# Impact of Oyster Aquaculture in Virginia on Waterfront Property Values

Katie Stump

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Master of Science in Agricultural and Applied Economics

Kevin J. Boyle, Committee Co-Chair

S. Kurt Stephenson, Committee Co-Chair

Jonathan van Senten

May 13, 2019

Blacksburg, VA

# Impact of Oyster Aquaculture in Virginia on Waterfront Property Values

Katie Stump

## ABSTRACT

Virginia is the east coast's largest producer of eastern oysters and produces more than any other state. As the industry grows to meet increasing demand, more conflicts have arisen with other resource users, especially waterfront property owners. Some landowners claim oysters impact recreational and aesthetic uses of their property, therefore lowering the value of the home. Using a hedonic property value model, this study examines the effect of oyster aquaculture on waterfront properties by using 2,245 property sales from 16 counties and independent cities and information on aquaculture activity from 2012-2016. The results suggest that oyster aquaculture has a positive effect on waterfront property values, but a negative effect when using cage equipment.

# Impact of Oyster Aquaculture in Virginia on Waterfront Property Values

Katherine Stump

## GENERAL AUDIENCE ABSTRACT

Virginia is the east coast's largest producer of eastern oysters and produces more than any other state. As the industry grows to meet increasing demand, more conflicts have arisen with other resource users, especially waterfront property owners. Some landowners claim oysters impact recreational and aesthetic uses of their property, therefore lowering the value of the home. This study examines the effect of oyster aquaculture on waterfront properties. The results suggest that oyster aquaculture has a positive effect on waterfront property values, but a negative effect when using cage equipment.

Table of Contents

## Introduction

The eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*) have been a major part of the culture, environment, and economy of Chesapeake Bay communities for centuries. Oysters generally grow in shallow areas in the Chesapeake Bay and its tributaries, and this is where aquaculture leases are placed. However, this is near where many people live and enjoy the water. Some members of waterfront communities argue that aquaculture sites hinder boating, other recreational activities, and aesthetic uses of their property. The equipment and markers associated with leases influences boating and navigation and could be visible from the shore depending on the tide and time of year. Additionally, aquaculturists do have to maintain the lease and harvest shellfish, which could also affect aesthetics. They argue that this decreases the value of waterfront properties [1]. If the presence of aquaculture operations does lower property values, this can have impacts on Bay communities through reduced property tax revenues. Residents of the Lynnhaven River system, near Virginia Beach, attempted to restrict oyster aquaculture by making it more difficult to obtain a lease in this area, which led to a temporary moratorium of new leases[2]. Much of these conflicts center around the use of cage equipment when growing oysters [3]. While public opposition to aquaculture appears to be localized,

Virginia legislators have proposed bills to reduce such conflicts could affect operations throughout the state. In January 2016, a proposed bill would have increased the cost of oyster leases within 1,000 feet of a residential property. According to the Virginia Marine Resources Commission (VMRC), this plan would affect fifty to seventy percent of the 119,000 acres of waterways available for leasing [4]. Other proposed legislation would make it easier for waterfront property owners to lease water near their property so that area cannot be used for commercial aquaculture [5]. Although neither of these bills passed, it shows that some policymakers are listening to these concerned landowners.

Whether shellfish aquaculture operations affect property values is an open question. The nearshore shellfish aquaculture may or may not impede recreational and other uses of the water or affect visual aesthetics. If there is an effect, this in turn could impact residential waterfront property values. A positive and significant effect on property values could reflect the ecosystem services that shellfish aquaculture provides, including water quality improvements by oysters. A negative and significant effect on property values indicates a resource use conflict between aquaculture growers and waterfront property owners that is reflected in lower property prices. If there is no effect on property prices, this suggest property prices are not influenced by nearby aquaculture operations.

This research will investigate the potential effects of aquaculture on residential property prices, with a focus on oyster aquaculture. The investigation will also consider if the use of cages and other aquaculture equipment affects property prices differently than growing shellfish in clusters on the bottom of the water. A hedonic property value study will be used to conduct these investigations [6]. The study area is eastern mainland Virginia and will use data covering the period from 2012 to 2016. The results show that active aquaculture leases have a positive effect on nearby property values, but aquaculture with cage equipment has a negative effect.

**Oyster Leasing and Aquaculture**

Historically, wild harvesting of oysters was more popular in Virginia than aquaculture. However, disease and habitat loss contributed to a decline in wild populations and wild harvest [7]. Improvements in production practices and growing consumer demand have fueled growth, especially in planting and harvesting oysters. Advances in oyster hatchery breeding techniques and innovations in technology have increased mortality and growth rates and allow for more efficient production. Clam aquaculture is a more well-established industry, and aquaculture has been the main source of clams for over a decade [8].

Oyster aquaculture is the fastest growing sector of shellfish aquaculture in Virginia and the state is the east coast's largest producer of eastern oysters. Virginia also produces more hard clams than any other state. Oysters are either grown using intensive or extensive methods. Intensive aquaculture involves growing oysters in a floating or on-bottom cage. In extensive, or spat-on-shell aquaculture, oysters grow on the bottom of the water, like wild oysters. Clams are normally grown in pots covered in netting [8].

Shellfish growers must obtain a lease to grow shellfish from VMRC. As part of the application process, growers must specify the location where they wish to lease, what species they will plant, and what equipment they plan to use. Equipment that extends more than one foot from the bottom requires additional documentation. Bottom cages do not need this additional documentation, but floats and other water column equipment do. Once a lease is assigned, the lease lasts for ten years [9]. Application fees range from $300 to $1,000 depending on the size of the lease. These same fees apply when the lease is transferred. These fees are one-time and there are additional fees associated with leasing application, including surveying fees, a $50 fee to harvest oysters for commercial use, and a $1.50 yearly rental fee [10]. A leaseholder can renew the lease if VMRC receives another application from them. When considering a lease renewal, the commission can consider to the public benefits of the aquaculture activity and whether continuation

of the lease is in the public interest. If there has been no significant production, VMRC will not approve the renewal. A recent law directs VMRC to create a lease renewal fee up to $300 [11]. Each month, aquaculture growers are required to report harvest information to VMRC, including date of harvest, location, equipment used, species and amount harvested, and number of crew members [12]. The boundaries of active lease grounds and any equipment must be marked with markers or buoys [13].

Certain measures exist in the leasing process to help resolve conflicts between leaseholders and other parties, including nearby property owners. When a grower applies for a new lease, residents are notified by newspaper advertisements and public flyer postings. A map of all leases and pending applications is publicly available online, so a homebuyer can find out if a property is near any oyster leases. There is no information at this source on whether the lease is active [14]. If the application is protested within 30 days of lease assignment and no initial compromise can be reached, VMRC must hold a public hearing on the application [10]. Protests can come from nearby property owners, adjacent leaseholders, public harvesters of oysters, or others.

Expansion of shellfish aquaculture provides several ecosystem services similar to naturally occurring ones. Oysters continuously filter water, which

improves water quality through biosequestration and other removal pathways [15]. Oysters can also improve water clarity and promote growth of submerged aquatic vegetation [16]. Since oysters are removed from the water before they die and can spread certain diseases, aquaculture can also help limit the spread of disease to wild populations [17]. Further, by providing a financially viable alternative to wild harvesting, aquaculture offers the potential to enhance shellfish restoration in the Bay. The aquaculture industry also employs hundreds of Virginia residents [8].

**Previous Research**

More research has been done on the subject using stated preference methods. A survey of west coast residents did suggest a potential negative effect on communities, but the results also indicated this was the result of a lack of public knowledge of shellfish production [18]. In Washington State, the production of Pacific geoduck clams has raised concerns among residents, businesses, and nonprofits. The major concern is environmental impacts, but the aesthetic, recreational, and economic impacts of the industry are also considered. Like in Virginia, aquaculture permits are often challenged. Based on a series of stakeholder interviews and analysis of current regulations, promoting aquaculture best management practices and improving communication between stakeholders could help improve the problem [19].

A 2010 study looked at residents' perceptions of proposed aquaculture while accounting for proximity to aquaculture sites and what recreational activities residents use the water for. The authors found that residents that live closer to the proposed sites and/or use the water more often were more likely to have more negative perceptions of aquaculture sites, even if they agree the practice can benefit the local economy [20]. A similar survey of stakeholders stressed the importance of industry and the government communicating well with residents and responding to their concerns. Residents of regions that overall had a more positive perception of shellfish also had more awareness and knowledge of the industry [21].

A recent report on challenges facing aquaculture included two case studies on Virginia concerning the permitting processes and conflicts in the Lynnhaven River. The authors stress the importance of developing trust between stakeholders, public outreach, and working with stakeholders to evaluate the current permitting process and regulations [3]. Other studies have stressed the need for more valuation of coastal resources to support public decision-making [22,23].

Based on previous research and the concerns of some Virginia landowners, production with cage equipment might have a different impact on property values

that spat-on-shell production, so a separate variable is included to evaluate these effects.

Hedonic models are often used to determine the effects of property characteristics on residential property prices, including the effects of coastal resources [24,25]. Hedonic valuation is used to determine the implicit price of a differentiated good, like a residential property. It uses the sale price of the good to determine the value of individual characteristics, including those of the lot, house, neighborhood, and environmental characteristics [6]. By observing consumer choice and determining the implicit price of individual characteristics, the willingness to pay for that characteristic can be found.

A few studies exist that discuss the potential effects of aquaculture on residential property values, including one that found no significant effects of aquaculture on property values in coastal Rhode Island. The results show that for properties with a lot size of one acre or more, oyster aquaculture has a negative effect on housing price. This suggests that wealthier landowners might consider aquaculture as a factor when purchasing a home, while others do not. Distance from the property to the nearest lease and if the property had a view of the water were used to help determine the effect of aquaculture in the model [26].

Additional research examined the effect of Maine aquaculture on residential property values. The study quantified the effect of oyster, salmon, cod, scallop, and sea vegetable aquaculture on properties within two miles of an aquaculture lease. The authors created an aquaculture index, incorporating information on number of leases, intensity, and proximity to property sales, along with the water area within a distance of the property. The results find limited effects, with the sign and significance varying depending on the region. The area that showed a positive impact has a long history of supporting the industry, and the region where it is negative relies more on ecotourism and a more natural environmental state. This suggests that localized attitudes of aquaculture could impact perceptions of aquaculture and property values [27].

The proximity and intensity of environmental variables often have an impact on property values. Hedonic models often include variables based on the area of an environmental variable within a buffer distance of the property. These buffers are either continuous circles or discrete bands. Both types of buffers are frequently used in hedonic models to represent intensity of and proximity to environmental variables, including tree cover, waterfront, and aquaculture [25,27,28].

## Data

The hedonic model will use residential waterfront property sales from mainland eastern Virginia from 2012 to 2016. Figure 1 indicates the counties and independent cities included in the study area. Property sales are preferred over other valuations like assessment values, so the model is based on market transactions [6]. The data was purchased from University Data Portal to ensure the uniformity which variables are included. Due to incomplete records of property characteristics, property sales in Accomack, Northampton, Northumberland, Richmond, Surry, and Westmoreland Counties could not be included. This time frame was chosen since aquaculture activity before this point was not as widespread and more complaints from landowners arose around this time [8]. The data only includes single family homes sold in arms-length transactions. All sale prices were converted to 2016 dollars using the Consumer Price Index. Property values range from $12,167 and $3,500,000 with an average of $530,887. Any property where a parcel edge is within 50 meters of the waterfront is included in the model, and waterfront properties are indicated using a categorical variable. Figure 2 is a map of sales observations, where each point represents the parcel center of a property sold during the time frame.

**Figure 1.** Counties and Cities in Study Area

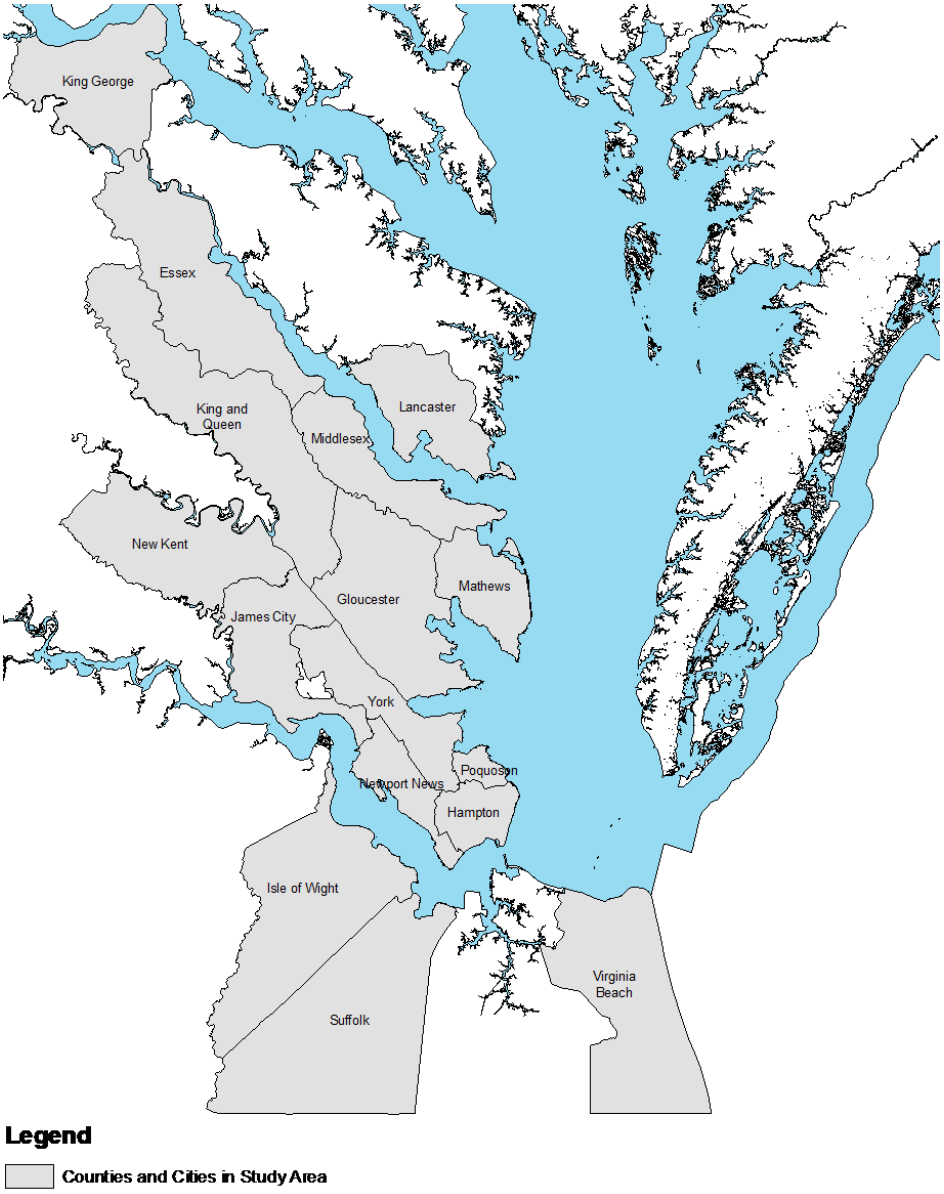
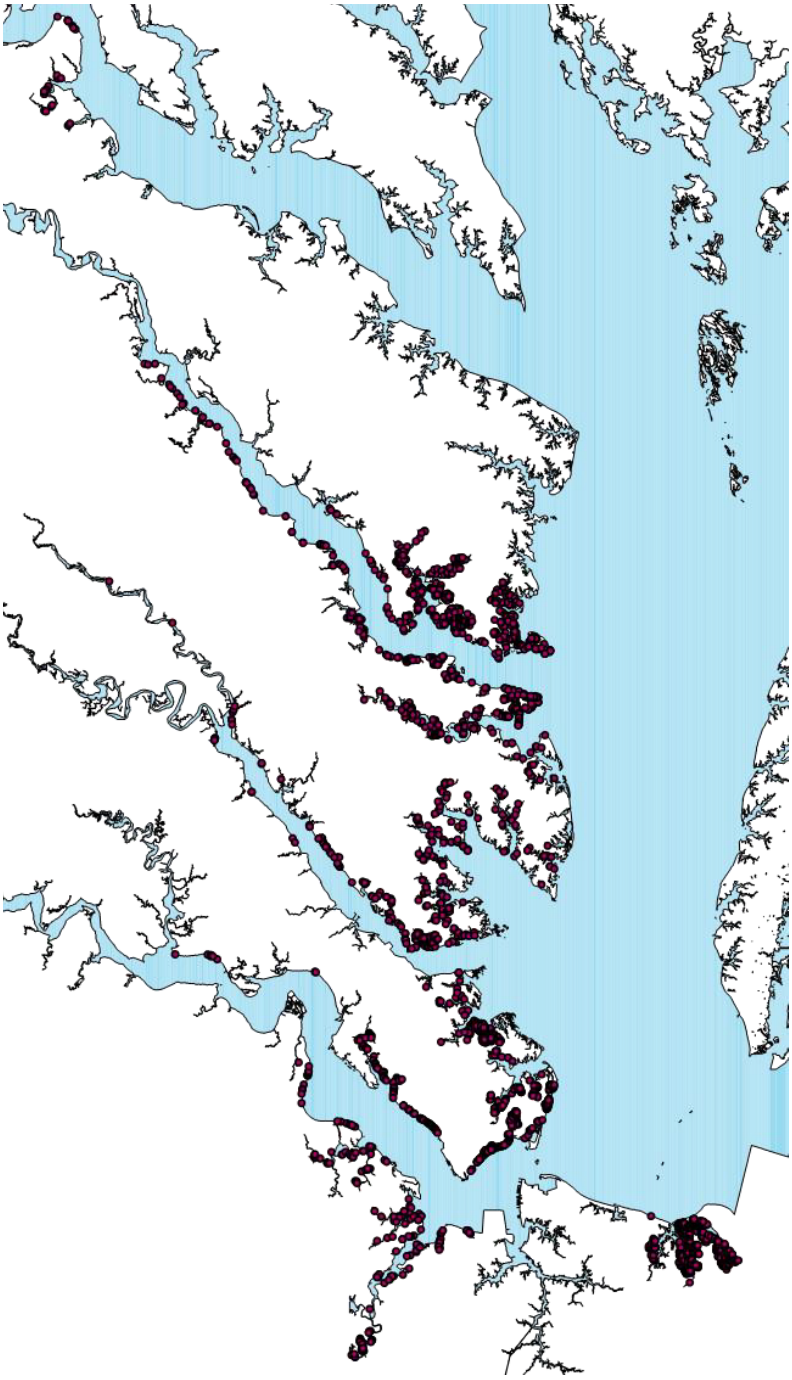


**Figure 2.** Location of Property Sales



Water quality has been shown to affect property values, including in the Chesapeake Bay and its tributaries. Water clarity is one of the most visible water quality measures and is often used in hedonic studies [25] It is influenced by other measures, including dissolved oxygen and nitrogen levels. Lease location and water quality are correlated, since growers consider it as a factor when choosing where to lease [3] Oysters cannot be harvested for consumption in areas that are too polluted since they filter water and are often consumed raw [29]. Water depth is also a factor considered for lease location and could be correlated with lease location, so average annual water depth is included as well.

The light attenuation coefficient ($K_D$) is used in the model and represents water clarity. The average light attenuation coefficient from the nearest monitoring station for the spring and summer March-September) before the property was sold is included in the model. The lower the coefficient, the clearer the water, so the estimated coefficient in the model results is expected to be negative. Water clarity and depth data was acquired from the Chesapeake Bay Program.

Oyster and clam aquaculture harvest data from 2012 to 2016 was obtained from VMRC. A unique identifier distinguishes leases, called the lease number. If any harvest on the lease occurred during a year, the lease is considered active and could potentially affect a nearby property sold during that same year. This data

also includes information on species harvested and equipment used on each active lease.

