained by two variables, one as a buildable property for retirement and second home purposes, as well as investment purposes.

Mean of Lot Price in Washington State by County: 2006-2017



This graph exhibits mean lot prices by year and county, for five western counties with high well drilling activity. Snohomish County largely reflects the trend of the state, with very high lot prices in 2007, followed by a sharp decline, and then with a resurgence in the last year. Snohomish County experienced the largest increase in lot price because of the affordability compared to King County, and economic development of major technology companies, including Boeing.

Note: not every year is included for the five counties.

Costs Associated with Single Family House Construction

The economic impact of permit-exempt well policy to Washington State will be a result of lost revenues from housing construction. The construction cost of a home was estimated. The table below summarizes the cost estimates:

Cost Associated with House Construction	
Mean selling price of lots in well-water dependent areas	$ 193,612
Mean cost of new home Construction (without land cost)	$ 387,224

Cost of Well Drilling Operations

The mean cost of drilling a 199 foot well was estimated. The table below also summarizes the estimates for costs:

Total Cost Associated with Drilling Wells	
Cost Per foot of drilling	$45
Cost of drilling 199 foot well	$8,955

Direct costs associated with drilling of wells:

A. The fee for construction of a new water well with a minimum top casing diameter:
   - < 12 inches = $200
   - >12 inches or more = $300

B. Cost of Water test : $20 - $40

As noted in the well depth, there is considerable variance by county and area in the state, depending on the geology, precipitation, and other related variables.

Full-Time Employees and Total Wages

Washington State Well Drilling Industry	
Total Number of Well Drillers	239
Employment Numbers[1]	300
Hourly Mean Wage	$29.02
Annual Mean Wage[2]	$60,360

Note:
(1) Detailed occupations are from the BLS. Self-employed workers are not included.
(2) Annual wages have been calculated by multiplying the hourly mean wage by 2,080 hours. Tax is not included.

Washington State Single Family Home Contractors	
Employment Numbers[1]	24,813
Employment on Well Dependent Houses[2]	8,891
Hourly Mean Wage	$23.43
Annual Mean Wage[3]	$48,735

Note:
(1) Detailed occupations are from the BLS. Self-employed workers are not included.
(2) Calculated based on relationship between total new single-family detached homes constructed and wells drilled between 2010 and 2016.
(3) Annual wages have been calculated by multiplying the hourly mean wage by 2,080 hours. Tax is not included.

Annual Economic Impact for Single Family Home Construction

Mean Cost of New House Construction: **$387,224**

Economic Impact of House Construction

Year	Numbers of wells Completed	Total Cost of Houses Constructed (2006-2016)	Total Economic Cost of House Construction
2006	7,591	$2,939,417,384	$6,616,628,531
2007	7,938	$3,073,784,112	$6,919,088,036
2008	7,633	$2,955,680,792	$6,653,237,463
2009	5,124	$1,984,135,776	$4,466,289,632
2010	6,431	$2,490,237,544	$5,605,524,712
2011	4,838	$1,873,389,712	$4,217,000,242
2012	4,586	$1,775,809,264	$3,997,346,653
2013	4,165	$1,612,787,960	$3,630,385,698
2014	2,781	$1,076,869,944	$2,424,034,244
2015	3,428	$1,327,403,872	$2,987,986,116
2016	3,431	$1,328,565,544	$2,990,601,040
Mean Economic Impact of House Construction Cost each Year			**$4,591,647,487**

The total cost of houses constructed was calculated by taking the mean price of a new house construction from 2006-2016 ($387,224), and multiplying it by the total number of wells completed. This gives an estimate of the total cost associated with houses built on wells. The multiplier is then used to calculate the total economic activity related, either directly or indirectly, to the construction of houses on wells. The multiplier is based on IMPLAN for Washington State, specifically involving single family homes in areas dependent on wells. The total economic cost of house construction was highest between 2006 and 2008, with economic activity in the sector accounting for over $6.5 billion annually. This has declined since, and the estimates for 2015 and 2016 show that the total cost surrounding house construction on wells is just under $3 billion.

Annual Economic Impact of Well Construction

Year	Wells Constructed	Cost of Well Construction Well[2]	Total Economic Cost of Well Construction
2006	7,591	$64,941,005	$146,117,261
2007	7,938	$67,909,590	$152,796,578
2008	7,633	$65,300,315	$146,925,709
2009	5,124	$43,835,820	$98,630,595
2010	6,431	$55,017,205	$123,788,711
2011	4,838	$41,389,090	$93,125,453
2012	4,586	$39,233,230	$88,274,768
2013	4,165	$35,631,575	$80,171,044
2014	2,781	$23,791,455	$53,530,774
2015	3,428	$29,326,540	$65,984,715
2016	3,431	$29,352,205	$66,042,461
Mean Economic Impact of Well Construction Cost each Year			**$46,064,534**

Note:

1. Conversion ratio of 0.56 used for calculating wells constructed from the Notice of Intent filed each year and the total number of approved wells

2. Cost of one well: Mean of average depth 199 foot multiplied by $45 per square foot cost = $8,955

The total economic impact from well construction was greatest in 2006, and then steadily declined until 2012. Since then, well construction has been on the rise, and generated an estimated value of $46 million to the Washington State economy in 2016, through direct and indirect channels.