**Table 1.** Property Descriptive Statistics ($n$=2,245)

| | **Description** | **Mean** | **Std Dev** | **Min** | **Max** |
|---|---|---|---|---|---|
| **Dependent** | | | | | |
| *sale price* | 2016 dollars | $530,887 | $399,663 | $12,167 | $3,605,150 |
| **Independent** | | | | | |
| **Structural** | | | | | |
| *sqft* | living area | 2,716 | 1,380 | 513 | 13,750 |
| *age* | age of house when sold | 41 | 30 | 0 | 315 |
| **Lot** | | | | | |
| *acres* | size of lot | 1.67 | 2.95 | 0.06 | 67.80 |
| *waterfront* | =1 if waterfront | 0.919 | 0.272 | 0 | 1 |
| *wqmean* | mean light attenuation ($m^{-1}$) | 1.161 | 0.800 | 0.504 | 6.757 |
| *depthmean* | mean annual depth (m) | 9.003 | 4.712 | 1.097 | 18.222 |
| **Control** | | | | | |
| *y2012* | =1 if sold in 2012 | 0.163 | 0.369 | 0 | 1 |
| *y2013* | =1 if sold in 2013 | 0.175 | 0.380 | 0 | 1 |
| *y2014* | =1 if sold in 2014 | 0.193 | 0.395 | 0 | 1 |
| *y2015* | =1 if sold in 2015 | 0.224 | 0.417 | 0 | 1 |
| *y2016* | =1 if sold in 2016 | 0.245 | 0.430 | 0 | 1 |
| *block group* | 167 categorical variables for census block group. | | | | |

The harvest data was merged, using lease number, with a current map of shellfish aquaculture leases, also from VMRC. Some of the leases in the harvest data were not successfully merged because there was no corresponding lease number in the map data. This is most likely due to leases being assigned new lease numbers between the active year and 2017, when the current map of aquaculture leases was obtained. A new lease number is assigned when the lease transfers to a new leaseholder or is re-surveyed. 925 leases were matched and active for at least one year from 2012 to 2016. So, there is a chance that a lease that does not have confirmed activity could still be active. Figure 3 shows the locations of all leases and active leases, respectively. To better show both the leases and property sales, Figure 4 shows all property sales and active leases near Suffolk City.

**Figure 3.** Maps of All Leases (Left) and Active Leases (Right)

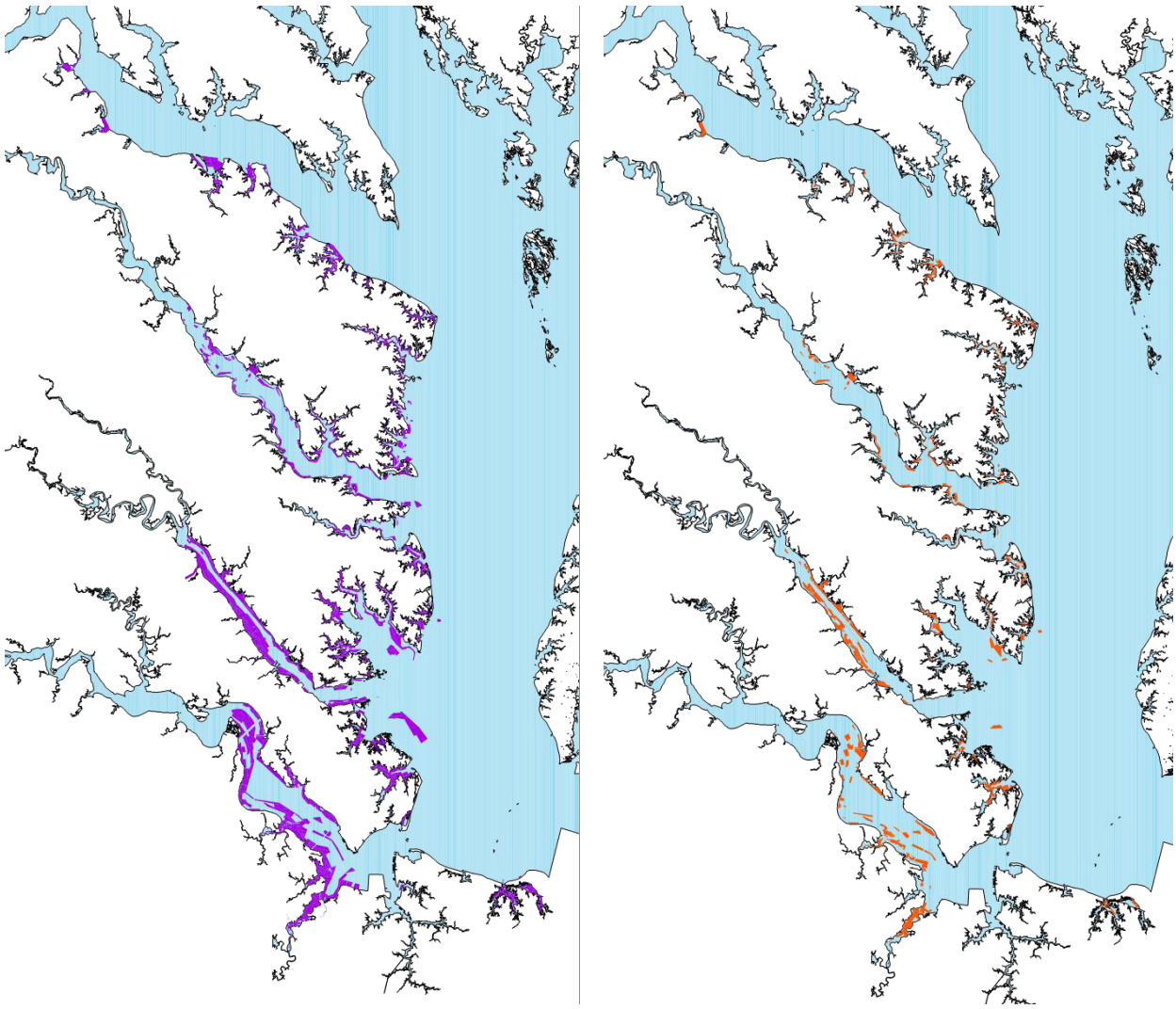
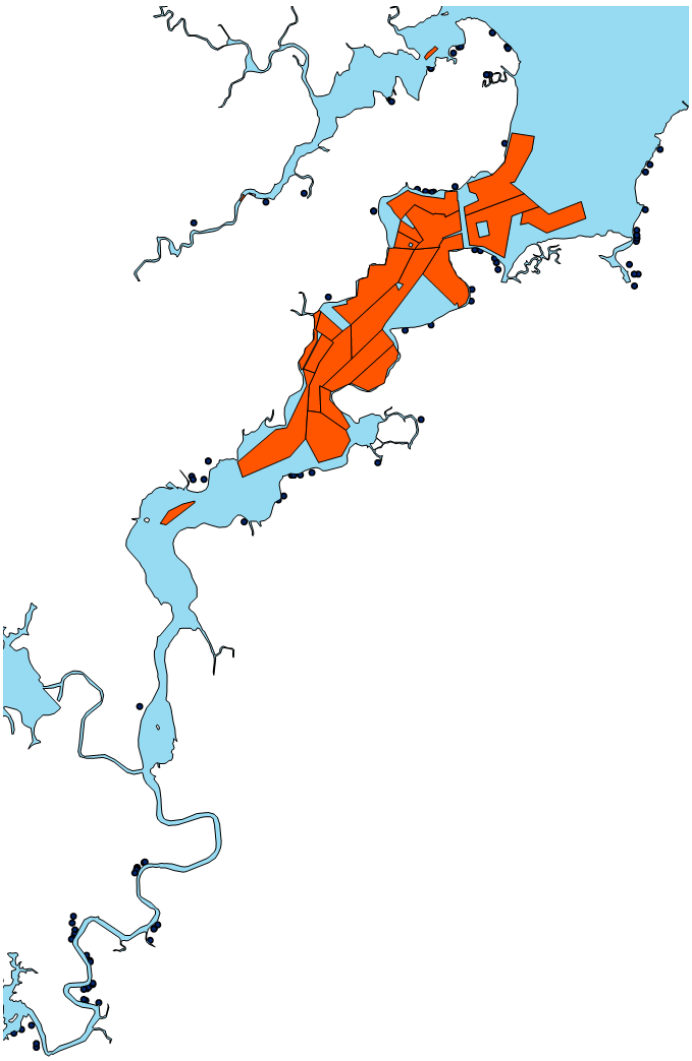


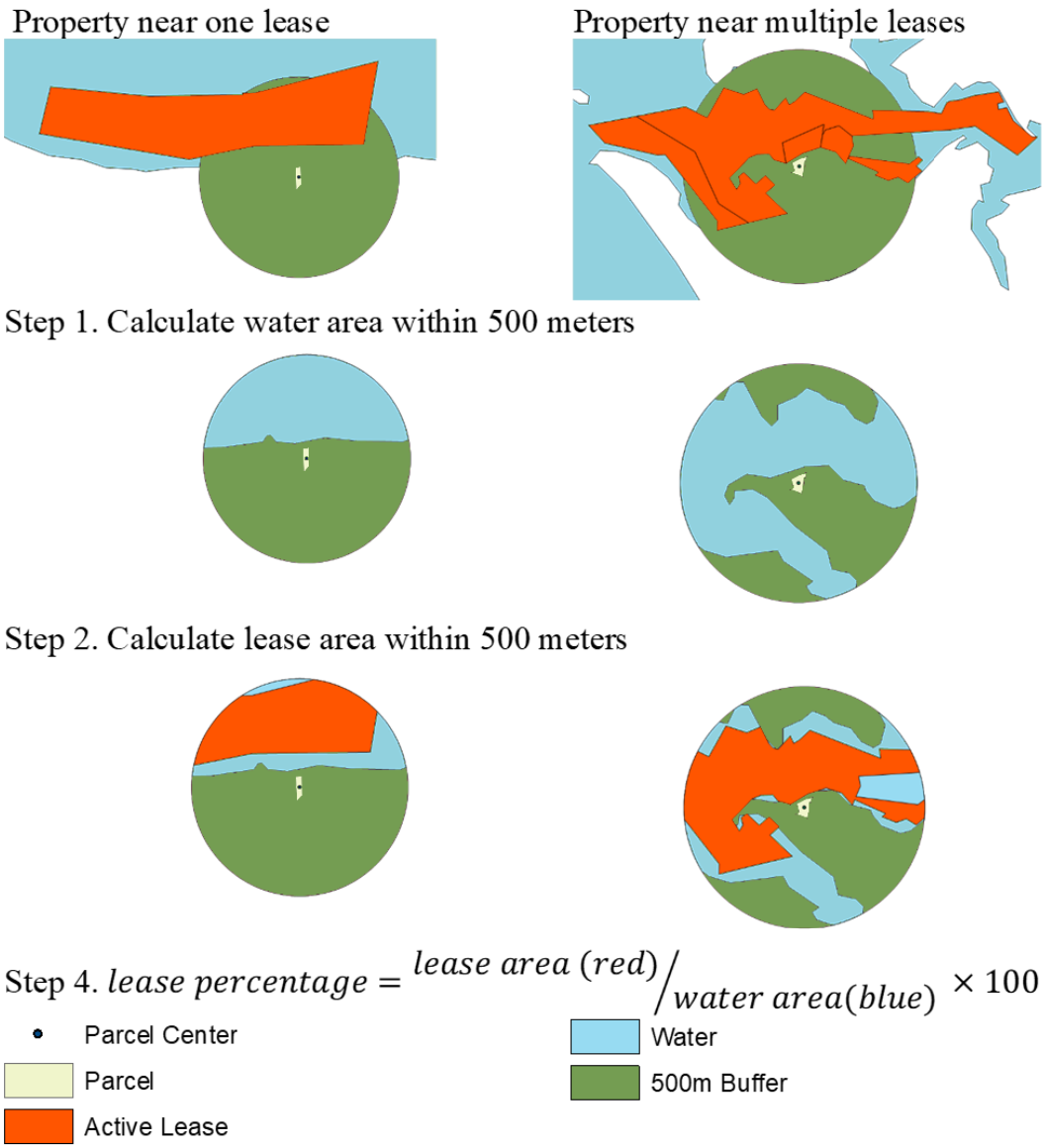
**Figure 4.** Property Sales in Suffolk City and Active Leases within 500 Meters



The aquaculture data is used to calculate the percentage of the water area within a buffer around each property is occupied by an aquaculture lease, in buffers from 100 to 500 meters in radius, each with a radius 100 meters wider than the previous one. The buffers are centered on the parcel center. These buffers are smaller than the radius of buffers in similar studies. Smaller buffers were used considering the geography of the Chesapeake Bay and nearby major rivers. Since

property owners are more concerned with cage equipment than spat-on-shell operations, this method is repeated to find the percent area of water that includes cage equipment and any lease regardless of activity. Figure 5 provides examples of how the environmental variables were calculated. Categorical variables for proximity to leases were also created to see if the presence of a lease has an effect.

**Figure 5.** Creating Environmental Variables[1]




[1] See Appendix A for GIS Code Used to create lease variables

**Table 2.** Descriptive Statistics, Lease Variables (*n*=2,245)

| Lease Percentage Variables | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Leases | | | | Active Leases | | | | Cage Leases | | | |
| **Buffer (m)** | **Mean** | **Std Dev** | **Min** | **Max** | **Mean** | **Std Dev** | **Min** | **Max** | **Mean** | **Std Dev** | **Min** | **Max** |
| **100** | 2.92 | 9.89 | 0 | 100 | 0.68 | 6.23 | 0 | 100 | 0.08 | 1.75 | 0 | 52.27 |
| **200** | 7.12 | 13.64 | 0 | 100 | 1.61 | 8.85 | 0 | 90.35 | 0.20 | 2.62 | 0 | 59.93 |
| **300** | 11.02 | 16.36 | 0 | 100 | 2.19 | 10.27 | 0 | 92.33 | 0.37 | 3.50 | 0 | 72.74 |
| **400** | 14.10 | 18.57 | 0 | 100 | 2.49 | 10.64 | 0 | 90.46 | 0.42 | 3.41 | 0 | 54.55 |
| **500** | 15.92 | 19.41 | 0 | 100 | 2.66 | 10.58 | 0 | 87.31 | 0.45 | 3.15 | 0 | 59.99 |
| **Lease Categorical Variables** | | | | | | | | | | | | |
| **100** | 0.15 | 0.35 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.00 | 0.07 | 0 | 1 |
| **200** | 0.38 | 0.49 | 0 | 1 | 0.05 | 0.23 | 0 | 1 | 0.01 | 0.11 | 0 | 1 |
| **300** | 0.52 | 0.50 | 0 | 1 | 0.08 | 0.28 | 0 | 1 | 0.02 | 0.15 | 0 | 1 |
| **400** | 0.62 | 0.49 | 0 | 1 | 0.12 | 0.33 | 0 | 1 | 0.04 | 0.20 | 0 | 1 |
| **500** | 0.69 | 0.46 | 0 | 1 | 0.16 | 0.36 | 0 | 1 | 0.05 | 0.22 | 0 | 1 |

The authors did want to examine the effects of different types of equipment but 90% of leases with cage equipment use the same type, on-bottom cages. The cage equipment variable combines data of three different cage types: rack and bag, water column cage[2], and bottom cage. Variables for percent area of oyster and clam leases were also created, but were not used in the model, since only 1% of leases had only clams, and most of them are on the Eastern Shore, as shown in Appendix B. 6% of leases had both clams and oysters at some point during the

[2] 1% of total active leases used water column cages and only one property in the dataset is near an active lease with this type of equipment.

study period. Tables 3 and 4 contains more information about shellfish production and lease location.

**Table 3.** Information on Lease Activity ($n$=925)

| | Cage Equipment | | | | Species | |
|---|---|---|---|---|---|---|
| **Equipment Type** | **Num of Leases** | **Percent of Cage Leases** | **Percent of Total Leases** | **Species** | **Num of Leases** | **Percent of Total Leases** |
| **rack and bag** | 12 | 6% | 1% | **oysters** | 857 | 93% |
| **water column cage** | 8 | 4% | 1% | **clams** | 11 | 1% |
| **bottom cage** | 185 | 90% | 20% | **both** | 57 | 6% |
| **total** | 205 | 100% | 22% | **total** | 925 | 100% |

**Table 4.** Property Sales and Lease Types by County/City

| **City/County** | **Property Sales** | **All Leases[a]** | **Active Leases** | **Cage Leases** | **Oyster Leases** | **Clam Leases** |
|---|---|---|---|---|---|---|
| **Essex County** | 32 | 28 | 5 | 0 | 5 | 0 |
| **Gloucester County** | 297 | 562 | 71 | 14 | 68 | 3 |
| **Hampton City** | 257 | 118 | 26 | 5 | 26 | 0 |
| **Isle of Wight County** | 71 | 201 | 44 | 0 | 44 | 0 |
| **James City County** | 13 | 80 | 21 | 1 | 21 | 0 |
| **King and Queen County** | 11 | 83 | 29 | 2 | 28 | 1 |
| **King George County** | 27 | 16 | 3 | 2 | 3 | 0 |
| **Lancaster County** | 383 | 466 | 87 | 11 | 87 | 0 |
| **Matthews County** | 65 | 518 | 106 | 21 | 102 | 4 |
| **Middlesex County** | 236 | 332 | 53 | 19 | 52 | 1 |
| **New Kent County** | 4 | 26 | 3 | 1 | 3 | 0 |
| **Newport News City** | 102 | 63 | 14 | 0 | 14 | 0 |
| **Poquoson City** | 144 | 186 | 35 | 11 | 35 | 0 |
| **Suffolk City** | 106 | 141 | 23 | 1 | 23 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Virginia Beach City** | 471 | 272 | 36 | 26 | 36 | 0 |
| **York County** | 26 | 233 | 57 | 8 | 56 | 1 |
| **Total** | 2,245 | 3,325 | 613 | 122 | 603 | 10 |

a. For any lease within 500m of a county or independent city. Leases within 500m of multiple counties are counted for both localities

**Model**

In a hedonic regression, the sale price of the property is the dependent variable and the characteristics of the properties that affect that price are the independent variables. The general function is specified as:

$$sale\ price = f(S, L, N, E), \quad (1)$$

Where *sale price* is the sale price of the property, *S* is structural characteristics (e.g. square feet, number of bathrooms, and age), *L* is lot characteristics (e.g. lot size and slope), *N* is neighborhood and location characteristics (e.g. school district, and census block group), and *E* is environmental characteristics (e.g. water depth, water quality, and proximity to aquaculture).

There is little guidance on what functional form should be used for a hedonic price function. Commonly used functional forms used include log-linear, double-log, and quadratic. The log-linear functional for mis the most common form and is used in this research [6].

The hedonic price function for this study is specified as:

$$\ln(sale\ price) = \beta_0 + \beta_1(sqft) + \beta_2(acres) + \beta_3(age) + \beta_4(actlease) + \beta_5(cagelease) + \beta_6(wqmean) + \beta_6(depthmean) + \beta_7(waterfront) + \beta_8(y2013) + \beta_9(y2014) + \beta_{10}(y2015) + \beta_{11}(y2016) + \beta\ bgroup' + \varepsilon, \quad (2)$$

where $\beta_i$ are coefficients to be estimated and used in analysis, *actlease* is the percent area of water within a distance that contains an active lease, *cagelease* is the percentage for active leases with equipment, *bgroup'* represents census block group categorical variables, and ε is a random error term. The model is estimated five times, using buffers with different radiuses[3].

Lot and structural characters included in the hedonic model are living square footage (*sqft*), age of the house when sold (*age*), lot size in acres (*acres*), and a set of categorical variables for the year the property was sold (*y2013*, *y2014*, *y2015*, and *y2016*). Number of bedrooms and number of bathrooms were considered but were not included in the model due to the high correlation between these variables

[3] See Appendix C for Stata Code used for variable creation and modeling.

and square footage. The variables for years when sold and census block group are control variables.

The effects, or implicit price of structural, neighborhood, and environmental variables can be calculated by:

$$\frac{\partial saleprice}{\partial x_i} = \beta_i \times saleprice \qquad (3)$$

The coefficients ($\beta_i$) are equal to the percentage changes in sale price caused by an increase of the variable by one unit. For example, increasing the square footage of the home by one square foot will change the sale price by $\beta_i \times 100$ percent.

Omitted variable bias is a common concern for hedonic models. Many factors can influence housing prices, and it is likely that an omitted variable is correlated with ones that are included. This bias could lead to under- or over-estimation of the effects of certain variables on sale prices. The unmatched leases mentioned in the previous section are also a concern, since there could be properties with active leases nearby that could not be accounted for. Additionally, the lack of sales data for certain counties and cities in Virginia should be kept in mind.

## Results

The percent area of water within 300, 400, and 500 meters of the parcel center that contains a shellfish aquaculture lease is significant and positive in the results. For example, an increase of one percentage point of lease percentage within 300 meters will increase the value of a property by 0.2%. The percent area of water within 300, 400, and 500 meters of the parcel center is negative and significant. A property would decrease in value by 1.1% if the cage lease percentage increases by one percentage point. The cage lease percentage variable for 100 meters is positive and significant.

**Table 5.** Model Results (*n*=2,245)

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026*[a] | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001)[b] | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.01811* | 0.01842* | 0.01883* | 0.01864* | 0.01851* |
| | (0.00382) | (0.00383) | (0.00382) | (0.00381) | (0.00381) |
| ***age*** | 0.00034 | 0.00033 | 0.00030 | 0.00031 | 0.00032 |
| | (0.00038) | (0.00038) | (0.00038) | (0.00038) | (0.00038) |
| ***actlease*** | 0.00023 | 0.00135 | 0.00213*** | 0.00253**[c] | 0.00280** |
| | (0.00179) | (0.00137) | (0.00124) | (0.00121) | (0.00123) |
| ***cagelease*** | 0.01015***[d] | -0.00322 | -0.01082* | -0.01285* | -0.01640* |
| | (0.00590) | (0.00411) | (0.00323) | (0.00330) | (0.00356) |
| ***wqmean*** | -0.00136 | -0.00225 | -0.00400 | -0.00580 | -0.00225 |
| | (0.02958) | (0.02960) | (0.02956) | (0.02956) | (0.02954) |
| ***depthmean*** | 0.00530 | 0.00529 | 0.00510 | 0.00527 | 0.00525 |
| | (0.00448) | (0.00449) | (0.00448) | (0.00447) | (0.00447) |
| ***waterfront*** | 0.19534* | 0.19586 | 0.19721* | 0.19606* | 0.19861* |
| | (0.04119) | (0.04121) | (0.04111) | (0.04107) | (0.04101) |
| $R^2$ | 0.57910 | 0.57860 | 0.58070 | 0.58150 | 0.58280 |

a. Significant at 1% level
b. Standard Error
c. Significant at 5% level
d. Significant at 10% level

The other major variables that show significance have an expected sign and larger effect than the environmental variable. Both square footage and acreage are positive and significant. Additionally, these coefficients do not change very much between the five different models. For estimation results for the control variables, see Appendix D.

Other models with different variables, including minimum and maximum water quality and depth, and categorical variables for whether any lease is within a distance of the property were considered for robustness. These models found similar results as the results presented in Table 5. Models using discrete buffers were also estimated, but these variables did not perform as well and do not make as much sense in this application. Waterfront property owners observing leases are looking out over the water and differences in distances might not matter as much as it does in other applications. Results for these other models can be found in Appendix E.

Table 6 shows the mean marginal willingness to pay for increasing a variable by one unit, like one square foot of living space, one acre of land, or one

percentage point of lease area using mean sale price. For example, an increase of one percentage point in cage lease percentage for the model with a 300-meter buffer results in a decrease in mean sale price by $5,744.

**Table 6.** Mean Marginal Willingness to Pay (μ=$530,887)

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 138 | 138 | 138 | 138 | 138 |
| ***acres*** | 9,615 | 9,782 | 9,997 | 9,896 | 9,826 |
| ***age*** | 181 | 177 | 161 | 166 | 169 |
| ***actlease*** | 121 | 718 | 1130 | 1344 | 1486 |
| ***cagelease*** | 5,387 | -1,708 | -5,744 | -6,821 | -8,706 |
| ***wqmean*** | -723 | -1,193 | -2,124 | -3,077 | -1,196 |
| ***depthmean*** | 2,815 | 2,808 | 2,708 | 2,800 | 2,790 |
| ***waterfront*** | 103,705 | 103,978 | 104,694 | 104,084 | 105,438 |

## Discussion

The results show that active oyster aquaculture has a positive effect on housing prices, while cage aquaculture has a negative effect.

The positive effect of oyster aquaculture, including the positive effect of cage activity in the 100-meter buffer model, does not mean that landowners are willing to pay to live near aquaculture. This positive effect could be caused by a correlation between lease location and location of desirable waterfront properties. Additionally, it could be the result of omitted variables that are highly correlated with lease percentage. These could include bottom substrate, how well the area is

protected from storms, and the stability of the environment. Storms can damage oyster operations and homes. Growers and homeowners might look for water with more flushing and tidal changes, which create cleaner, fresher water. More stagnant water is not as aesthetically pleasing and can also smell.

Although much of the conversation about aquaculture and residential properties is centered on the waterfront, the presence of aquaculture could influence the value of near-waterfront homes. Other hedonic studies of coastal amenities include near-waterfront homes as well, and this could be examined with properties that are farther from the waterfront [27]. The model could also be expanded to include sales from other counties if more complete data can be acquired.

Other factors of production and harvesting could also be considered in another hedonic model. Since leaseholders report harvest data by month, the effect of when during the year leases are harvested could be observed. Oyster harvest activity might have a bigger impact on housing prices if harvest happens in the spring and summer when residents are more likely to use the water for recreation. However, there might not be enough variation in this information.

Recent collaboration among stakeholders have led to policy recommendations and changes. In response to the 2016 legislation, a working

group of stakeholders in the Lynnhaven River area met and made several recommendations to VMRC on potential policy changes, including requiring leasing plans or permitting for cage equipment. No policy changes were made. Lynnhaven residents also stressed the importance of better notifying nearby residents of new lease applications [3].

The Virginia Secretary of Natural Resources formed the Clam and Oyster Aquaculture Working Group composed of lawmakers and stakeholders to collaborate in response to these conflicts and proposed legislation. The goal of the working group is to address resource use conflicts. In 2019, two of their recommendations were passed by the General Assembly and signed by the governor. These measures focus on conflicts over dredging the Lynnhaven River and other waterways in Virginia, but they do have implications on other concerns. The bills increase transparency in the oyster leasing process and the creation of riparian leases by waterfront landowners, which give landowners greater control of the water adjacent to their property. They also increase leasing fees to discourage leasing shellfish grounds by those who do not intend to grow clams and oysters [30].

Regulators and those in the aquaculture industry often cite the lack of evidence that aquaculture has any effect on property values, but agree that a

balance needs to be found among multiple resource users [31,32]. This study provides evidence that cage aquaculture has a negative effect on nearby properties. This evidence could support the claims that some landowners have about the impact of oyster aquaculture. Stakeholders, policymakers, and others can use these results to make better informed decisions and communicate better in the future when considering changes and when discussing the resource use conflict.

## References


[1] A. Berleant, Proposed Surry oyster farm will change property values, selectman holds, Wkly. Pack. (2013). http://weeklypacket.com/news/2013/jun/27/proposed-surry-oyster-farm-will-change-property-va/#.XNI2UI5KhPZ (accessed May 7, 2019).

[2] D. Mayfield, Virginia regulators leave Lynnhaven oyster rules unchanged, The Virginian-Pilot. (2016). https://pilotonline.com/news/local/environment/article_389aef82-3564-54f8-9fe3-ed7deb710c81.html (accessed May 7, 2019).

[3] National Sea Grant, Overcoming impediments to shellfish aquaculture through legal research and outreach: case studies, 2019.

[4] D. Mayfield, Virginia bill would dramatically increase cost of oyster, clam leases, The Virginian-Pilot. (2016). https://pilotonline.com/news/local/environment/article_82bfbfb0-788c-51a6-8d1d-e5ad4eb74688.html.

[5] D. Mayfield, Bills would enable more Virginia landowners to lease water off their properties, The Virginian-Pilot. (2017). https://pilotonline.com/news/local/environment/article_a850e5a1-3768-571b-b507-003c49468f99.html (accessed May 7, 2019).

[6] L.O. Taylor, Hedonics, in: P.A. Champ, K.J. Boyle, T.C. Brown (Eds.), A Prim. Nonmarket Valuat., 2017. doi:10.1007/978-94-007-7104-8.

[7] D.M. Schulte, History of the Virginia Oyster Fishery, Chesapeake Bay, USA, Front. Mar. Sci. 4 (2017) 127. doi:10.3389/fmars.2017.00127.

[8] K. Hudson, Virginia Shellfish Aquaculture Situation and Outlook Report. Results of the 2017 Virginia Shellfish Aquaculture Crop Reporting Survey, VIMS Mar. Resour. Rep. No. 2018-9. Virginia Sea Grant VSG-18-3. (2018) 20. www.vims.edu/map/aquaculture.

[9] Duration of lease, 1999. https://law.lis.virginia.gov/vacode/title28.2/chapter6/section28.2-613/ (accessed May 27, 2019).

[10] Virginia Marine Resources Commission, Application for oyster planting ground, (2019). https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php (accessed May 7, 2019).

[11] T.M. Mason, SB 1413 Oyster Planting Grounds; Lease Assignments, Virginia General Assembly, Richmond, VA, 2019. http://lis.virginia.gov/cgi-bin/legp604.exe?191+sum+SB1413 (accessed May 27, 2019).

[12] Mandatory Harvest Reporting., Virginia Administrative Code, 2013. https://law.lis.virginia.gov/admincode/title4/agency20/chapter610/section60/ (accessed May 27, 2019).

[13] Method and Manner of Marking., Virginia Administrative Code, 2016. https://law.lis.virginia.gov/admincode/title4/agency20/chapter290/section30/ (accessed May 27, 2019).

[14] Virginia Marine Resources Commission, Chesapeake Bay Map, (2019). https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php (accessed May 11, 2019).

[15] C.B. Higgins, K. Stephenson, B.L. Brown, Nutrient Bioassimilation Capacity of Aquacultured Oysters: Quantification of an Ecosystem Service, J. Environ. Qual. 40 (2010) 271. doi:10.2134/jeq2010.0203.

[16] J.H. Grabowski, R.D. Brumbaugh, R.F. Conrad, A.G. Keeler, J.J. Opaluch, C.H. Peterson, M.F. Piehler, S.P. Powers, A.R. Smyth, Economic Valuation of Ecosystem Services Provided by Oyster Reefs, Bioscience. 62 (2012) 900–909. doi:10.1525/bio.2012.62.10.10.

[17] T. Ben-Horin, C.A. Burge, D. Bushek, M.L. Groner, D.A. Proestou, L.I. Huey, G. Bidegain, R.B. Carnegie, Intensive oyster aquaculture can reduce disease impacts on sympatric wild oysters, Aquac. Environ. Interact. 10 (2018) 557–567. doi:10.3354/AEI00290.

[18] B. Hudson, Public Opinion of Shellfish Farming, 2016.

[19] C.M. Ryan, P.S. McDonald, D.S. Feinberg, L.W. Hall, J.G. Hamerly, C.W. Wright, Digging Deep: Managing Social and Policy Dimensions of Geoduck Aquaculture Conflict in Puget Sound, Washington, Coast. Manag. 45 (2016) 73–89. doi:10.1080/08920753.2017.1252628.

[20] C.S. Shafer, G.J. Inglis, V. Martin, Examining residents' proximity, recreational use, and perceptions regarding proposed aquaculture development, Coast. Manag. 38 (2010) 559–574. doi:10.1080/08920753.2010.511700.

[21] N.A. Mazur, A.L. Curtis, Understanding community perceptions of aquaculture: Lessons from Australia, Aquac. Int. 16 (2008) 601–621.

doi:10.1007/s10499-008-9171-0.

[22] T. Börger, N.J. Beaumont, L. Pendleton, K.J. Boyle, P. Cooper, S. Fletcher, T. Haab, M. Hanemann, T.L. Hooper, S.S. Hussain, R. Portela, M. Stithou, J. Stockill, T. Taylor, M.C. Austen, Incorporating ecosystem services in marine planning: The role of valuation, Mar. Policy. 46 (2014) 161–170. doi:10.1016/j.marpol.2014.01.019.

[23] L. Pendleton, P. Atiyah, A. Moorthy, Is the non-market literature adequate to support coastal and marine management?, Ocean Coast. Manag. 50 (2007) 363–378. doi:10.1016/j.ocecoaman.2006.11.004.

[24] S. Gopalakrishnan, M.D. Smith, J.M. Slott, A.B. Murray, The value of disappearing beaches: A hedonic pricing model with endogenous beach width, J. Environ. Econ. Manage. 61 (2011) 297–310. doi:10.1016/j.jeem.2010.09.003.

[25] P. Walsh, C. Griffiths, D. Guignet, H. Klemick, Modeling the Property Price Impact of Water Quality in 14 Chesapeake Bay Counties, Ecol. Econ. 135 (2017) 103–113. doi:10.1016/j.ecolecon.2016.12.014.

[26] P.O. Sudhakaran, Three Essays on Shellfish Management in Rhode Island, 2015.

[27] K.S. Evans, X. Chen, C.A. Robichaud, Living in close quarters? A hedonic analysis of the impact of marine aquaculture on coastal housing prices in Maine, (2017).

[28] S.D. Siriwardena, K.J. Boyle, T.P. Holmes, P.E. Wiseman, The implicit value of tree cover in the U.S.: A meta-analysis of hedonic property value studies, Ecol. Econ. 128 (2016) 68–76. doi:10.1016/j.ecolecon.2016.04.016.

[29] Virginia Department of Health, Classification of Shellfish Growing Areas, (2019). http://www.vdh.virginia.gov/environmental-health/environmental-health-services/shellfish-safety/classification-of-shellfish-growing-areas/ (accessed May 11, 2019).

[30] M. Albiges, Virginia is cracking down on “bad actors” who lease oyster grounds to block dredging - Daily Press, Dly. Press. (2019). https://www.dailypress.com/news/virginia/dp-nws-oyster-dredging-vabeach-general-assembly-2019-story.html (accessed May 7, 2019).

[31] T.B. Wheeler, Bay Journal - Article: Lawyers not cannons the big guns in latest round of oyster wars, Bay J. (2019).

https://www.bayjournal.com/article/lawyers_not_cannons_the_big_guns_in_latest_round_of_oyster_wars (accessed May 7, 2019).

[32] A. Lefin, Report to understand the water uses of our bays, rivers, and seaside waters released, WSET Richmond. (2018). https://wset.com/news/local/report-to-understand-the-water-uses-of-our-bays-rivers-and-seaside-waters-released (accessed May 7, 2019).

## Appendices

**Appendix A**. GIS Code

Code used in ArcMap 10.5 to calculate areas within buffers centered on the parcel center. The areas for water (*water)*, any lease (*alllease)*, active leases (*actlease)*, and leases with cagement (*cage)* were calculated. The information was transferred to Microsoft Excel, then Stata.

```
import arcpy

arcpy.env.workspace=
"C:\Users\Katie\Documents\School\Thesis\Data\VMRC_KML.gdb"

arcpy.Intersect_analysis(in_features="'Buffer\Buffer100_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.g
db/water100", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="water100",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.g
db/water100_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="water100_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/water1
00.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer200_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.g
db/water200", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="water200",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.g
db/water200_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="water200_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/water2
00.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer300_Project'
#;'ChesapeakeBay' #",
```

```
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water300", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="water300",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water300_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="water300_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/water300.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer400_Project' #;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water400", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="water400",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water400_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="water400_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/water400.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer500_Project' #;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water500", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="water500",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/water500_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="water500_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/water500.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer100_Project' #;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease100", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="alllease100",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease100_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="alllease100_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/alllease100.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer200_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease200", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="alllease200",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease200_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="alllease200_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/alllease200.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer300_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease300", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="alllease300",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease300_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="alllease300_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/alllease300.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer400_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease400", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="alllease400",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease400_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="alllease400_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/alllease400.xls")

arcpy.Intersect_analysis(in_features="'Buffer\Buffer500_Project'
#;'ChesapeakeBay' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease500", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="alllease500",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/alllease500_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="alllease500_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/alllease500.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer100_Project selection'
#;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease112", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease112",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease112_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease112_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease112.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer200_Project selection'
#;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease212", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="actlease212",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease212_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease212_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease12.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer300_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease312", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease312",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease312_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease312_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease312.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer400_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease412", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease412",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease412_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease412_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease412.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer500_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease512", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="actlease512",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease512_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease512_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease512.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer100_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease113", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease113",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease113_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease113_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease113.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer200_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease213", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease213",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease213_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease213_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease13.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer300_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease313", join_attributes="ALL", output_type="INPUT")
```

arcpy.Dissolve_management(in_features="actlease313",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease313_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease313_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease313.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer400_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease413", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease413",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease413_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease413_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease413.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer500_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease513", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease513",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease513_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease513_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease513.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer100_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease114", join_attributes="ALL", output_type="INPUT")

```
arcpy.Dissolve_management(in_features="actlease114",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease114_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease114_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease114.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer200_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease214", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease214",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease214_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease214_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease14.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer300_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease314", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease314",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease314_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease314_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease314.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer400_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease414", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="actlease414",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease414_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease414_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease414.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer500_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease514", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease514",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease514_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease514_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease514.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer100_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease115", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease115",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease115_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease115_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease115.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer200_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease215", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="actlease215",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease215_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease215_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease15.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer300_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease315", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease315",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease315_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease315_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease315.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer400_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease415", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="actlease415",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease415_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease415_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease415.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer500_Project selection' #;'PrivateActleases_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease515", join_attributes="ALL", output_type="INPUT")
```

arcpy.Dissolve_management(in_features="actlease515", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/actlease515_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="actlease515_Dissolve", Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/actlease515.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer100_Project selection' #;'PrivateCages_Polygons' #", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage112", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage112", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage112_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage112_Dissolve", Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage112.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer200_Project selection' #;'PrivateCages_Polygons' #", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage212", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage212", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage212_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage212_Dissolve", Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage12.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer300_Project selection' #;'PrivateCages_Polygons' #", out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage312", join_attributes="ALL", output_type="INPUT")

```
arcpy.Dissolve_management(in_features="cage312",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage312_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage312_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage312.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer400_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage412", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage412",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage412_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage412_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage412.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2012\Buffer500_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage512", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage512",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage512_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage512_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage512.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer100_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage113", join_attributes="ALL", output_type="INPUT")
```

arcpy.Dissolve_management(in_features="cage113",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage113_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage113_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage113.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer200_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage213", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage213",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage213_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage213_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage13.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer300_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage313", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage313",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage313_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage313_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage313.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer400_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage413", join_attributes="ALL", output_type="INPUT")