Direct Taxes

Taxes	Total Value (2006-2016)	Annual Mean
House, Well, and Lot Value	**$34,176,029,289**	**$3,106,911,753**
Sales and Use tax ***(8.8%)***	$3,007,490,577	$273,408,234
Property Tax ***(0.93%)***	$104,337,080	$9,485,189
Excise Tax ***(1.78%)***	$608,333,321	$55,303,029
Title Insurance Tax	$15,065,960	$1,369,633
Business and Occupation Tax ***(0.47%)***	$107,897,845	$9,808,895
Unemployment Tax ***(1.24%)***	$284,666,655	$25,878,787
Total	**$4,319,637,040**	**$392,694,276**

Note:
1. Total cost of construction cost is $387,224, the mean well cost is $8,955, and the mean lot price is $193,612. The total number of wells drilled 2006-2016 = 57,946. So, the total cost is $34,176,029,289.
2. This rate comes from the 2017 State mean, from the Washington State Department of Labor.
3. Business and Occupation and Unemployment tax only applies to well and house construction.

Between 2006 and 2016, an 11-year period, the state and local governments collected around $4.3 billion in tax revenue related to the housing industry's involvement with the development of water well properties.

Skagit County Model: Property Devaluation and Tax Shift

Based on analysis from the Skagit County Assessor's Office's implementation of the Swinomish decision, we estimate the Hirst decision will greatly diminish the value of undeveloped properties in impacted zones, subsequently reducing property tax revenue from these locations.

	Unincorporated Housing Units	Unimproved Parcels without Water	Ratio
Skagit County	23,294	10,450	0.45
Washington State	1,066,214	478,318*	0.45

*To extrapolate the effects seen in Skagit County to the state, we found the relationship between the unimproved parcels without water to the unincorporated housing units. We then used this ratio to estimate the number of unimproved parcels in the state.

	Unimproved Parcels without Water	Impacted Properties	Ratio
Skagit County	10,450	6,000	0.57
Washington State	478,318	274,632*	0.57

*The Skagit County Assessor's Office estimated about 6,000 properties impacted from the Swinomish decision, of about 10,450 total undeveloped properties without water access. We then used this ratio to estimate the number of unimproved properties that would be affected in Washington State.

	Impacted Property Value	Impacted Property Tax .93%
Pre-Hirst Value	$53,172,102,250	$494,500,551
Post Hirst Value	$15,951,630,675	$148,350,165
Property Value Loss/Property Tax Shift to Other Property Owners	$37,220,471,575	$346,150,386

The Skagit County Model estimates a property shift of 70% in property value to affected areas.

Conclusions

1. The ground water supply is highly complex, with over 100 independent variables and multicollinearity. Ground and surface water flows are a result of the diverse geological arrays of soil, rock conditions, recharge rates, precipitation and their competing uses for fish, agriculture, recreation impacts from deforestation, and other biological changes over time.

2. The demand equations of population growth are especially related to the Growth Management Act's policies and changes. Economic conditions of employment centers, transportation corridors and buildable and affordable inventories of lots for single family construction were considered as well. There are social, psychographic, and demographic changes that also affect demand.

3. The residential housing sector involved with building single family homes requiring ground water wells has a total employment of 9,291 FTE. The direct labor totals $452,310,885 in income to employees in the State of Washington. Much of this will be spent in more rural counties.

4. The annual tax revenue from 2006-2016 related to development of well dependent homes was approximately $4,341,291,430. This estimate comes from the sum of local and state taxes on housing and well construction and lot purchases over an 11-year period (2006-2016). The mean annual tax revenue in this sector is $392 million.

   Furthermore, an extrapolation of Skagit County property data to Washington State gives insight into the potential huge loss of value and subsequent shift in tax burden that the Hirst decision could bring. We estimate that about 275,000 undeveloped properties (without water access) in Washington State could lose about 70% of their value. This would be a tax shift of about $346 million in property tax from these rural areas to existing property owners.

5. The total asset value of the lots with wells and final house construction represented $34.2 billion of assets between 2006 and 2016, and an annual mean value of $3.1 billion in assets. These sums incorporate the values of houses, wells, and lot values. Based on the key person interviews of the president and senior real estate planning officers, this total asset value may not be realized, depending on the domestic water well issue. Furthermore, there was a warning that current lots that were being financed would lose substantial value and potentially be foreclosed. Depending on the extent of the policies which would impact developability for these approximately 57,946 properties that already have wells, and in addition to those approximately 275,000 unimproved lots estimated from the Skagit County model, there is a high potential financial risk to the financial mortgage loan community. Some of the banks reported that they have already

discontinued their lending activities for single family wells involved in a domestic water right issue.

6. Affordable housing, especially in urban centers such as Seattle and Bellevue are less subsidized, and beyond the budgets of many potential home buyers. Adverse policy restricting the building activity of single family domestic wells in rural areas throughout the state will further impact the affordability and increase the demand on roads and infrastructure within the urban centers. This also has a high probability of effecting the continued strong economic growth of the high-tech industry, which can provide incomes for housing purchases.

Economic Summary

Cost	Number of Employees (FTE)	Annual Salary FTE
House Construction	8,891	$433,302,885
Well Construction	300	$19,008,000
Total Jobs and Salary[1]	**9,291**	**$452,310,885**

1. This is the sum of Home Construction workers and Well workers, and their mean salaries.

Total Economic Cost	
Total Economic Cost of Lot Sales and Construction of Wells and Houses each Year	**$6,990,551,444**

The above charts give a summary of the total economic activity surrounding housing construction on properties dependent on well use.

The total jobs and salary represent all employees surrounding the development of well dependent properties, which includes well workers and construction workers.

The total economic cost surrounding industry involved in the development of properties reliant on wells was calculated by adding the mean annual economic impact of housing construction cost to the mean annual economic impact of well construction cost each year. Overall, we estimate that the development of single family domestic use well properties in Washington State contribute $6.9 billion to the economy, through direct and indirect impacts.