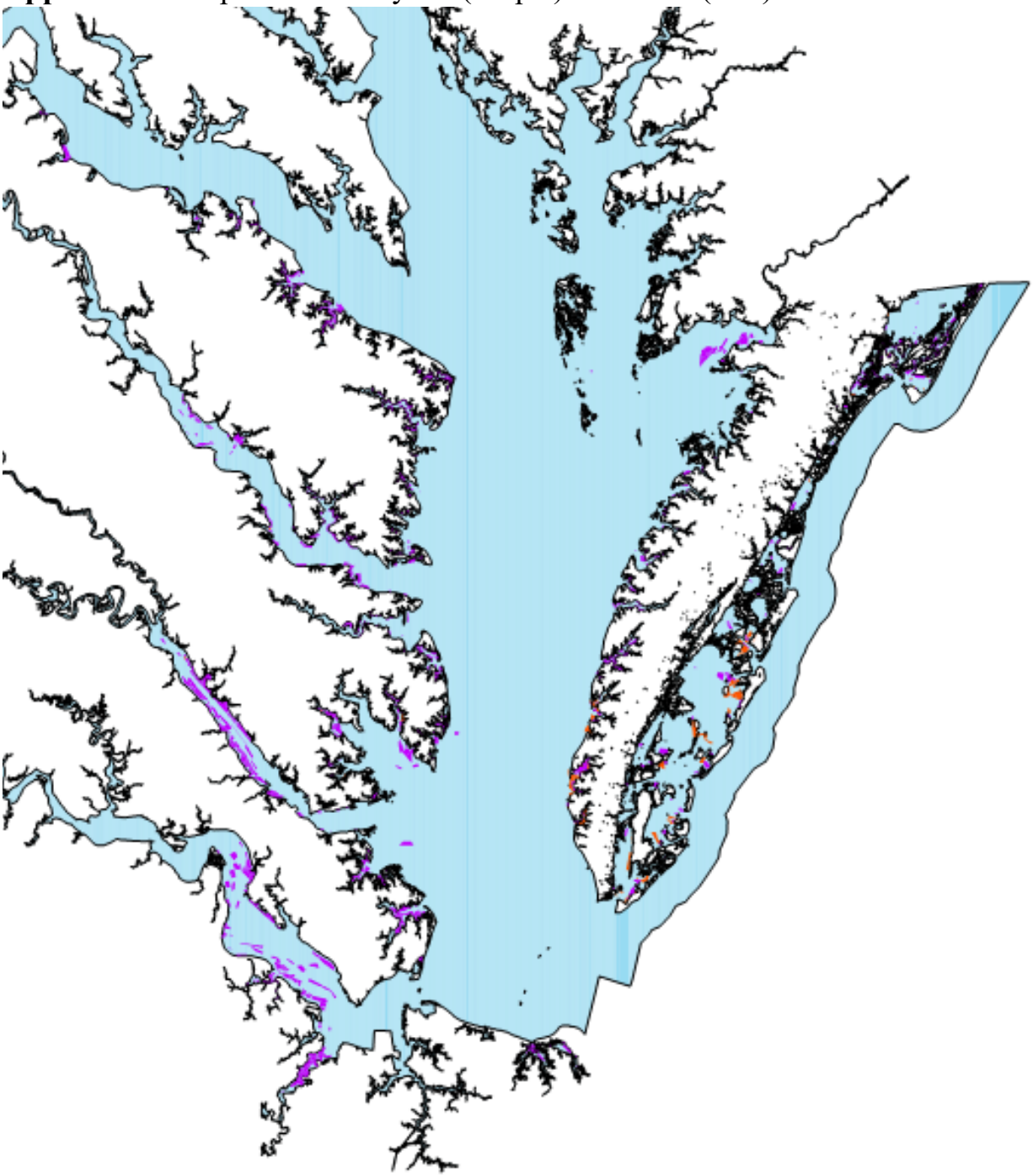
```
arcpy.Dissolve_management(in_features="cage413",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage413_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage413_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage413.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2013\Buffer500_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage513", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage513",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage513_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage513_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage513.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer100_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage114", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage114",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage114_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage114_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage114.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer200_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage214", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="cage214",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage214_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage214_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage14.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer300_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage314", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage314",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage314_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage314_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage314.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer400_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage414", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage414",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage414_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage414_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage414.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2014\Buffer500_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage514", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="cage514",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage514_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage514_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage514.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer100_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage115", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage115",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage115_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage115_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage115.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer200_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage215", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage215",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage215_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage215_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage15.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer300_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage315", join_attributes="ALL", output_type="INPUT")
```

```
arcpy.Dissolve_management(in_features="cage315",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage315_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage315_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage315.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer400_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage415", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage415",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage415_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage415_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage415.xls")

arcpy.Intersect_analysis(in_features="'Buffer 2015\Buffer500_Project selection' #;'PrivateCages_Polygons' #",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage515", join_attributes="ALL", output_type="INPUT")

arcpy.Dissolve_management(in_features="cage515",
out_feature_class="C:/Users/katie/Documents/School/Thesis/Data/VMRC_KML.gdb/cage515_Dissolve", dissolve_field="parcella_1")

arcpy.TableToExcel_conversion(Input_Table="cage515_Dissolve",
Output_Excel_File="C:/Users/katie/Documents/School/Thesis/Data/scratch/cage515.xls")
```

**Appendix B.** Map of Active Oyster (Purple) and Clam (Red) Leases



**Appendix C**. Stata Code

This code was used in Stata 14.2 to import GIS data, create lease percentages and other variables, and run regressions

```
import excel "C:\Users\CAUSRE User\Documents\water100.xls",
sheet("water100") firstrow clear
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area water100
save "C:\Users\CAUSRE User\Documents\water100.dta"
import excel "C:\Users\CAUSRE User\Documents\water200.xls",
sheet("water200") firstrow clear
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area water200
save "C:\Users\CAUSRE User\Documents\water200.dta"
import excel "C:\Users\CAUSRE User\Documents\water300.xls",
sheet("water300") firstrow clear
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area water300
save "C:\Users\CAUSRE User\Documents\water300.dta"
import excel "C:\Users\CAUSRE User\Documents\water400.xls",
sheet("water400") firstrow clear
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area water400
save "C:\Users\CAUSRE User\Documents\water400.dta"
import excel "C:\Users\CAUSRE User\Documents\water500.xls",
sheet("water500") firstrow clear
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area water500
save "C:\Users\CAUSRE User\Documents\water500.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\alllease112.xls",
sheet("alllease112") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease112.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease212.xls",
sheet("alllease212") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease212.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease312.xls",
sheet("alllease312") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease312.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease412.xls",
sheet("alllease412") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease412.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease512.xls",
sheet("alllease512") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease512.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease113.xls",
sheet("alllease113") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease113.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease213.xls",
sheet("alllease213") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease213.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease313.xls",
sheet("alllease313") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease313.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease413.xls",
sheet("alllease413") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease413.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease513.xls",
sheet("alllease513") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease513.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease114.xls",
sheet("alllease114") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease114.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease214.xls",
sheet("alllease214") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease214.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\alllease314.xls",
sheet("alllease314") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease314.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease414.xls",
sheet("alllease414") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease414.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease514.xls",
sheet("alllease514") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease514.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease115.xls",
sheet("alllease115") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease115.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease215.xls",
sheet("alllease215") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease215.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease315.xls",
sheet("alllease315") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease315.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease415.xls",
sheet("alllease415") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease415.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease515.xls",
sheet("alllease515") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease515.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease116.xls",
sheet("alllease116") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease116.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease216.xls",
sheet("alllease216") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease216.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease316.xls",
sheet("alllease316") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease316.dta"
import excel "C:\Users\CAUSRE User\Documents\alllease416.xls",
sheet("alllease416") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease416.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\alllease516.xls",
sheet("alllease516") firstrow clear
save "C:\Users\CAUSRE User\Documents\alllease516.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease112.xls",
sheet("actlease112") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease112.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease212.xls",
sheet("actlease212") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease212.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease312.xls",
sheet("actlease312") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease312.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease412.xls",
sheet("actlease412") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease412.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease512.xls",
sheet("actlease512") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease512.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease113.xls",
sheet("actlease113") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease113.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease213.xls",
sheet("actlease213") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease213.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease313.xls",
sheet("actlease313") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease313.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease413.xls",
sheet("actlease413") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease413.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease513.xls",
sheet("actlease513") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease513.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease114.xls",
sheet("actlease114") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease114.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\actlease214.xls",
sheet("actlease214") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease214.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease314.xls",
sheet("actlease314") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease314.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease414.xls",
sheet("actlease414") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease414.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease514.xls",
sheet("actlease514") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease514.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease115.xls",
sheet("actlease115") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease115.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease215.xls",
sheet("actlease215") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease215.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease315.xls",
sheet("actlease315") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease315.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease415.xls",
sheet("actlease415") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease415.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease515.xls",
sheet("actlease515") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease515.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease116.xls",
sheet("actlease116") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease116.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease216.xls",
sheet("actlease216") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease216.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease316.xls",
sheet("actlease316") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease316.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\actlease416.xls",
sheet("actlease416") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease416.dta"
import excel "C:\Users\CAUSRE User\Documents\actlease516.xls",
sheet("actlease516") firstrow clear
save "C:\Users\CAUSRE User\Documents\actlease516.dta"
import excel "C:\Users\CAUSRE User\Documents\cage112.xls", sheet("cage112")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage112.dta"
import excel "C:\Users\CAUSRE User\Documents\cage212.xls", sheet("cage212")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage212.dta"
import excel "C:\Users\CAUSRE User\Documents\cage312.xls", sheet("cage312")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage312.dta"
import excel "C:\Users\CAUSRE User\Documents\cage412.xls", sheet("cage412")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage412.dta"
import excel "C:\Users\CAUSRE User\Documents\cage512.xls", sheet("cage512")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage512.dta"
import excel "C:\Users\CAUSRE User\Documents\cage113.xls", sheet("cage113")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage113.dta"
import excel "C:\Users\CAUSRE User\Documents\cage213.xls", sheet("cage213")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage213.dta"
import excel "C:\Users\CAUSRE User\Documents\cage313.xls", sheet("cage313")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage313.dta"
import excel "C:\Users\CAUSRE User\Documents\cage413.xls", sheet("cage413")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage413.dta"
import excel "C:\Users\CAUSRE User\Documents\cage513.xls", sheet("cage513")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage513.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\cage114.xls", sheet("cage114")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage114.dta"
import excel "C:\Users\CAUSRE User\Documents\cage214.xls", sheet("cage214")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage214.dta"
import excel "C:\Users\CAUSRE User\Documents\cage314.xls", sheet("cage314")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage314.dta"
import excel "C:\Users\CAUSRE User\Documents\cage414.xls", sheet("cage414")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage414.dta"
import excel "C:\Users\CAUSRE User\Documents\cage514.xls", sheet("cage514")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage514.dta"
import excel "C:\Users\CAUSRE User\Documents\cage115.xls", sheet("cage115")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage115.dta"
import excel "C:\Users\CAUSRE User\Documents\cage215.xls", sheet("cage215")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage215.dta"
import excel "C:\Users\CAUSRE User\Documents\cage315.xls", sheet("cage315")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage315.dta"
import excel "C:\Users\CAUSRE User\Documents\cage415.xls", sheet("cage415")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage415.dta"
import excel "C:\Users\CAUSRE User\Documents\cage515.xls", sheet("cage515")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage515.dta"
import excel "C:\Users\CAUSRE User\Documents\cage116.xls", sheet("cage116")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage116.dta"
import excel "C:\Users\CAUSRE User\Documents\cage216.xls", sheet("cage216")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage216.dta"
```

```
import excel "C:\Users\CAUSRE User\Documents\cage316.xls", sheet("cage316")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage316.dta"
import excel "C:\Users\CAUSRE User\Documents\cage416.xls", sheet("cage416")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage416.dta"
import excel "C:\Users\CAUSRE User\Documents\cage516.xls", sheet("cage516")
firstrow clear
save "C:\Users\CAUSRE User\Documents\cage516.dta"
use "C:\Users\CAUSRE User\Documents\alllease112.dta", clear
append using "C:\Users\CAUSRE User\Documents\alllease113.dta"
append using "C:\Users\CAUSRE User\Documents\alllease114.dta"
append using "C:\Users\CAUSRE User\Documents\alllease115.dta"
append using "C:\Users\CAUSRE User\Documents\alllease116.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area alllease100
save "C:\Users\CAUSRE User\Documents\alllease100.dta"
use "C:\Users\CAUSRE User\Documents\alllease212.dta", clear
append using "C:\Users\CAUSRE User\Documents\alllease213.dta"
append using "C:\Users\CAUSRE User\Documents\alllease214.dta"
append using "C:\Users\CAUSRE User\Documents\alllease215.dta"
append using "C:\Users\CAUSRE User\Documents\alllease216.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area alllease200
save "C:\Users\CAUSRE User\Documents\alllease200.dta"
use "C:\Users\CAUSRE User\Documents\alllease312.dta", clear
append using "C:\Users\CAUSRE User\Documents\alllease313.dta"
append using "C:\Users\CAUSRE User\Documents\alllease314.dta"
append using "C:\Users\CAUSRE User\Documents\alllease315.dta"
append using "C:\Users\CAUSRE User\Documents\alllease316.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area alllease300
save "C:\Users\CAUSRE User\Documents\alllease300.dta"
```

```
use "C:\Users\CAUSRE User\Documents\alllease412.dta", clear
append using "C:\Users\CAUSRE User\Documents\alllease413.dta"
append using "C:\Users\CAUSRE User\Documents\alllease414.dta"
append using "C:\Users\CAUSRE User\Documents\alllease415.dta"
append using "C:\Users\CAUSRE User\Documents\alllease416.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area alllease400
save "C:\Users\CAUSRE User\Documents\alllease400.dta"
use "C:\Users\CAUSRE User\Documents\alllease512.dta", clear
append using "C:\Users\CAUSRE User\Documents\alllease513.dta"
append using "C:\Users\CAUSRE User\Documents\alllease514.dta"
append using "C:\Users\CAUSRE User\Documents\alllease515.dta"
append using "C:\Users\CAUSRE User\Documents\alllease516.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area alllease500
save "C:\Users\CAUSRE User\Documents\alllease500.dta"
use "C:\Users\CAUSRE User\Documents\actlease112.dta", clear
append using "C:\Users\CAUSRE User\Documents\actlease113.dta"
append using "C:\Users\CAUSRE User\Documents\actlease114.dta"
append using "C:\Users\CAUSRE User\Documents\actlease115.dta"
append using "C:\Users\CAUSRE User\Documents\actlease116.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area actlease100
save "C:\Users\CAUSRE User\Documents\actlease100.dta"
use "C:\Users\CAUSRE User\Documents\actlease212.dta", clear
append using "C:\Users\CAUSRE User\Documents\actlease213.dta"
append using "C:\Users\CAUSRE User\Documents\actlease214.dta"
append using "C:\Users\CAUSRE User\Documents\actlease215.dta"
append using "C:\Users\CAUSRE User\Documents\actlease216.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area actlease200
save "C:\Users\CAUSRE User\Documents\actlease200.dta"
```

```
use "C:\Users\CAUSRE User\Documents\actlease312.dta", clear
append using "C:\Users\CAUSRE User\Documents\actlease313.dta"
append using "C:\Users\CAUSRE User\Documents\actlease314.dta"
append using "C:\Users\CAUSRE User\Documents\actlease315.dta"
append using "C:\Users\CAUSRE User\Documents\actlease316.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area actlease300
save "C:\Users\CAUSRE User\Documents\actlease300.dta"
use "C:\Users\CAUSRE User\Documents\actlease412.dta", clear
append using "C:\Users\CAUSRE User\Documents\actlease413.dta"
append using "C:\Users\CAUSRE User\Documents\actlease414.dta"
append using "C:\Users\CAUSRE User\Documents\actlease415.dta"
append using "C:\Users\CAUSRE User\Documents\actlease416.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area actlease400
save "C:\Users\CAUSRE User\Documents\actlease400.dta"
use "C:\Users\CAUSRE User\Documents\actlease512.dta", clear
append using "C:\Users\CAUSRE User\Documents\actlease513.dta"
append using "C:\Users\CAUSRE User\Documents\actlease514.dta"
append using "C:\Users\CAUSRE User\Documents\actlease515.dta"
append using "C:\Users\CAUSRE User\Documents\actlease516.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area actlease500
save "C:\Users\CAUSRE User\Documents\actlease500.dta"
use "C:\Users\CAUSRE User\Documents\cage112.dta", clear
append using "C:\Users\CAUSRE User\Documents\cage113.dta"
append using "C:\Users\CAUSRE User\Documents\cage114.dta"
append using "C:\Users\CAUSRE User\Documents\cage115.dta"
append using "C:\Users\CAUSRE User\Documents\cage116.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area cage100
save "C:\Users\CAUSRE User\Documents\cage100.dta"
```

```
use "C:\Users\CAUSRE User\Documents\cage212.dta", clear
append using "C:\Users\CAUSRE User\Documents\cage213.dta"
append using "C:\Users\CAUSRE User\Documents\cage214.dta"
append using "C:\Users\CAUSRE User\Documents\cage215.dta"
append using "C:\Users\CAUSRE User\Documents\cage216.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area cage200
save "C:\Users\CAUSRE User\Documents\cage200.dta"
use "C:\Users\CAUSRE User\Documents\cage312.dta", clear
append using "C:\Users\CAUSRE User\Documents\cage313.dta"
append using "C:\Users\CAUSRE User\Documents\cage314.dta"
append using "C:\Users\CAUSRE User\Documents\cage315.dta"
append using "C:\Users\CAUSRE User\Documents\cage316.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area cage300
save "C:\Users\CAUSRE User\Documents\cage300.dta"
use "C:\Users\CAUSRE User\Documents\cage412.dta", clear
append using "C:\Users\CAUSRE User\Documents\cage413.dta"
append using "C:\Users\CAUSRE User\Documents\cage414.dta"
append using "C:\Users\CAUSRE User\Documents\cage415.dta"
append using "C:\Users\CAUSRE User\Documents\cage416.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area cage400
save "C:\Users\CAUSRE User\Documents\cage400.dta"
use "C:\Users\CAUSRE User\Documents\cage512.dta", clear
append using "C:\Users\CAUSRE User\Documents\cage513.dta"
append using "C:\Users\CAUSRE User\Documents\cage514.dta"
append using "C:\Users\CAUSRE User\Documents\cage515.dta"
append using "C:\Users\CAUSRE User\Documents\cage516.dta"
drop OBJECTID Shape_Length
rename parcella_1 gisunique
rename Shape_Area cage500
save "C:\Users\CAUSRE User\Documents\cage500.dta"
```

```
Use “C:\Users\CAUSRE User\Documents\propertysales.dta”, clear
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\alllease100.dta"
drop if _merge==2
replace alllease100=0 if mi(alllease100)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\alllease200.dta"
drop if _merge==2
replace alllease200=0 if mi(alllease200)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\alllease300.dta"
drop if _merge==2
replace alllease300=0 if mi(alllease300)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\alllease400.dta"
drop if _merge==2
replace alllease400=0 if mi(alllease400)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\alllease500.dta"
drop if _merge==2
replace alllease500=0 if mi(alllease500)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\actlease100.dta"
drop if _merge==2
replace actlease100=0 if mi(actlease100)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\actlease200.dta"
drop if _merge==2
replace actlease200=0 if mi(actlease200)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\actlease300.dta"
drop if _merge==2
replace actlease300=0 if mi(actlease300)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\actlease400.dta"
drop if _merge==2
replace actlease400=0 if mi(actlease400)
```

```
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\actlease500.dta"
drop if _merge==2
replace actlease500=0 if mi(actlease500)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\cage100.dta"
drop if _merge==2
replace cage100=0 if mi(cage100)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\cage200.dta"
drop if _merge==2
replace cage200=0 if mi(cage200)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\cage300.dta"
drop if _merge==2
replace cage300=0 if mi(cage300)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\cage400.dta"
drop if _merge==2
replace cage400=0 if mi(cage400)
drop _merge
merge 1:1 gisunique using "C:\Users\CAUSRE User\Documents\cage500.dta"
drop if _merge==2
replace cage500=0 if mi(cage500)
drop _merge
gen pactlease100=lease100/water100*100
gen pactlease200=lease200/water200*100
gen pactlease300=lease300/water300*100
gen pactlease400=lease400/water400*100
gen pactlease500=lease500/water500*100
gen pactlease1000=lease1000/water1000*100
gen palllease100=alllease100/water100*100
gen palllease200=alllease200/water200*100
gen palllease300=alllease300/water300*100
gen palllease400=alllease400/water400*100
gen palllease500=alllease500/water500*100
```

```
gen pcage100=cage100/water100*100
gen pcage200=cage200/water200*100
gen pcage300=cage300/water300*100
gen pcage400=cage400/water400*100
gen pcage500=cage500/water500*100
replace pactlease100=0 if mi(pactlease100)
replace pactlease200=0 if mi(pactlease200)
replace pactlease300=0 if mi(pactlease300)
replace pactlease400=0 if mi(pactlease400)
replace pactlease500=0 if mi(pactlease500)
replace pcage100=0 if mi(pcage100)
replace pcage200=0 if mi(pcage200)
replace pcage300=0 if mi(pcage300)
replace pcage400=0 if mi(pcage400)
replace pcage500=0 if mi(pcage500)
replace palllease100=0 if mi(palllease100)
replace palllease200=0 if mi(palllease200)
replace palllease300=0 if mi(palllease300)
replace palllease400=0 if mi(palllease400)
replace palllease500=0 if mi(palllease500)
replace pactlease100=100 if pactlease100>100
replace pactlease200=100 if pactlease200>100
replace pactlease300=100 if pactlease300>100
replace pactlease400=100 if pactlease400>100
replace pactlease500=100 if pactlease500>100
replace palllease100=100 if palllease100>100
replace palllease200=100 if palllease200>100
replace palllease300=100 if palllease300>100
replace palllease400=100 if palllease400>100
replace palllease500=100 if palllease500>100
replace pcage100=100 if pcage100>100
replace pcage200=100 if pcage200>100
replace pcage300=100 if pcage300>100
replace pcage400=100 if pcage400>100
replace pcage500=100 if pcage500>100
```

reg lnsale livingsqft acres age pactlease100 pcage100 y2013 y2014 y2015 y2016 depthmean wqmean waterfront bgroup1 bgroup2 bgroup3 bgroup4 bgroup5 bgroup6 bgroup7 bgroup8 bgroup9 bgroup10 bgroup11 bgroup12 bgroup13 bgroup14 bgroup15 bgroup16 bgroup17 bgroup18 bgroup19 bgroup20 bgroup21 bgroup22 bgroup23 bgroup24 bgroup25 bgroup26 bgroup27 bgroup28 bgroup29 bgroup30 bgroup31 bgroup32 bgroup33 bgroup34 bgroup35 bgroup36 bgroup37 bgroup38 bgroup39 bgroup40 bgroup41 bgroup42 bgroup43 bgroup44 bgroup45 bgroup46 bgroup47 bgroup48 bgroup49 bgroup50 bgroup51 bgroup52 bgroup53 bgroup54 bgroup55 bgroup56 bgroup57 bgroup58 bgroup59 bgroup60 bgroup61 bgroup62 bgroup63 bgroup64 bgroup65 bgroup66 bgroup67 bgroup68 bgroup69 bgroup70 bgroup71 bgroup72 bgroup73 bgroup74 bgroup75 bgroup76 bgroup77 bgroup78 bgroup79 bgroup80 bgroup81 bgroup82 bgroup83 bgroup84 bgroup85 bgroup86 bgroup87 bgroup88 bgroup89 bgroup90 bgroup91 bgroup92 bgroup93 bgroup94 bgroup95 bgroup96 bgroup97 bgroup98 bgroup99 bgroup100 bgroup101 bgroup102 bgroup103 bgroup104 bgroup105 bgroup106 bgroup107 bgroup108 bgroup109 bgroup110 bgroup111 bgroup112 bgroup113 bgroup114 bgroup115 bgroup116 bgroup117 bgroup118 bgroup119 bgroup120 bgroup121 bgroup122 bgroup123 bgroup124 bgroup125 bgroup126 bgroup127 bgroup128 bgroup129 bgroup130 bgroup131 bgroup132 bgroup133 bgroup134 bgroup135 bgroup136 bgroup137 bgroup138 bgroup139 bgroup140 bgroup141 bgroup142 bgroup143 bgroup144 bgroup145 bgroup146 bgroup147 bgroup148 bgroup149 bgroup150 bgroup151 bgroup152 bgroup153 bgroup154 bgroup155 bgroup156 bgroup157 bgroup158 bgroup159 bgroup160 bgroup161 bgroup162 bgroup163 bgroup164 bgroup165 bgroup166

reg lnsale livingsqft acres age pactlease200 pcage200 y2013 y2014 y2015 y2016 depthmean wqmean waterfront bgroup1 bgroup2 bgroup3 bgroup4 bgroup5 bgroup6 bgroup7 bgroup8 bgroup9 bgroup10 bgroup11 bgroup12 bgroup13 bgroup14 bgroup15 bgroup16 bgroup17 bgroup18 bgroup19 bgroup20 bgroup21 bgroup22 bgroup23 bgroup24 bgroup25 bgroup26 bgroup27 bgroup28 bgroup29 bgroup30 bgroup31 bgroup32 bgroup33 bgroup34 bgroup35 bgroup36 bgroup37 bgroup38 bgroup39 bgroup40 bgroup41 bgroup42 bgroup43 bgroup44 bgroup45 bgroup46 bgroup47 bgroup48 bgroup49 bgroup50 bgroup51 bgroup52 bgroup53 bgroup54 bgroup55 bgroup56 bgroup57 bgroup58 bgroup59 bgroup60 bgroup61 bgroup62 bgroup63 bgroup64 bgroup65 bgroup66 bgroup67 bgroup68 bgroup69 bgroup70 bgroup71 bgroup72 bgroup73 bgroup74 bgroup75 bgroup76 bgroup77 bgroup78 bgroup79 bgroup80 bgroup81 bgroup82 bgroup83 bgroup84 bgroup85

bgroup86 bgroup87 bgroup88 bgroup89 bgroup90 bgroup91 bgroup92 bgroup93 bgroup94 bgroup95 bgroup96 bgroup97 bgroup98 bgroup99 bgroup100 bgroup101 bgroup102 bgroup103 bgroup104 bgroup105 bgroup106 bgroup107 bgroup108 bgroup109 bgroup110 bgroup111 bgroup112 bgroup113 bgroup114 bgroup115 bgroup116 bgroup117 bgroup118 bgroup119 bgroup120 bgroup121 bgroup122 bgroup123 bgroup124 bgroup125 bgroup126 bgroup127 bgroup128 bgroup129 bgroup130 bgroup131 bgroup132 bgroup133 bgroup134 bgroup135 bgroup136 bgroup137 bgroup138 bgroup139 bgroup140 bgroup141 bgroup142 bgroup143 bgroup144 bgroup145 bgroup146 bgroup147 bgroup148 bgroup149 bgroup150 bgroup151 bgroup152 bgroup153 bgroup154 bgroup155 bgroup156 bgroup157 bgroup158 bgroup159 bgroup160 bgroup161 bgroup162 bgroup163 bgroup164 bgroup165 bgroup166

reg lnsale livingsqft acres age pactlease300 pcage300 y2013 y2014 y2015 y2016 depthmean wqmean waterfront bgroup1 bgroup2 bgroup3 bgroup4 bgroup5 bgroup6 bgroup7 bgroup8 bgroup9 bgroup10 bgroup11 bgroup12 bgroup13 bgroup14 bgroup15 bgroup16 bgroup17 bgroup18 bgroup19 bgroup20 bgroup21 bgroup22 bgroup23 bgroup24 bgroup25 bgroup26 bgroup27 bgroup28 bgroup29 bgroup30 bgroup31 bgroup32 bgroup33 bgroup34 bgroup35 bgroup36 bgroup37 bgroup38 bgroup39 bgroup40 bgroup41 bgroup42 bgroup43 bgroup44 bgroup45 bgroup46 bgroup47 bgroup48 bgroup49 bgroup50 bgroup51 bgroup52 bgroup53 bgroup54 bgroup55 bgroup56 bgroup57 bgroup58 bgroup59 bgroup60 bgroup61 bgroup62 bgroup63 bgroup64 bgroup65 bgroup66 bgroup67 bgroup68 bgroup69 bgroup70 bgroup71 bgroup72 bgroup73 bgroup74 bgroup75 bgroup76 bgroup77 bgroup78 bgroup79 bgroup80 bgroup81 bgroup82 bgroup83 bgroup84 bgroup85 bgroup86 bgroup87 bgroup88 bgroup89 bgroup90 bgroup91 bgroup92 bgroup93 bgroup94 bgroup95 bgroup96 bgroup97 bgroup98 bgroup99 bgroup100 bgroup101 bgroup102 bgroup103 bgroup104 bgroup105 bgroup106 bgroup107 bgroup108 bgroup109 bgroup110 bgroup111 bgroup112 bgroup113 bgroup114 bgroup115 bgroup116 bgroup117 bgroup118 bgroup119 bgroup120 bgroup121 bgroup122 bgroup123 bgroup124 bgroup125 bgroup126 bgroup127 bgroup128 bgroup129 bgroup130 bgroup131 bgroup132 bgroup133 bgroup134 bgroup135 bgroup136 bgroup137 bgroup138 bgroup139 bgroup140 bgroup141 bgroup142 bgroup143 bgroup144 bgroup145 bgroup146 bgroup147 bgroup148 bgroup149 bgroup150 bgroup151 bgroup152 bgroup153 bgroup154 bgroup155 bgroup156 bgroup157 bgroup158 bgroup159 bgroup160 bgroup161 bgroup162 bgroup163 bgroup164 bgroup165 bgroup166

reg lnsale livingsqft acres age pactlease400 pcage400 y2013 y2014 y2015 y2016 depthmean wqmean waterfront bgroup1 bgroup2 bgroup3 bgroup4 bgroup5 bgroup6 bgroup7 bgroup8 bgroup9 bgroup10 bgroup11 bgroup12 bgroup13 bgroup14 bgroup15 bgroup16 bgroup17 bgroup18 bgroup19 bgroup20 bgroup21 bgroup22 bgroup23 bgroup24 bgroup25 bgroup26 bgroup27 bgroup28 bgroup29 bgroup30 bgroup31 bgroup32 bgroup33 bgroup34 bgroup35 bgroup36 bgroup37 bgroup38 bgroup39 bgroup40 bgroup41 bgroup42 bgroup43 bgroup44 bgroup45 bgroup46 bgroup47 bgroup48 bgroup49 bgroup50 bgroup51 bgroup52 bgroup53 bgroup54 bgroup55 bgroup56 bgroup57 bgroup58 bgroup59 bgroup60 bgroup61 bgroup62 bgroup63 bgroup64 bgroup65 bgroup66 bgroup67 bgroup68 bgroup69 bgroup70 bgroup71 bgroup72 bgroup73 bgroup74 bgroup75 bgroup76 bgroup77 bgroup78 bgroup79 bgroup80 bgroup81 bgroup82 bgroup83 bgroup84 bgroup85 bgroup86 bgroup87 bgroup88 bgroup89 bgroup90 bgroup91 bgroup92 bgroup93 bgroup94 bgroup95 bgroup96 bgroup97 bgroup98 bgroup99 bgroup100 bgroup101 bgroup102 bgroup103 bgroup104 bgroup105 bgroup106 bgroup107 bgroup108 bgroup109 bgroup110 bgroup111 bgroup112 bgroup113 bgroup114 bgroup115 bgroup116 bgroup117 bgroup118 bgroup119 bgroup120 bgroup121 bgroup122 bgroup123 bgroup124 bgroup125 bgroup126 bgroup127 bgroup128 bgroup129 bgroup130 bgroup131 bgroup132 bgroup133 bgroup134 bgroup135 bgroup136 bgroup137 bgroup138 bgroup139 bgroup140 bgroup141 bgroup142 bgroup143 bgroup144 bgroup145 bgroup146 bgroup147 bgroup148 bgroup149 bgroup150 bgroup151 bgroup152 bgroup153 bgroup154 bgroup155 bgroup156 bgroup157 bgroup158 bgroup159 bgroup160 bgroup161 bgroup162 bgroup163 bgroup164 bgroup165 bgroup166

reg lnsale livingsqft acres age pactlease500 pcage500 y2013 y2014 y2015 y2016 depthmean wqmean waterfront bgroup1 bgroup2 bgroup3 bgroup4 bgroup5 bgroup6 bgroup7 bgroup8 bgroup9 bgroup10 bgroup11 bgroup12 bgroup13 bgroup14 bgroup15 bgroup16 bgroup17 bgroup18 bgroup19 bgroup20 bgroup21 bgroup22 bgroup23 bgroup24 bgroup25 bgroup26 bgroup27 bgroup28 bgroup29 bgroup30 bgroup31 bgroup32 bgroup33 bgroup34 bgroup35 bgroup36 bgroup37 bgroup38 bgroup39 bgroup40 bgroup41 bgroup42 bgroup43 bgroup44 bgroup45 bgroup46 bgroup47 bgroup48 bgroup49 bgroup50 bgroup51 bgroup52 bgroup53 bgroup54 bgroup55 bgroup56 bgroup57 bgroup58 bgroup59 bgroup60 bgroup61 bgroup62 bgroup63 bgroup64 bgroup65 bgroup66 bgroup67 bgroup68 bgroup69 bgroup70 bgroup71 bgroup72 bgroup73 bgroup74 bgroup75 bgroup76 bgroup77 bgroup78 bgroup79 bgroup80 bgroup81 bgroup82 bgroup83 bgroup84 bgroup85

bgroup86 bgroup87 bgroup88 bgroup89 bgroup90 bgroup91 bgroup92 bgroup93 bgroup94 bgroup95 bgroup96 bgroup97 bgroup98 bgroup99 bgroup100 bgroup101 bgroup102 bgroup103 bgroup104 bgroup105 bgroup106 bgroup107 bgroup108 bgroup109 bgroup110 bgroup111 bgroup112 bgroup113 bgroup114 bgroup115 bgroup116 bgroup117 bgroup118 bgroup119 bgroup120 bgroup121 bgroup122 bgroup123 bgroup124 bgroup125 bgroup126 bgroup127 bgroup128 bgroup129 bgroup130 bgroup131 bgroup132 bgroup133 bgroup134 bgroup135 bgroup136 bgroup137 bgroup138 bgroup139 bgroup140 bgroup141 bgroup142 bgroup143 bgroup144 bgroup145 bgroup146 bgroup147 bgroup148 bgroup149 bgroup150 bgroup151 bgroup152 bgroup153 bgroup154 bgroup155 bgroup156 bgroup157 bgroup158 bgroup159 bgroup160 bgroup161 bgroup162 bgroup163 bgroup164 bgroup165 bgroup166

**Appendix D.** Full Model Results

**Table 1D**. Full Results, 100m Buffer

| | Coefficient | Standard Error |
|---|---|---|
| ***sqft*** | 0.000259*[a] | 9.57E-06 |
| ***acres*** | 0.018111* | 0.003823 |
| ***age*** | 0.000342 | 0.000377 |
| ***actlease100*** | 0.000228 | 0.001788 |
| ***cage100*** | 0.010147***[c] | 0.005901 |
| ***wqmean*** | -0.00136 | 0.029584 |
| ***depthmean*** | 0.005303 | 0.004481 |
| ***waterfront*** | 0.195343* | 0.041189 |
| ***y2013*** | 0.013505 | 0.034934 |
| ***y2014*** | 0.011262 | 0.034694 |
| ***y2015*** | 0.032585 | 0.034067 |
| ***y2016*** | 0.023424 | 0.034128 |
| ***bgroup1*** | 0.473532 | 0.527535 |
| ***bgroup2*** | 0.251003 | 0.49998 |
| ***bgroup3*** | 0.448371 | 0.533641 |
| ***bgroup4*** | 0.366867 | 0.506809 |
| ***bgroup5*** | -0.01574 | 0.52069 |
| ***bgroup6*** | 0.125194 | 0.478039 |
| ***bgroup7*** | 0.047995 | 0.481783 |
| ***bgroup8*** | 0.450737 | 0.472029 |
| ***bgroup9*** | 0.36131 | 0.471349 |
| ***bgroup10*** | -0.34864 | 0.504989 |
| ***bgroup11*** | 0.293008 | 0.486907 |
| ***bgroup12*** | 0.273571 | 0.477282 |
| ***bgroup13*** | 0.545951 | 0.503234 |
| ***bgroup14*** | 0.001287 | 0.483484 |
| ***bgroup15*** | 0.172299 | 0.518804 |
| ***bgroup16*** | 0.362525 | 0.476585 |
| ***bgroup17*** | 0.162745 | 0.487274 |
| ***bgroup18*** | -0.11445 | 0.476468 |
| ***bgroup19*** | -0.19607 | 0.488619 |
| ***bgroup20*** | 0.373854 | 0.471192 |
| ***bgroup21*** | -0.26159 | 0.500372 |
| ***bgroup22*** | 0.241593 | 0.486497 |
| ***bgroup23*** | 0.250123 | 0.48681 |

| | | |
|---|---|---|
| ***bgroup24*** | 0.187725 | 0.49329 |
| ***bgroup25*** | 0.069726 | 0.492934 |
| ***bgroup26*** | 0.362824 | 0.48833 |
| ***bgroup27*** | 0.386342 | 0.509257 |
| ***bgroup28*** | 0.400136 | 0.492891 |
| ***bgroup29*** | 0.24195 | 0.537655 |
| ***bgroup30*** | 0.193642 | 0.536533 |
| ***bgroup31*** | 0.245814 | 0.656241 |
| ***bgroup32*** | 0.406968 | 0.656252 |
| ***bgroup33*** | -0.1468 | 0.572692 |
| ***bgroup34*** | 1.148718*** | 0.658749 |
| ***bgroup35*** | 0.485444 | 0.505678 |
| ***bgroup36*** | 0.421409 | 0.536268 |
| ***bgroup37*** | 0.374524 | 0.57274 |
| ***bgroup38*** | 0.264824 | 0.54425 |
| ***bgroup39*** | -0.10865 | 0.50628 |
| ***bgroup40*** | 0.477562 | 0.49547 |
| ***bgroup41*** | 0.26664 | 0.483405 |
| ***bgroup42*** | -0.74966 | 0.540506 |
| ***bgroup43*** | 0.291943 | 0.521775 |
| ***bgroup44*** | 0.417339 | 0.484721 |
| ***bgroup45*** | 0.357278 | 0.475465 |
| ***bgroup46*** | 0.287729 | 0.468751 |
| ***bgroup47*** | 0.459706 | 0.475613 |
| ***bgroup48*** | 0.511405 | 0.47297 |
| ***bgroup49*** | 0.491767 | 0.473123 |
| ***bgroup50*** | 0.419956 | 0.469454 |
| ***bgroup51*** | 0.632997 | 0.472102 |
| ***bgroup52*** | 0.502505 | 0.469164 |
| ***bgroup53*** | 0.375435 | 0.468244 |
| ***bgroup54*** | 0.598394 | 0.510236 |
| ***bgroup55*** | -0.15006 | 0.499084 |
| ***bgroup56*** | 0.435185 | 0.569554 |
| ***bgroup57*** | 0.451019 | 0.492644 |
| ***bgroup58*** | -0.11662 | 0.486273 |
| ***bgroup59*** | 0.085956 | 0.481682 |
| ***bgroup60*** | 0.299693 | 0.480324 |
| ***bgroup61*** | 0.10793 | 0.492986 |
| ***bgroup62*** | 0.482184 | 0.497653 |

| | | |
|---|---|---|
| ***bgroup63*** | 0.300565 | 0.47354 |
| ***bgroup64*** | 0.134851 | 0.487824 |
| ***bgroup65*** | 0.392722 | 0.483136 |
| ***bgroup66*** | 0.482414 | 0.656236 |
| ***bgroup67*** | 0.321817 | 0.470424 |
| ***bgroup68*** | 0.744973 | 0.492051 |
| ***bgroup69*** | 0.050138 | 0.480221 |
| ***bgroup70*** | 0.595812 | 0.471117 |
| ***bgroup71*** | 0.52704 | 0.468595 |
| ***bgroup72*** | 0.157498 | 0.524692 |
| ***bgroup73*** | 0.522428 | 0.569523 |
| ***bgroup74*** | 0.590257 | 0.657712 |
| ***bgroup75*** | 0.264755 | 0.538073 |
| ***bgroup76*** | 0.087381 | 0.509726 |
| ***bgroup77*** | 0.147442 | 0.655195 |
| ***bgroup78*** | -0.03959 | 0.511688 |
| ***bgroup79*** | 0.037273 | 0.537266 |
| ***bgroup80*** | 0.311763 | 0.536231 |
| ***bgroup81*** | -0.07189 | 0.502822 |
| ***bgroup82*** | 0.139614 | 0.482176 |
| ***bgroup83*** | 0.103664 | 0.509995 |
| ***bgroup84*** | 0.059167 | 0.537409 |
| ***bgroup85*** | -0.12227 | 0.476009 |
| ***bgroup86*** | -0.1965 | 0.491184 |
| ***bgroup87*** | -0.45448 | 0.657622 |
| ***bgroup88*** | -0.5496 | 0.519927 |
| ***bgroup89*** | -0.06275 | 0.478842 |
| ***bgroup90*** | -0.22276 | 0.479088 |
| ***bgroup91*** | -0.23878 | 0.493257 |
| ***bgroup92*** | -0.2171 | 0.485581 |
| ***bgroup93*** | 0.602038 | 0.472305 |
| ***bgroup94*** | 0.21151 | 0.521724 |
| ***bgroup95*** | 0.262839 | 0.501952 |
| ***bgroup96*** | -0.26629 | 0.655581 |
| ***bgroup97*** | 0.326902 | 0.484807 |
| ***bgroup98*** | -0.18817 | 0.481436 |
| ***bgroup99*** | 0.19034 | 0.480633 |
| ***bgroup100*** | 0.021391 | 0.474669 |
| ***bgroup101*** | -0.52947 | 0.508932 |

| | | |
|---|---|---|
| ***bgroup102*** | 0.130065 | 0.480218 |
| ***bgroup103*** | 0.377199 | 0.486422 |
| ***bgroup104*** | 0.031453 | 0.521043 |
| ***bgroup105*** | -0.28704 | 0.567745 |
| ***bgroup106*** | -0.36157 | 0.480478 |
| ***bgroup107*** | 0.665016 | 0.476791 |
| ***bgroup108*** | 0.530361 | 0.568076 |
| ***bgroup109*** | 0.648262 | 0.488586 |
| ***bgroup110*** | 0.29971 | 0.496475 |
| ***bgroup111*** | 0.117372 | 0.510257 |
| ***bgroup112*** | 0.479765 | 0.508445 |
| ***bgroup113*** | 0.357267 | 0.482555 |
| ***bgroup114*** | -0.05672 | 0.569886 |
| ***bgroup115*** | 0.121435 | 0.483786 |
| ***bgroup116*** | 0.167341 | 0.519302 |
| ***bgroup117*** | 0.155356 | 0.509733 |
| ***bgroup118*** | 0.270487 | 0.473013 |
| ***bgroup119*** | 0.219928 | 0.470382 |
| ***bgroup120*** | 0.312629 | 0.472244 |
| ***bgroup121*** | 0.082865 | 0.656374 |
| ***bgroup122*** | 0.407317 | 0.493791 |
| ***bgroup123*** | -0.72104 | 0.569805 |
| ***bgroup124*** | 0.316993 | 0.484896 |
| ***bgroup125*** | 0.086146 | 0.511812 |
| ***bgroup126*** | 0.583949 | 0.655411 |
| ***bgroup127*** | 0.336714 | 0.491956 |
| ***bgroup128*** | 0.092911 | 0.507779 |
| ***bgroup129*** | 0.314195 | 0.48921 |
| ***bgroup130*** | 0.619901 | 0.507329 |
| ***bgroup131*** | 0.239898 | 0.484181 |
| ***bgroup132*** | -0.08274 | 0.482847 |
| ***bgroup133*** | 0.287226 | 0.65714 |
| ***bgroup134*** | -0.34392 | 0.49345 |
| ***bgroup135*** | -0.00004 | 0.499556 |
| ***bgroup136*** | 0.279365 | 0.539454 |
| ***bgroup137*** | 0.057316 | 0.504596 |
| ***bgroup138*** | 0.361282 | 0.506386 |
| ***bgroup139*** | 0.03186 | 0.483847 |
| ***bgroup140*** | 0.473464 | 0.480191 |

| | | |
|---|---|---|
| ***bgroup141*** | 0.627029 | 0.518834 |
| ***bgroup142*** | 0.390352 | 0.495325 |
| ***bgroup143*** | 0.762237 | 0.535752 |
| ***bgroup144*** | 0.401257 | 0.654966 |
| ***bgroup145*** | 0.801205*** | 0.480305 |
| ***bgroup146*** | 0.555988 | 0.494996 |
| ***bgroup147*** | -0.05363 | 0.534719 |
| ***bgroup148*** | 0.311741 | 0.477965 |
| ***bgroup149*** | 0.529257 | 0.468367 |
| ***bgroup150*** | 0.541852 | 0.467655 |
| ***bgroup151*** | 0.870973*** | 0.476171 |
| ***bgroup152*** | 0.590131 | 0.497573 |
| ***bgroup153*** | 0.632901 | 0.47024 |
| ***bgroup154*** | 0.668003 | 0.466092 |
| ***bgroup155*** | 0.564834 | 0.477739 |
| ***bgroup156*** | 1.08674**[b] | 0.488175 |
| ***bgroup157*** | 1.280065* | 0.491418 |
| ***bgroup158*** | 0.44324 | 0.480547 |
| ***bgroup159*** | 0.617769 | 0.47616 |
| ***bgroup160*** | 0.512654 | 0.479027 |
| ***bgroup161*** | 0.913689*** | 0.482468 |
| ***bgroup162*** | 0.572333 | 0.473303 |
| ***bgroup163*** | 0.867497*** | 0.471086 |
| ***bgroup164*** | 0.831925*** | 0.481811 |
| ***bgroup165*** | -0.01389 | 0.655956 |
| ***bgroup166*** | 0.355564 | 0.567331 |
| ***_cons*** | 11.61593* | 0.471766 |

a. Significant at 1% level
b. Significant at 5% level
c. Significant at 10% level

**Table 2D**. Full Results, 200m Buffer

| | **Coefficient** | **Standard Error** |
|---|---|---|
| ***sqft*** | 0.00026* | 9.59E-06 |
| ***acres*** | 0.018425* | 0.003832 |
| ***age*** | 0.000334 | 0.000378 |
| ***actlease200*** | 0.001352 | 0.001367 |
| ***cage200*** | -0.00322 | 0.004106 |

| | | |
|---|---|---|
| ***wqmean*** | -0.00225 | 0.0296 |
| ***depthmean*** | 0.00529 | 0.004486 |
| ***waterfront*** | 0.195857* | 0.041212 |
| ***y2013*** | 0.012161 | 0.034951 |
| ***y2014*** | 0.010794 | 0.034722 |
| ***y2015*** | 0.030097 | 0.034108 |
| ***y2016*** | 0.021279 | 0.034233 |
| ***bgroup1*** | 0.481311 | 0.527824 |
| ***bgroup2*** | 0.258842 | 0.500262 |
| ***bgroup3*** | 0.455973 | 0.533934 |
| ***bgroup4*** | 0.375648 | 0.507095 |
| ***bgroup5*** | -0.00722 | 0.520978 |
| ***bgroup6*** | 0.130558 | 0.478302 |
| ***bgroup7*** | 0.028932 | 0.482685 |
| ***bgroup8*** | 0.455138 | 0.472287 |
| ***bgroup9*** | 0.366577 | 0.471614 |
| ***bgroup10*** | -0.36083 | 0.505225 |
| ***bgroup11*** | 0.296432 | 0.487169 |
| ***bgroup12*** | 0.277772 | 0.477546 |
| ***bgroup13*** | 0.550072 | 0.503508 |
| ***bgroup14*** | 0.006531 | 0.483747 |
| ***bgroup15*** | 0.176115 | 0.519083 |
| ***bgroup16*** | 0.365732 | 0.476842 |
| ***bgroup17*** | 0.166291 | 0.48754 |
| ***bgroup18*** | -0.10961 | 0.476727 |
| ***bgroup19*** | -0.19212 | 0.488883 |
| ***bgroup20*** | 0.378235 | 0.47145 |
| ***bgroup21*** | -0.2593 | 0.500643 |
| ***bgroup22*** | 0.248454 | 0.486767 |
| ***bgroup23*** | 0.248826 | 0.487103 |
| ***bgroup24*** | 0.179399 | 0.493244 |
| ***bgroup25*** | 0.073155 | 0.4932 |
| ***bgroup26*** | 0.367635 | 0.488595 |
| ***bgroup27*** | 0.390305 | 0.50953 |
| ***bgroup28*** | 0.377962 | 0.493578 |
| ***bgroup29*** | 0.246035 | 0.537949 |
| ***bgroup30*** | 0.197512 | 0.536821 |
| ***bgroup31*** | 0.24901 | 0.656596 |
| ***bgroup32*** | 0.409431 | 0.656605 |

| | | |
|---|---|---|
| ***bgroup33*** | -0.14402 | 0.572998 |
| ***bgroup34*** | 1.152028*** | 0.659103 |
| ***bgroup35*** | 0.491294 | 0.505958 |
| ***bgroup36*** | 0.428616 | 0.536561 |
| ***bgroup37*** | 0.381281 | 0.573052 |
| ***bgroup38*** | 0.271754 | 0.544547 |
| ***bgroup39*** | -0.10266 | 0.506558 |
| ***bgroup40*** | 0.481525 | 0.495737 |
| ***bgroup41*** | 0.270911 | 0.483665 |
| ***bgroup42*** | -0.74803 | 0.540791 |
| ***bgroup43*** | 0.298046 | 0.522062 |
| ***bgroup44*** | 0.420464 | 0.484984 |
| ***bgroup45*** | 0.361777 | 0.475726 |
| ***bgroup46*** | 0.288802 | 0.469015 |
| ***bgroup47*** | 0.459659 | 0.475876 |
| ***bgroup48*** | 0.513529 | 0.473229 |
| ***bgroup49*** | 0.493226 | 0.473379 |
| ***bgroup50*** | 0.418741 | 0.469727 |
| ***bgroup51*** | 0.625491 | 0.472439 |
| ***bgroup52*** | 0.504079 | 0.469418 |
| ***bgroup53*** | 0.377946 | 0.468498 |
| ***bgroup54*** | 0.604625 | 0.510521 |
| ***bgroup55*** | -0.14756 | 0.499353 |
| ***bgroup56*** | 0.441309 | 0.569865 |
| ***bgroup57*** | 0.433467 | 0.491824 |
| ***bgroup58*** | -0.11255 | 0.486538 |
| ***bgroup59*** | 0.090513 | 0.481948 |
| ***bgroup60*** | 0.304485 | 0.480588 |
| ***bgroup61*** | 0.114856 | 0.493258 |
| ***bgroup62*** | 0.486437 | 0.497924 |
| ***bgroup63*** | 0.305243 | 0.473799 |
| ***bgroup64*** | 0.131773 | 0.488141 |
| ***bgroup65*** | 0.397545 | 0.483399 |
| ***bgroup66*** | 0.487599 | 0.656589 |
| ***bgroup67*** | 0.326414 | 0.470681 |
| ***bgroup68*** | 0.74703 | 0.492316 |
| ***bgroup69*** | 0.065913 | 0.481164 |
| ***bgroup70*** | 0.594343 | 0.471348 |
| ***bgroup71*** | 0.541994 | 0.468946 |

| | | |
|---|---|---|
| ***bgroup72*** | 0.163989 | 0.524981 |
| ***bgroup73*** | 0.526181 | 0.569848 |
| ***bgroup74*** | 0.595511 | 0.658065 |
| ***bgroup75*** | 0.270413 | 0.53837 |
| ***bgroup76*** | 0.092968 | 0.510007 |
| ***bgroup77*** | 0.152088 | 0.655548 |
| ***bgroup78*** | -0.03437 | 0.511969 |
| ***bgroup79*** | 0.043308 | 0.537561 |
| ***bgroup80*** | 0.317021 | 0.536523 |
| ***bgroup81*** | -0.08603 | 0.503438 |
| ***bgroup82*** | 0.143727 | 0.482439 |
| ***bgroup83*** | 0.106549 | 0.510271 |
| ***bgroup84*** | 0.063689 | 0.537702 |
| ***bgroup85*** | -0.11689 | 0.476271 |
| ***bgroup86*** | -0.19156 | 0.491454 |
| ***bgroup87*** | -0.44836 | 0.657988 |
| ***bgroup88*** | -0.5445 | 0.520214 |
| ***bgroup89*** | -0.05792 | 0.479106 |
| ***bgroup90*** | -0.21795 | 0.479353 |
| ***bgroup91*** | -0.23331 | 0.49353 |
| ***bgroup92*** | -0.21191 | 0.485848 |
| ***bgroup93*** | 0.606345 | 0.472562 |
| ***bgroup94*** | 0.140222 | 0.525824 |
| ***bgroup95*** | 0.267209 | 0.502228 |
| ***bgroup96*** | -0.26248 | 0.655936 |
| ***bgroup97*** | 0.330796 | 0.485071 |
| ***bgroup98*** | -0.18314 | 0.481703 |
| ***bgroup99*** | 0.195305 | 0.480899 |
| ***bgroup100*** | 0.026293 | 0.474931 |
| ***bgroup101*** | -0.52293 | 0.509218 |
| ***bgroup102*** | 0.134842 | 0.480483 |
| ***bgroup103*** | 0.381275 | 0.486687 |
| ***bgroup104*** | 0.037237 | 0.521329 |
| ***bgroup105*** | -0.28243 | 0.568053 |
| ***bgroup106*** | -0.35675 | 0.480746 |
| ***bgroup107*** | 0.66905 | 0.47705 |
| ***bgroup108*** | 0.535023 | 0.568385 |
| ***bgroup109*** | 0.650749 | 0.488849 |
| ***bgroup110*** | 0.302654 | 0.496742 |

| | | |
|---|---|---|
| ***bgroup111*** | 0.12097 | 0.510535 |
| ***bgroup112*** | 0.483742 | 0.508721 |
| ***bgroup113*** | 0.360917 | 0.482814 |
| ***bgroup114*** | -0.05233 | 0.570194 |
| ***bgroup115*** | 0.126293 | 0.484051 |
| ***bgroup116*** | 0.171871 | 0.519584 |
| ***bgroup117*** | 0.161399 | 0.510016 |
| ***bgroup118*** | 0.274694 | 0.473273 |
| ***bgroup119*** | 0.236972 | 0.47067 |
| ***bgroup120*** | 0.315891 | 0.472503 |
| ***bgroup121*** | 0.084566 | 0.656726 |
| ***bgroup122*** | 0.410812 | 0.494058 |
| ***bgroup123*** | -0.71763 | 0.570112 |
| ***bgroup124*** | 0.320637 | 0.48516 |
| ***bgroup125*** | 0.092371 | 0.512091 |
| ***bgroup126*** | 0.587172 | 0.655763 |
| ***bgroup127*** | 0.341654 | 0.492225 |
| ***bgroup128*** | 0.094438 | 0.508051 |
| ***bgroup129*** | 0.317181 | 0.489473 |
| ***bgroup130*** | 0.620575 | 0.507602 |
| ***bgroup131*** | 0.237805 | 0.484445 |
| ***bgroup132*** | -0.07831 | 0.48311 |
| ***bgroup133*** | 0.292069 | 0.657499 |
| ***bgroup134*** | -0.38535 | 0.495445 |
| ***bgroup135*** | 0.004332 | 0.499824 |
| ***bgroup136*** | 0.284163 | 0.539743 |
| ***bgroup137*** | 0.063032 | 0.504868 |
| ***bgroup138*** | 0.367346 | 0.506665 |
| ***bgroup139*** | 0.03839 | 0.484113 |
| ***bgroup140*** | 0.475648 | 0.480448 |
| ***bgroup141*** | 0.629767 | 0.519112 |
| ***bgroup142*** | 0.393261 | 0.495593 |
| ***bgroup143*** | 0.767095 | 0.536043 |
| ***bgroup144*** | 0.403956 | 0.655318 |
| ***bgroup145*** | 0.800749*** | 0.480563 |
| ***bgroup146*** | 0.558448 | 0.495262 |
| ***bgroup147*** | -0.05257 | 0.535005 |
| ***bgroup148*** | 0.315909 | 0.478224 |
| ***bgroup149*** | 0.533398 | 0.468623 |

| | | |
|---|---|---|
| ***bgroup150*** | 0.544919 | 0.46791 |
| ***bgroup151*** | 0.868194*** | 0.476435 |
| ***bgroup152*** | 0.595042 | 0.497845 |
| ***bgroup153*** | 0.641546 | 0.470505 |
| ***bgroup154*** | 0.677428 | 0.466343 |
| ***bgroup155*** | 0.569097 | 0.478 |
| ***bgroup156*** | 1.090254** | 0.48844 |
| ***bgroup157*** | 1.283499* | 0.491687 |
| ***bgroup158*** | 0.446162 | 0.480806 |
| ***bgroup159*** | 0.621561 | 0.476418 |
| ***bgroup160*** | 0.517362 | 0.47929 |
| ***bgroup161*** | 0.916973*** | 0.482729 |
| ***bgroup162*** | 0.574521 | 0.473559 |
| ***bgroup163*** | 0.870241*** | 0.47134 |
| ***bgroup164*** | 0.834782 | 0.482073 |
| ***bgroup165*** | -0.00869 | 0.65631 |
| ***bgroup166*** | 0.359437 | 0.567637 |
| ***_cons*** | 11.6117* | 0.472056 |

**Table 3D**. Full Results, 300m Buffer

| | **Coefficient** | **Standard Error** |
|---|---|---|
| ***sqft*** | 0.000261* | 9.56E-06 |
| ***acres*** | 0.01883* | 0.003821 |
| ***age*** | 0.000304 | 0.000377 |
| ***actlease300*** | 0.002128*** | 0.001237 |
| ***cage300*** | -0.01082* | 0.003234 |
| ***wqmean*** | -0.004 | 0.02956 |
| ***depthmean*** | 0.005102 | 0.004476 |
| ***waterfront*** | 0.197207* | 0.041113 |
| ***y2013*** | 0.009549 | 0.034894 |
| ***y2014*** | 0.007461 | 0.034676 |
| ***y2015*** | 0.026473 | 0.034063 |
| ***y2016*** | 0.018817 | 0.034215 |
| ***bgroup1*** | 0.491959 | 0.526549 |
| ***bgroup2*** | 0.270533 | 0.499084 |
| ***bgroup3*** | 0.466502 | 0.532661 |
| ***bgroup4*** | 0.388026 | 0.505885 |
| ***bgroup5*** | 0.004804 | 0.519723 |

| | | |
|---|---|---|
| ***bgroup6*** | 0.138144 | 0.477132 |
| ***bgroup7*** | -0.00214 | 0.482323 |
| ***bgroup8*** | 0.460826 | 0.47113 |
| ***bgroup9*** | 0.372601 | 0.470456 |
| ***bgroup10*** | -0.38096 | 0.504184 |
| ***bgroup11*** | 0.302109 | 0.48598 |
| ***bgroup12*** | 0.280295 | 0.476374 |
| ***bgroup13*** | 0.554379 | 0.502274 |
| ***bgroup14*** | 0.015385 | 0.482571 |
| ***bgroup15*** | 0.182771 | 0.517818 |
| ***bgroup16*** | 0.368622 | 0.475673 |
| ***bgroup17*** | 0.170216 | 0.486344 |
| ***bgroup18*** | -0.10591 | 0.475559 |
| ***bgroup19*** | -0.12782 | 0.488167 |
| ***bgroup20*** | 0.383167 | 0.470292 |
| ***bgroup21*** | -0.25678 | 0.499417 |
| ***bgroup22*** | 0.254645 | 0.485571 |
| ***bgroup23*** | 0.252701 | 0.485885 |
| ***bgroup24*** | 0.177999 | 0.491947 |
| ***bgroup25*** | 0.077868 | 0.491994 |
| ***bgroup26*** | 0.374136 | 0.487399 |
| ***bgroup27*** | 0.394466 | 0.508283 |
| ***bgroup28*** | 0.367047 | 0.49215 |
| ***bgroup29*** | 0.25427 | 0.536647 |
| ***bgroup30*** | 0.202008 | 0.535506 |
| ***bgroup31*** | 0.254283 | 0.654988 |
| ***bgroup32*** | 0.414094 | 0.654999 |
| ***bgroup33*** | -0.13888 | 0.571616 |
| ***bgroup34*** | 1.155443*** | 0.657489 |
| ***bgroup35*** | 0.500165 | 0.504738 |
| ***bgroup36*** | 0.446039 | 0.535273 |
| ***bgroup37*** | 0.390758 | 0.571661 |
| ***bgroup38*** | 0.281118 | 0.543224 |
| ***bgroup39*** | -0.09297 | 0.505334 |
| ***bgroup40*** | 0.486442 | 0.494523 |
| ***bgroup41*** | 0.277165 | 0.482484 |
| ***bgroup42*** | -0.74541 | 0.539467 |
| ***bgroup43*** | 0.307314 | 0.520787 |
| ***bgroup44*** | 0.42331 | 0.483794 |

| | | |
|---|---|---|
| ***bgroup45*** | 0.36668 | 0.474558 |
| ***bgroup46*** | 0.292664 | 0.467861 |
| ***bgroup47*** | 0.460147 | 0.474713 |
| ***bgroup48*** | 0.515394 | 0.47207 |
| ***bgroup49*** | 0.495513 | 0.472219 |
| ***bgroup50*** | 0.414914 | 0.468604 |
| ***bgroup51*** | 0.621968 | 0.471282 |
| ***bgroup52*** | 0.509535 | 0.468273 |
| ***bgroup53*** | 0.382892 | 0.467356 |
| ***bgroup54*** | 0.611539 | 0.509266 |
| ***bgroup55*** | -0.14613 | 0.49813 |
| ***bgroup56*** | 0.44823 | 0.568469 |
| ***bgroup57*** | 0.439354 | 0.490082 |
| ***bgroup58*** | -0.11072 | 0.485345 |
| ***bgroup59*** | 0.093071 | 0.480768 |
| ***bgroup60*** | 0.307907 | 0.479407 |
| ***bgroup61*** | 0.125285 | 0.49206 |
| ***bgroup62*** | 0.492142 | 0.496702 |
| ***bgroup63*** | 0.31155 | 0.47264 |
| ***bgroup64*** | 0.123338 | 0.48704 |
| ***bgroup65*** | 0.404502 | 0.482218 |
| ***bgroup66*** | 0.494607 | 0.654984 |
| ***bgroup67*** | 0.333237 | 0.469531 |
| ***bgroup68*** | 0.734452 | 0.491214 |
| ***bgroup69*** | 0.123916 | 0.479878 |
| ***bgroup70*** | 0.597629 | 0.470168 |
| ***bgroup71*** | 0.566789 | 0.467782 |
| ***bgroup72*** | 0.17348 | 0.523702 |
| ***bgroup73*** | 0.577114 | 0.568717 |
| ***bgroup74*** | 0.601494 | 0.656455 |
| ***bgroup75*** | 0.379608 | 0.538349 |
| ***bgroup76*** | 0.102864 | 0.508762 |
| ***bgroup77*** | 0.158861 | 0.653951 |
| ***bgroup78*** | -0.02813 | 0.510712 |
| ***bgroup79*** | 0.051634 | 0.536244 |
| ***bgroup80*** | 0.324097 | 0.535208 |
| ***bgroup81*** | -0.10539 | 0.502454 |
| ***bgroup82*** | 0.148226 | 0.481255 |
| ***bgroup83*** | 0.109682 | 0.509024 |

| | | |
|---|---|---|
| ***bgroup84*** | 0.068642 | 0.536384 |
| ***bgroup85*** | -0.11008 | 0.475104 |
| ***bgroup86*** | -0.18558 | 0.490247 |
| ***bgroup87*** | -0.43914 | 0.656383 |
| ***bgroup88*** | -0.53561 | 0.518943 |
| ***bgroup89*** | -0.05203 | 0.47793 |
| ***bgroup90*** | -0.21101 | 0.478179 |
| ***bgroup91*** | -0.22537 | 0.492322 |
| ***bgroup92*** | -0.20483 | 0.484659 |
| ***bgroup93*** | 0.610936 | 0.471403 |
| ***bgroup94*** | 0.089987 | 0.524065 |
| ***bgroup95*** | 0.274618 | 0.501002 |
| ***bgroup96*** | -0.25793 | 0.65433 |
| ***bgroup97*** | 0.336417 | 0.483888 |
| ***bgroup98*** | -0.175 | 0.480531 |
| ***bgroup99*** | 0.202044 | 0.479726 |
| ***bgroup100*** | 0.033755 | 0.473773 |
| ***bgroup101*** | -0.51296 | 0.507979 |
| ***bgroup102*** | 0.140275 | 0.479303 |
| ***bgroup103*** | 0.385743 | 0.485494 |
| ***bgroup104*** | 0.043397 | 0.520049 |
| ***bgroup105*** | -0.27465 | 0.566671 |
| ***bgroup106*** | -0.34813 | 0.479578 |
| ***bgroup107*** | 0.675118 | 0.475887 |
| ***bgroup108*** | 0.540345 | 0.566995 |
| ***bgroup109*** | 0.654323 | 0.487657 |
| ***bgroup110*** | 0.306796 | 0.495527 |
| ***bgroup111*** | 0.125735 | 0.509282 |
| ***bgroup112*** | 0.489081 | 0.507478 |
| ***bgroup113*** | 0.366005 | 0.481635 |
| ***bgroup114*** | -0.04619 | 0.568797 |
| ***bgroup115*** | 0.132765 | 0.482867 |
| ***bgroup116*** | 0.178318 | 0.518313 |
| ***bgroup117*** | 0.169401 | 0.508774 |
| ***bgroup118*** | 0.28535 | 0.472123 |
| ***bgroup119*** | 0.276024 | 0.46966 |
| ***bgroup120*** | 0.3176 | 0.471346 |
| ***bgroup121*** | 0.08764 | 0.655119 |
| ***bgroup122*** | 0.414613 | 0.492847 |

| | | |
|---|---|---|
| ***bgroup123*** | -0.71546 | 0.568715 |
| ***bgroup124*** | 0.324144 | 0.483969 |
| ***bgroup125*** | 0.102484 | 0.510857 |
| ***bgroup126*** | 0.59405 | 0.654162 |
| ***bgroup127*** | 0.348837 | 0.491024 |
| ***bgroup128*** | 0.098402 | 0.506817 |
| ***bgroup129*** | 0.322845 | 0.488286 |
| ***bgroup130*** | 0.623435 | 0.506365 |
| ***bgroup131*** | 0.239748 | 0.483231 |
| ***bgroup132*** | -0.0721 | 0.481928 |
| ***bgroup133*** | 0.298612 | 0.655886 |
| ***bgroup134*** | -0.42211 | 0.494474 |
| ***bgroup135*** | 0.005772 | 0.498599 |
| ***bgroup136*** | 0.29083 | 0.538435 |
| ***bgroup137*** | 0.072322 | 0.503647 |
| ***bgroup138*** | 0.376666 | 0.50545 |
| ***bgroup139*** | 0.048886 | 0.482947 |
| ***bgroup140*** | 0.478933 | 0.479275 |
| ***bgroup141*** | 0.633423 | 0.517843 |
| ***bgroup142*** | 0.398515 | 0.494383 |
| ***bgroup143*** | 0.772961 | 0.534731 |
| ***bgroup144*** | 0.410317 | 0.65372 |
| ***bgroup145*** | 0.799673*** | 0.479391 |
| ***bgroup146*** | 0.562174 | 0.494054 |
| ***bgroup147*** | -0.04901 | 0.5337 |
| ***bgroup148*** | 0.322378 | 0.477057 |
| ***bgroup149*** | 0.539524 | 0.467478 |
| ***bgroup150*** | 0.549971 | 0.466768 |
| ***bgroup151*** | 0.867407*** | 0.47527 |
| ***bgroup152*** | 0.603938 | 0.49663 |
| ***bgroup153*** | 0.65007 | 0.469346 |
| ***bgroup154*** | 0.685495 | 0.465195 |
| ***bgroup155*** | 0.574922 | 0.476832 |
| ***bgroup156*** | 1.095429** | 0.487248 |
| ***bgroup157*** | 1.288956* | 0.490489 |
| ***bgroup158*** | 0.450905 | 0.479632 |
| ***bgroup159*** | 0.62733 | 0.475254 |
| ***bgroup160*** | 0.524343 | 0.478118 |
| ***bgroup161*** | 0.922129*** | 0.481552 |

| | | |
|---|---|---|
| ***bgroup162*** | 0.577921 | 0.472403 |
| ***bgroup163*** | 0.875153*** | 0.470192 |
| ***bgroup164*** | 0.839175*** | 0.480897 |
| ***bgroup165*** | -0.00083 | 0.654707 |
| ***bgroup166*** | 0.364736 | 0.566249 |
| ***_cons*** | 11.60961* | 0.470907 |

**Table 4D**. Full Results, 400m Buffer

| | **Coefficient** | **Standard Error** |
|---|---|---|
| ***sqft*** | 0.00026* | 9.55E-06 |
| ***acres*** | 0.01864* | 0.003812 |
| ***age*** | 0.000313 | 0.000376 |
| ***actlease400*** | 0.002532** | 0.001212 |
| ***cage400*** | -0.01285* | 0.003296 |
| ***wqmean*** | -0.0058 | 0.029556 |
| ***depthmean*** | 0.005274 | 0.004473 |
| ***waterfront*** | 0.196057* | 0.041065 |
| ***y2013*** | 0.007241 | 0.034877 |
| ***y2014*** | 0.00742 | 0.034652 |
| ***y2015*** | 0.023933 | 0.034066 |
| ***y2016*** | 0.01821 | 0.034183 |
| ***bgroup1*** | 0.499137 | 0.526027 |
| ***bgroup2*** | 0.278793 | 0.498598 |
| ***bgroup3*** | 0.475183 | 0.532141 |
| ***bgroup4*** | 0.395695 | 0.505387 |
| ***bgroup5*** | 0.012445 | 0.51921 |
| ***bgroup6*** | 0.13856 | 0.476643 |
| ***bgroup7*** | -0.0165 | 0.482331 |
| ***bgroup8*** | 0.461521 | 0.470648 |
| ***bgroup9*** | 0.374421 | 0.469986 |
| ***bgroup10*** | -0.3886 | 0.503744 |
| ***bgroup11*** | 0.304162 | 0.485485 |
| ***bgroup12*** | 0.280338 | 0.475896 |
| ***bgroup13*** | 0.55701 | 0.501763 |
| ***bgroup14*** | 0.018052 | 0.48208 |
| ***bgroup15*** | 0.182816 | 0.517289 |
| ***bgroup16*** | 0.370964 | 0.47519 |
| ***bgroup17*** | 0.172511 | 0.48585 |

| | | |
|---|---|---|
| ***bgroup18*** | -0.10417 | 0.475074 |
| ***bgroup19*** | -0.11507 | 0.487706 |
| ***bgroup20*** | 0.386145 | 0.469815 |
| ***bgroup21*** | -0.25648 | 0.498908 |
| ***bgroup22*** | 0.24876 | 0.485077 |
| ***bgroup23*** | 0.257334 | 0.485381 |
| ***bgroup24*** | 0.179968 | 0.491405 |
| ***bgroup25*** | 0.079566 | 0.491492 |
| ***bgroup26*** | 0.376996 | 0.486904 |
| ***bgroup27*** | 0.393399 | 0.507766 |
| ***bgroup28*** | 0.362704 | 0.491583 |
| ***bgroup29*** | 0.25687 | 0.5361 |
| ***bgroup30*** | 0.205861 | 0.534962 |
| ***bgroup31*** | 0.254982 | 0.65432 |
| ***bgroup32*** | 0.415174 | 0.65433 |
| ***bgroup33*** | -0.13226 | 0.571046 |
| ***bgroup34*** | 1.160533*** | 0.656821 |
| ***bgroup35*** | 0.503824 | 0.504229 |
| ***bgroup36*** | 0.442905 | 0.534709 |
| ***bgroup37*** | 0.395828 | 0.571086 |
| ***bgroup38*** | 0.278376 | 0.542655 |
| ***bgroup39*** | -0.0889 | 0.504825 |
| ***bgroup40*** | 0.491206 | 0.494022 |
| ***bgroup41*** | 0.282473 | 0.481998 |
| ***bgroup42*** | -0.73743 | 0.538924 |
| ***bgroup43*** | 0.310371 | 0.520257 |
| ***bgroup44*** | 0.42585 | 0.483302 |
| ***bgroup45*** | 0.36381 | 0.474081 |
| ***bgroup46*** | 0.300933 | 0.467407 |
| ***bgroup47*** | 0.462291 | 0.474227 |
| ***bgroup48*** | 0.511777 | 0.471605 |
| ***bgroup49*** | 0.497928 | 0.471738 |
| ***bgroup50*** | 0.411016 | 0.468149 |
| ***bgroup51*** | 0.618659 | 0.47079 |
| ***bgroup52*** | 0.51028 | 0.4678 |
| ***bgroup53*** | 0.387944 | 0.466895 |
| ***bgroup54*** | 0.615969 | 0.508753 |
| ***bgroup55*** | -0.14981 | 0.497638 |
| ***bgroup56*** | 0.450131 | 0.56789 |

| | | |
|---|---|---|
| ***bgroup57*** | 0.445914 | 0.489453 |
| ***bgroup58*** | -0.11099 | 0.484852 |
| ***bgroup59*** | 0.092716 | 0.480283 |
| ***bgroup60*** | 0.305619 | 0.478923 |
| ***bgroup61*** | 0.130826 | 0.491567 |
| ***bgroup62*** | 0.494752 | 0.496197 |
| ***bgroup63*** | 0.31188 | 0.472156 |
| ***bgroup64*** | 0.125464 | 0.486715 |
| ***bgroup65*** | 0.405348 | 0.481724 |
| ***bgroup66*** | 0.496563 | 0.654316 |
| ***bgroup67*** | 0.333423 | 0.46905 |
| ***bgroup68*** | 0.724129 | 0.490805 |
| ***bgroup69*** | 0.132496 | 0.479356 |
| ***bgroup70*** | 0.597785 | 0.469689 |
| ***bgroup71*** | 0.56874 | 0.467295 |
| ***bgroup72*** | 0.178081 | 0.523172 |
| ***bgroup73*** | 0.613416 | 0.568465 |
| ***bgroup74*** | 0.603733 | 0.655786 |
| ***bgroup75*** | 0.457802 | 0.539381 |
| ***bgroup76*** | 0.133639 | 0.508375 |
| ***bgroup77*** | 0.161585 | 0.653285 |
| ***bgroup78*** | -0.02591 | 0.510195 |
| ***bgroup79*** | 0.051441 | 0.535695 |
| ***bgroup80*** | 0.324873 | 0.534662 |
| ***bgroup81*** | -0.11754 | 0.502088 |
| ***bgroup82*** | 0.150557 | 0.480766 |
| ***bgroup83*** | 0.111461 | 0.508504 |
| ***bgroup84*** | 0.070458 | 0.535838 |
| ***bgroup85*** | -0.10909 | 0.474618 |
| ***bgroup86*** | -0.18366 | 0.489749 |
| ***bgroup87*** | -0.44061 | 0.655705 |
| ***bgroup88*** | -0.53596 | 0.51841 |
| ***bgroup89*** | -0.05073 | 0.477443 |
| ***bgroup90*** | -0.21092 | 0.477689 |
| ***bgroup91*** | -0.22525 | 0.491817 |
| ***bgroup92*** | -0.20433 | 0.484163 |
| ***bgroup93*** | 0.612838 | 0.470923 |
| ***bgroup94*** | 0.063618 | 0.523409 |
| ***bgroup95*** | 0.274466 | 0.500487 |

| | | |
|---|---|---|
| ***bgroup96*** | -0.25808 | 0.653662 |
| ***bgroup97*** | 0.337619 | 0.483393 |
| ***bgroup98*** | -0.17575 | 0.480036 |
| ***bgroup99*** | 0.202665 | 0.479233 |
| ***bgroup100*** | 0.033896 | 0.473286 |
| ***bgroup101*** | -0.51371 | 0.507454 |
| ***bgroup102*** | 0.141716 | 0.478816 |
| ***bgroup103*** | 0.387548 | 0.485 |
| ***bgroup104*** | 0.045707 | 0.519521 |
| ***bgroup105*** | -0.27372 | 0.566092 |
| ***bgroup106*** | -0.34924 | 0.479083 |
| ***bgroup107*** | 0.676339 | 0.475399 |
| ***bgroup108*** | 0.541822 | 0.566416 |
| ***bgroup109*** | 0.657444 | 0.487161 |
| ***bgroup110*** | 0.30899 | 0.495022 |
| ***bgroup111*** | 0.127261 | 0.508763 |
| ***bgroup112*** | 0.490426 | 0.50696 |
| ***bgroup113*** | 0.369031 | 0.481145 |
| ***bgroup114*** | -0.04322 | 0.568218 |
| ***bgroup115*** | 0.134373 | 0.482374 |
| ***bgroup116*** | 0.179871 | 0.517784 |
| ***bgroup117*** | 0.171646 | 0.508255 |
| ***bgroup118*** | 0.296835 | 0.471676 |
| ***bgroup119*** | 0.270826 | 0.46909 |
| ***bgroup120*** | 0.317523 | 0.47087 |
| ***bgroup121*** | 0.089226 | 0.654451 |
| ***bgroup122*** | 0.416884 | 0.492346 |
| ***bgroup123*** | -0.7121 | 0.568136 |
| ***bgroup124*** | 0.326135 | 0.483477 |
| ***bgroup125*** | 0.106729 | 0.510343 |
| ***bgroup126*** | 0.593291 | 0.653493 |
| ***bgroup127*** | 0.348907 | 0.49052 |
| ***bgroup128*** | 0.100504 | 0.506305 |
| ***bgroup129*** | 0.324267 | 0.487791 |
| ***bgroup130*** | 0.624653 | 0.505851 |
| ***bgroup131*** | 0.237727 | 0.482743 |
| ***bgroup132*** | -0.06996 | 0.481437 |
| ***bgroup133*** | 0.299079 | 0.655216 |
| ***bgroup134*** | -0.44814 | 0.49445 |

| | | |
|---|---|---|
| ***bgroup135*** | 0.012657 | 0.498103 |
| ***bgroup136*** | 0.29692 | 0.537894 |
| ***bgroup137*** | 0.076518 | 0.503142 |
| ***bgroup138*** | 0.380386 | 0.504945 |
| ***bgroup139*** | 0.052745 | 0.482461 |
| ***bgroup140*** | 0.478669 | 0.478785 |
| ***bgroup141*** | 0.634732 | 0.517315 |
| ***bgroup142*** | 0.397341 | 0.493876 |
| ***bgroup143*** | 0.773575 | 0.534185 |
| ***bgroup144*** | 0.409038 | 0.65305 |
| ***bgroup145*** | 0.795511*** | 0.478912 |
| ***bgroup146*** | 0.562725 | 0.493549 |
| ***bgroup147*** | -0.04879 | 0.533155 |
| ***bgroup148*** | 0.322127 | 0.476568 |
| ***bgroup149*** | 0.53853 | 0.466997 |
| ***bgroup150*** | 0.549701 | 0.466289 |
| ***bgroup151*** | 0.868238*** | 0.474776 |
| ***bgroup152*** | 0.601767 | 0.496118 |
| ***bgroup153*** | 0.649681 | 0.468863 |
| ***bgroup154*** | 0.686522 | 0.464722 |
| ***bgroup155*** | 0.574219 | 0.476342 |
| ***bgroup156*** | 1.095556** | 0.486749 |
| ***bgroup157*** | 1.289302* | 0.489986 |
| ***bgroup158*** | 0.45021 | 0.479141 |
| ***bgroup159*** | 0.627036 | 0.474767 |
| ***bgroup160*** | 0.523115 | 0.477626 |
| ***bgroup161*** | 0.930437** | 0.48107 |
| ***bgroup162*** | 0.577839 | 0.47192 |
| ***bgroup163*** | 0.875569*** | 0.469711 |
| ***bgroup164*** | 0.838751*** | 0.480404 |
| ***bgroup165*** | -0.00058 | 0.654037 |
| ***bgroup166*** | 0.364281 | 0.56567 |
| ***_cons*** | 11.6117* | 0.470447 |

**Table 5D**. Full Results, 500m Buffer

| | **Coefficient** | **Standard Error** |
|---|---|---|
| ***sqft*** | 0.00026* | 9.53E-06 |
| ***acres*** | 0.018508* | 0.003805 |

| | | |
|---|---|---|
| ***age*** | 0.000318 | 0.000375 |
| ***actlease500*** | 0.002799** | 0.001234 |
| ***cage500*** | -0.0164* | 0.003561 |
| ***wqmean*** | -0.00225 | 0.029541 |
| ***depthmean*** | 0.005255 | 0.004466 |
| ***waterfront*** | 0.198607* | 0.041009 |
| ***y2013*** | 0.004807 | 0.034843 |
| ***y2014*** | 0.008583 | 0.034617 |
| ***y2015*** | 0.022864 | 0.034033 |
| ***y2016*** | 0.018457 | 0.034154 |
| ***bgroup1*** | 0.488234 | 0.525246 |
| ***bgroup2*** | 0.264344 | 0.497869 |
| ***bgroup3*** | 0.460391 | 0.531365 |
| ***bgroup4*** | 0.381426 | 0.50464 |
| ***bgroup5*** | -0.00046 | 0.518438 |
| ***bgroup6*** | 0.137089 | 0.475931 |
| ***bgroup7*** | -0.03984 | 0.482105 |
| ***bgroup8*** | 0.460509 | 0.469946 |
| ***bgroup9*** | 0.372184 | 0.469294 |
| ***bgroup10*** | -0.40362 | 0.503184 |
| ***bgroup11*** | 0.302949 | 0.484761 |
| ***bgroup12*** | 0.277529 | 0.475181 |
| ***bgroup13*** | 0.553838 | 0.501013 |
| ***bgroup14*** | 0.01322 | 0.481359 |
| ***bgroup15*** | 0.180797 | 0.516519 |
| ***bgroup16*** | 0.368375 | 0.47448 |
| ***bgroup17*** | 0.169531 | 0.485124 |
| ***bgroup18*** | -0.10934 | 0.474365 |
| ***bgroup19*** | -0.11193 | 0.486853 |
| ***bgroup20*** | 0.383431 | 0.469112 |
| ***bgroup21*** | -0.25736 | 0.498165 |
| ***bgroup22*** | 0.238024 | 0.484352 |
| ***bgroup23*** | 0.253342 | 0.484655 |
| ***bgroup24*** | 0.177327 | 0.490659 |
| ***bgroup25*** | 0.077249 | 0.490759 |
| ***bgroup26*** | 0.373117 | 0.486175 |
| ***bgroup27*** | 0.385428 | 0.507012 |
| ***bgroup28*** | 0.351772 | 0.490923 |
| ***bgroup29*** | 0.251046 | 0.5353 |

| | | |
|---|---|---|
| ***bgroup30*** | 0.202712 | 0.534164 |
| ***bgroup31*** | 0.251668 | 0.653344 |
| ***bgroup32*** | 0.412131 | 0.653355 |
| ***bgroup33*** | -0.14076 | 0.57021 |
| ***bgroup34*** | 1.152061*** | 0.655843 |
| ***bgroup35*** | 0.494725 | 0.503484 |
| ***bgroup36*** | 0.417452 | 0.5339 |
| ***bgroup37*** | 0.387276 | 0.570238 |
| ***bgroup38*** | 0.254409 | 0.541855 |
| ***bgroup39*** | -0.09844 | 0.504076 |
| ***bgroup40*** | 0.485342 | 0.493285 |
| ***bgroup41*** | 0.275271 | 0.48128 |
| ***bgroup42*** | -0.74328 | 0.538125 |
| ***bgroup43*** | 0.304469 | 0.519476 |
| ***bgroup44*** | 0.4248 | 0.482581 |
| ***bgroup45*** | 0.362491 | 0.473373 |
| ***bgroup46*** | 0.29843 | 0.466702 |
| ***bgroup47*** | 0.461793 | 0.473519 |
| ***bgroup48*** | 0.508848 | 0.470909 |
| ***bgroup49*** | 0.49809 | 0.471035 |
| ***bgroup50*** | 0.4075 | 0.467465 |
| ***bgroup51*** | 0.618899 | 0.470067 |
| ***bgroup52*** | 0.510817 | 0.467108 |
| ***bgroup53*** | 0.394107 | 0.466211 |
| ***bgroup54*** | 0.61675 | 0.507996 |
| ***bgroup55*** | -0.14875 | 0.496893 |
| ***bgroup56*** | 0.449759 | 0.567043 |
| ***bgroup57*** | 0.449662 | 0.488674 |
| ***bgroup58*** | -0.11153 | 0.48413 |
| ***bgroup59*** | 0.087901 | 0.479582 |
| ***bgroup60*** | 0.303908 | 0.47821 |
| ***bgroup61*** | 0.119939 | 0.490833 |
| ***bgroup62*** | 0.490012 | 0.495454 |
| ***bgroup63*** | 0.310756 | 0.471451 |
| ***bgroup64*** | 0.196467 | 0.48661 |
| ***bgroup65*** | 0.40328 | 0.481005 |
| ***bgroup66*** | 0.496236 | 0.653341 |
| ***bgroup67*** | 0.332154 | 0.46835 |
| ***bgroup68*** | 0.718363 | 0.490113 |

| | | |
|---|---|---|
| ***bgroup69*** | 0.140755 | 0.478564 |
| ***bgroup70*** | 0.595756 | 0.46899 |
| ***bgroup71*** | 0.571344 | 0.466586 |
| ***bgroup72*** | 0.168372 | 0.52239 |
| ***bgroup73*** | 0.688038 | 0.568451 |
| ***bgroup74*** | 0.605797 | 0.65481 |
| ***bgroup75*** | 0.52456 | 0.539397 |
| ***bgroup76*** | 0.181632 | 0.507946 |
| ***bgroup77*** | 0.15995 | 0.652314 |
| ***bgroup78*** | -0.02595 | 0.509433 |
| ***bgroup79*** | 0.052375 | 0.534897 |
| ***bgroup80*** | 0.324817 | 0.533864 |
| ***bgroup81*** | -0.12739 | 0.501413 |
| ***bgroup82*** | 0.147583 | 0.480047 |
| ***bgroup83*** | 0.109858 | 0.507746 |
| ***bgroup84*** | 0.068365 | 0.535037 |
| ***bgroup85*** | -0.11031 | 0.473909 |
| ***bgroup86*** | -0.18553 | 0.489016 |
| ***bgroup87*** | -0.44063 | 0.654728 |
| ***bgroup88*** | -0.53854 | 0.517634 |
| ***bgroup89*** | -0.05305 | 0.476729 |
| ***bgroup90*** | -0.21289 | 0.476975 |
| ***bgroup91*** | -0.22661 | 0.491082 |
| ***bgroup92*** | -0.20554 | 0.48344 |
| ***bgroup93*** | 0.611292 | 0.47022 |
| ***bgroup94*** | 0.05147 | 0.522492 |
| ***bgroup95*** | 0.272199 | 0.499739 |
| ***bgroup96*** | -0.26087 | 0.652689 |
| ***bgroup97*** | 0.336548 | 0.482672 |
| ***bgroup98*** | -0.17654 | 0.47932 |
| ***bgroup99*** | 0.201013 | 0.478517 |
| ***bgroup100*** | 0.032314 | 0.472579 |
| ***bgroup101*** | -0.5148 | 0.506696 |
| ***bgroup102*** | 0.139965 | 0.4781 |
| ***bgroup103*** | 0.385259 | 0.484275 |
| ***bgroup104*** | 0.044434 | 0.518744 |
| ***bgroup105*** | -0.2737 | 0.565249 |
| ***bgroup106*** | -0.35145 | 0.478367 |
| ***bgroup107*** | 0.666191 | 0.474688 |

| | | |
|---|---|---|
| ***bgroup108*** | 0.540829 | 0.565572 |
| ***bgroup109*** | 0.652361 | 0.486434 |
| ***bgroup110*** | 0.306411 | 0.494285 |
| ***bgroup111*** | 0.12448 | 0.508003 |
| ***bgroup112*** | 0.486136 | 0.506204 |
| ***bgroup113*** | 0.366375 | 0.480428 |
| ***bgroup114*** | -0.04693 | 0.567369 |
| ***bgroup115*** | 0.131644 | 0.481654 |
| ***bgroup116*** | 0.176506 | 0.517012 |
| ***bgroup117*** | 0.16724 | 0.507496 |
| ***bgroup118*** | 0.314702 | 0.47104 |
| ***bgroup119*** | 0.266672 | 0.468332 |
| ***bgroup120*** | 0.314851 | 0.470169 |
| ***bgroup121*** | 0.086715 | 0.653477 |
| ***bgroup122*** | 0.415864 | 0.491611 |
| ***bgroup123*** | -0.71281 | 0.567289 |
| ***bgroup124*** | 0.324697 | 0.482756 |
| ***bgroup125*** | 0.099562 | 0.509583 |
| ***bgroup126*** | 0.590173 | 0.65252 |
| ***bgroup127*** | 0.347399 | 0.489789 |
| ***bgroup128*** | 0.097649 | 0.505554 |
| ***bgroup129*** | 0.321852 | 0.487069 |
| ***bgroup130*** | 0.624193 | 0.505102 |
| ***bgroup131*** | 0.220692 | 0.48206 |
| ***bgroup132*** | -0.07365 | 0.480718 |
| ***bgroup133*** | 0.295989 | 0.654238 |
| ***bgroup134*** | -0.47354 | 0.494266 |
| ***bgroup135*** | 0.010532 | 0.497363 |
| ***bgroup136*** | 0.287169 | 0.537084 |
| ***bgroup137*** | 0.070088 | 0.502395 |
| ***bgroup138*** | 0.371341 | 0.504206 |
| ***bgroup139*** | 0.044551 | 0.481745 |
| ***bgroup140*** | 0.479166 | 0.478073 |
| ***bgroup141*** | 0.634687 | 0.516545 |
| ***bgroup142*** | 0.397967 | 0.493142 |
| ***bgroup143*** | 0.774651 | 0.53339 |
| ***bgroup144*** | 0.407061 | 0.652078 |
| ***bgroup145*** | 0.791487*** | 0.478216 |
| ***bgroup146*** | 0.564528 | 0.492816 |

| | | |
|---|---|---|
| ***bgroup147*** | -0.04841 | 0.532363 |
| ***bgroup148*** | 0.323513 | 0.475859 |
| ***bgroup149*** | 0.538643 | 0.466302 |
| ***bgroup150*** | 0.551097 | 0.465596 |
| ***bgroup151*** | 0.870817*** | 0.474065 |
| ***bgroup152*** | 0.603647 | 0.49538 |
| ***bgroup153*** | 0.650245 | 0.468164 |
| ***bgroup154*** | 0.689286 | 0.464032 |
| ***bgroup155*** | 0.57406 | 0.475632 |
| ***bgroup156*** | 1.096176** | 0.486025 |
| ***bgroup157*** | 1.298452* | 0.489265 |
| ***bgroup158*** | 0.450349 | 0.478428 |
| ***bgroup159*** | 0.627322 | 0.47406 |
| ***bgroup160*** | 0.522992 | 0.476915 |
| ***bgroup161*** | 0.94982** | 0.4804 |
| ***bgroup162*** | 0.579008 | 0.471219 |
| ***bgroup163*** | 0.876082*** | 0.469013 |
| ***bgroup164*** | 0.83866*** | 0.479689 |
| ***bgroup165*** | 0.000411 | 0.653064 |
| ***bgroup166*** | 0.364309 | 0.564828 |
| ***_cons*** | 11.60829* | 0.469756 |

**Appendix E.** Alternate Model Results

**Table 1E**. Results Using Minimum Depth and Water Quality

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026*[a] | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001)[b] | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.01817* | 0.01848* | 0.01889* | 0.01869* | 0.01856* |
| | (0.00382) | (0.00383) | (0.00382) | (0.00381) | (0.00380) |
| ***age*** | 0.00035 | 0.00034 | 0.00031 | 0.00032 | 0.00032 |
| | (0.00038) | (0.00038) | (0.00038) | (0.00038) | (0.00038) |
| ***actlease*** | 0.00021 | 0.00132 | 0.00211*** | 0.00252**[c] | 0.00281** |
| | (0.00179) | (0.00137) | (0.00124) | (0.00121) | (0.00123) |
| ***cagelease*** | 0.01008***[d] | -0.00318 | -0.01079* | -0.01276* | -0.01614* |
| | (0.00590) | (0.00410) | (0.00323) | (0.00329) | (0.00357) |
| ***wqmin*** | -0.04473 | -0.04566 | -0.04525 | -0.04563 | -0.03751 |
| | (0.03981) | (0.03982) | (0.03973) | (0.03969) | (0.03972) |
| ***depthmin*** | 0.00632 | 0.00625 | 0.00612 | 0.00608 | 0.00602 |
| | (0.00474) | (0.00475) | (0.00473) | (0.00473) | (0.00472) |
| ***waterfront*** | 0.19535* | 0.19587* | 0.19722* | 0.19608* | 0.19859* |
| | (0.04117) | (0.04119) | (0.04109) | (0.04105) | (0.04100) |
| $R^2$ | 0.5795 | 0.579 | 0.5811 | 0.5819 | 0.5831 |

a. Significant at 1% level
b. Standard Error
c. Significant at 5% level
d. Significant at 10% level

**Table 3E**. Results Using Mean Water Quality

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001) | (0.00001) | (0.00001) | 90.00001) | (0.00001) |
| ***acres*** | 0.01794* | 0.01825) | 0.01867* | 0.01847* | 0.01847* |
| | (0.00382) | (0.00383) | (0.00382) | (0.00381) | (0.00381) |
| ***age*** | 0.00034 | 0.00033 | 0.00030 | 0.00031 | 0.00031 |
| | (0.00038) | (0.00038) | (0.00038) | (0.00038) | (0.00038) |
| ***actlease*** | 0.00025 | 0.00140 | 0.00218*** | 0.00259** | 0.00259** |
| | (0.00179) | (0.00137) | (0.00124) | (0.00121) | (0.00121) |
| ***cagelease*** | 0.01018*** | -0.00319 | -0.01087* | -0.01284* | -0.01284* |
| | (0.00590) | (0.00411) | (0.00323) | (0.00330) | (0.00330) |

| | | | | | |
|---|---|---|---|---|---|
| ***wqmean*** | -0.00387 | -0.00476 | -0.00648 | -0.00839 | -0.00839 |
| | (0.02951) | (0.02953) | (0.02948) | (0.02948) | (0.02948) |
| ***waterfront*** | 0.19544* | 0.19593* | 0.19728* | 0.19612* | 0.19612* |
| | (0.04119) | (0.04122) | (0.04112) | (0.04107) | (0.04107) |
| $R^2$ | 0.5788 | 0.5783 | 0.5804 | 0.5813 | 0.5825 |

**Table 4E.** Results Using Minimum Water Quality

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001) | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.01800* | 0.01831* | 0.01873* | 0.01853* | 0.01839* |
| | (0.00382) | (0.00383) | (0.00382) | (0.00381) | (0.00380) |
| ***age*** | 0.00035 | 0.00034 | 0.00031 | 0.00032 | 0.00032 |
| | (0.00038) | (0.00038) | (0.00038) | (0.00038) | (0.00038) |
| ***actlease*** | 0.00023 | 0.00138 | 0.00217*** | 0.00258** | 0.00287** |
| | (0.00179) | (0.00137) | (0.00123) | (0.00121) | (0.00123) |
| ***cagelease*** | 0.01009*** | -0.00316 | -0.01083* | -0.01280* | -0.01618* |
| | (0.00590) | (0.00410) | (0.00323) | (0.00329) | (0.00357) |
| ***wqmin*** | -0.05030 | -0.05117 | -0.05066 | -0.05101 | -0.04287 |
| | (0.03960) | (0.03961) | (0.03951) | (0.03948) | (0.03951) |
| ***waterfront*** | 0.19510* | 0.19559* | 0.19695* | 0.19582* | 0.19833* |
| | (0.04118) | (0.04120) | (0.04110) | (0.04105) | (0.04100) |
| $R^2$ | 0.5791 | 0.5787 | 0.5807 | 0.5816 | 0.5827 |

**Table 5E.** Results Using Maximum Water Quality

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001) | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.01795* | 0.01826* | 0.01867* | 0.01847* | 0.01834* |
| | (0.00382) | (0.00383) | (0.00382) | (0.00381) | (0.00380) |
| ***age*** | 0.00034 | 0.00034 | 0.00031 | 0.00031 | 0.00032 |
| | (0.00038) | (0.00038) | (0.00038) | (0.00038) | (0.00038) |
| ***actlease*** | 0.00025 | 0.00137 | 0.00213*** | 0.00254** | 0.00281** |
| | (0.00179) | (0.00137) | (0.00124) | (0.00121) | (0.00123) |
| ***cagelease*** | 0.01019*** | -0.00316 | -0.01085* | -0.01279* | -0.01638* |
| | (0.00590) | (0.00411) | (0.00323) | (0.00330) | (0.00356) |

| | | | | | |
|---|---|---|---|---|---|
| ***wqmax*** | 0.00576 | 0.00538 | 0.00503 | 0.00423 | 0.00463 |
| | (0.01146) | (0.01147) | (0.01146) | (0.01145) | (0.01144) |
| ***waterfront*** | 0.19546* | 0.19597* | 0.19736* | 0.19623* | 0.19874* |
| | (0.04119) | (0.04121) | (0.04111) | (0.04107) | (0.04101) |
| $R^2$ | 0.5788 | 0.5784 | 0.5805 | 0.5813 | 0.5825 |

**Table 6E**. Results Using Mean Water Quality and All Lease Category

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00025* |
| | (0.00001) | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.02022* | 0.02011* | 0.02049* | 0.01895* | 0.01937* |
| | (0.00384) | (0.00384) | (0.00381) | (0.00381) | (0.00380) |
| ***age*** | 0.00028 | 0.00023 | 0.00022 | 0.00026 | 0.00026 |
| | (0.00038) | (0.00038) | (0.00037) | (0.00038) | (0.00037) |
| ***actlease*** | -0.00144 | 0.00038 | 0.00135 | 0.00225*** | 0.00249** |
| | (0.00182) | (0.00138) | (0.00124) | (0.00122) | (0.00123) |
| ***cagelease*** | 0.00929 | -0.00351 | -0.01104* | -0.01294* | -0.01658* |
| | (0.00588) | (0.00409) | (0.00321) | (0.00329) | (0.00355) |
| ***leasecat*** | 0.13860* | 0.10368* | 0.12862* | 0.07362* | 0.11424* |
| | (0.03105) | (0.02447) | (0.02491) | (0.02700) | (0.02991) |
| ***wqmean*** | -0.00789 | -0.00845 | -0.00578 | -0.00713 | -0.00468 |
| | (0.02939) | (0.02942) | (0.02930) | (0.02944) | (0.02936) |
| ***waterfront*** | 0.18784* | 0.18169* | 0.18079* | 0.18910* | 0.19355* |
| | (0.04104) | (0.04119) | (0.04099) | (0.04109) | (0.04090) |
| $R^2$ | 0.5828 | 0.582 | 0.5858 | 0.5828 | 0.5854 |

**Table 7E**. Results Using Minimum Water Quality and All Lease Category

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001) | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.02028* | 0.02016* | 0.02052* | 0.01899* | 0.01940* |
| | (0.00384) | (0.00384) | (0.00381) | (0.00381) | (0.00380) |
| ***age*** | 0.00029 | 0.00024 | 0.00022 | 0.00027 | 0.00026 |
| | (0.00038) | (0.00038) | (0.00037) | (0.00038) | (0.00037) |
| ***actlease*** | -0.00145 | 0.00037 | 0.00135 | 0.00225*** | 0.00250** |
| | (0.00182) | (0.00138) | (0.00124) | (0.00121) | (0.00123) |

| | | | | | |
|---|---|---|---|---|---|
| ***cagelease*** | 0.00920 | -0.00348 | -0.01100* | -0.01290* | -0.01640* |
| | (0.00588) | (0.00409) | (0.00321) | (0.00329) | (0.00355) |
| ***leasecat*** | 0.13841* | 0.10347* | 0.12781* | 0.07253* | 0.11313* |
| | (0.03102) | (0.02445) | (0.02491) | (0.02701) | (0.02993) |
| ***wqmin*** | -0.05058 | -0.05115 | -0.04475 | -0.04709 | -0.03689 |
| | (0.03942) | (0.03945) | (0.03929) | (0.03944) | (0.03941) |
| ***waterfront*** | 0.18756* | 0.18142* | 0.18061* | 0.18892* | 0.19331* |
| | (0.04103) | (0.04117) | (0.04097) | (0.04107) | (0.04089) |
| $R^2$ | 0.5831 | 0.5823 | 0.586 | 0.583 | 0.5856 |

**Table 8E**. Results Using Maximum Water Quality and All Lease Category

| | Radius of Buffer (m) | | | | |
|---|---|---|---|---|---|
| | **100** | **200** | **300** | **400** | **500** |
| ***sqft*** | 0.00026* | 0.00026* | 0.00026* | 0.00026* | 0.00026* |
| | (0.00001) | (0.00001) | (0.00001) | (0.00001) | (0.00001) |
| ***acres*** | 0.02021* | 0.02010* | 0.02049* | 0.01895* | 0.01937* |
| | (0.00384) | (0.00384) | (0.00381) | (0.00381) | (0.00380) |
| ***age*** | 0.00029 | 0.00024 | 0.00022 | 0.00026 | 0.00026 |
| | (0.00038) | (0.00038) | (0.00037) | (0.00038) | (0.00037) |
| ***actlease*** | -0.00143 | 0.00037 | 0.00131 | 0.00219*** | 0.00244** |
| | (0.00182) | (0.00138) | (0.00124) | (0.00122) | (0.00123) |
| ***cagelease*** | 0.00931 | -0.00348 | -0.01101* | -0.01289* | -0.01657* |
| | (0.00588) | (0.00409) | (0.00321) | (0.00329) | (0.00355) |
| ***leasecat*** | 0.13792* | 0.10317* | 0.12870* | 0.07398* | 0.11431* |
| | (0.03106) | (0.02448) | (0.02491) | (0.02700) | (0.02991) |
| ***wqmax*** | 0.00343 | 0.00332 | 0.00533 | 0.00491 | 0.00484 |
| | (0.01142) | (0.01143) | (0.01139) | (0.01144) | (0.01140) |
| ***waterfront*** | 0.18795* | 0.18184* | 0.18086* | 0.18916* | 0.19361* |
| | (0.04104) | (0.04118) | (0.04098) | (0.04108) | (0.04090) |
| $R^2$ | 0.5828 | 0.582 | 0.5858 | 0.5828 | 0.5855 |