

Memorandum

Date: January 24, 2010
To: Bobbi Hudson – Pacific Shellfish Institute
From: Katharine Wellman – Northern Economics, Inc.
Re: Property Value Study – NOAA Marine Aquaculture Grant

Abbreviations

GIS Geographic information systems
MLS Multiple listing service
OFM State of Washington Office of Financial Management
SMA Shoreline Management Act

1 Introduction

The South Puget Sound Region is known as one of the finest shellfish habitats in the world. The region's shellfish production plays a vital role in maintaining Washington's position as a leading producer of farmed bivalve shellfish in the nation. In 2006, this region's total shellfish catch (including harvest of commercially cultured shellfish and commercial and recreational harvest of species such as shrimp and crab) produced nearly \$3.5 million in ex-vessel/farmgate value; second in the state only to the coastal region (TCW Economics, 2008). Seafood producers harvest a variety of bivalve species in the South Sound Region including, clams, oysters, geoduck and mussels, etc. The equipment and human activity required for harvesting varies depending on the species and scale of the operation.

It is common across the United States for tidelands to be publically owned, but in Washington, the majority of tidelands are privately owned. In some cases, the waterfront property and adjoining tidelands may be owned by different people. Many waterfront property owners, including the State of Washington, lease their tidelands to commercial shellfish growers and receive royalties.

The presence of a commercial shellfish operation on tidelands has the potential to have adverse effects on nearby residential properties. Some waterfront property owners in the South Sound Region have voiced concerns that harvesting operations have a negative effect on their property values and visual aesthetics. These concerns range from the unsightliness of growbags, nets, and

piles of shells, to noise created by the boats, barges, and hydraulic equipment used to harvest the shellfish.

One way to investigate the question of whether the negative externalities created by commercial shellfish harvesting activities have a detrimental effect on property values is through the use of hedonic analysis. The hedonic method attempts to find the price effect associated with the characteristics that affect the home or property sales price. Therefore, this method provides the price impacts that commercial shellfish harvesting has on property values.

Northern Economics, Inc. researched a number of studies that applied the hedonic method to measure the implicit price of production activities near residential areas. In all, Northern Economics identified four studies which showed industrial and farming activities to have an adverse impact on property values.

An alternative method to examine the effects of commercial shellfish production activities on residential value is through the use of conjoint analysis. This method involves asking people to value different features that make up a product or service. This is accomplished by asking respondents to rank or rate the combination of characteristics that might explain the item in question. This method is relatively more difficult and costly than the hedonic method as it requires a great deal of primary research, while the latter relies on a great deal of data that is public information and therefore less expensive and relatively easy to collect.

The objective of this case study is to help determine the disamenity impacts of commercial shellfish production on residential property values. Northern Economics recommends hedonic analysis as the preferred method to determine these effects; however, the limited resources available make the development of such a model for the South Puget Sound Region impractical for this project. Instead, this study begins by describing the process of developing and analyzing an appropriate hedonic property value model in Section [1.11.1](#). Section [1.21.2](#) outlines the details of reviewed studies that utilized hedonic property value models to measure the effects of industrial and agricultural sites. Section [1.31.3](#) discusses the case study area and the implementation and findings of the key informant interviews with realtors and property assessors from the study area. Section [1.41.4](#) offers a discussion of the results.

1.1 Hedonic Property Value Model

The hedonic method is an indirect valuation approach that relies on observable market transactions to evaluate, and establishes a monetary value for individual attributes or components of a commodity (Griliches, 1971). Housing markets are ideal for this method as information on residential housing and neighborhood characteristics is readily available to researchers. Therefore, the price paid for a property reflects understood choices about its various attributes. For example, all things being equal, if House A were identical to House B with the exception that House A overlooked a forest valley while House B sat next to a busy airport, we would expect House A to command a higher market price.

1.1.1 Developing a Hedonic Property Value Model

The first step in hedonic modeling is to estimate the price function where the property values are regressed on selected attributes of the property to determine the value consumers place on

them. The dependent variable is sales price of property. The specific explanatory variables will differ with each model and will vary depending on the particular study area and its qualities. A thorough hedonic model will include data on the following to explain property values:

- Specific location of residential properties
- Property attributes—number of bed and bathrooms, lot size, age and condition of building, square footage of the home, etc.
- Accessibility characteristics—distances to lakes, rivers, universities, major highways, shopping centers, etc.
- Neighborhood characteristics—quality of schools, property tax levels, zoning restrictions, etc.
- Environmental characteristics that affect prices

Once the desired variables are specified, the next step is to obtain data for each of the chosen characteristics. Much of the housing data is publically available and can be found through the local multiple listing service (MLS). Other data sources may include local, state, and federal government agencies, non-profit organizations, etc.

As mentioned above, the process of determining appropriate characteristics will depend on the particular study. The study’s specific goals, timeframe, and budget often determine the range of data gathered. Some methods of obtaining data (e.g. in-person interviews, first hand observations, etc.) will vary depending on the type of data required and may be time-intensive and costly.

Once the data are collected, the next step is to estimate a pricing function by regressing the observed sales prices for the properties against the selected property characteristics. The resulting equation will show the share of the property sales price that is attributable to each characteristic.

The final step is to use the resulting property value model to estimate economic costs and benefits associated with the explanatory variable(s) under investigation.

1.2 Hedonic Analysis in This Context

Northern Economics conducted a literature review to find hedonic property value studies which showed industrial and agricultural sites to have adverse effects on property values. The results of our review are summarized in Table 1 below. In the following paragraphs, a description of each study and its findings is provided.

Table 1. Summary Hedonic Property Value Studies

Author(s)	Year of Publication	Type of Facility/Activity	Findings
Nelson, J. Genereux, and M. Genereux	1992	Landfill	Home values increased by about 6.2% per mile from landfill, but no significant effects over 2 miles
Boxall, Chan, and McMillan	2005	Oil & natural gas facilities	At the mean level of industry facilities within 4 km, home values reduced from 4% to 8%

Ready and Abdalla	2005	Large to small-scale farms	One animal production facility decreased property values by up to 6.4%, but no negative impacts over 1600 m
Neupane and Gustavson	2007	Contaminated industrial sites	Home values reduced by 12.4% within 100 m, 100 to 200 m reduced 1.8%, and homes over 200 m were reduced by less than 1%

Each of the studies identified in Table 1 used independent variables to describe the characteristics of the properties and industrial sites. The authors used unique variables to explain the properties in their respective study area; however, the properties shared the following common independent variables: age of the building, number of bedrooms, number of bathrooms, area of the structure, and lot size. Also, the sales price of the home was used by all as the dependent variable.

The earliest hedonic study found was by Nelson, Genereux and Genereux (1992). They examined the effect of a landfill in Ramsey, Minnesota on the values of 708 nearby homes from 1979-1989. They used the distance from the landfill as an independent variable to account for the industrial site. Other property variables used include the distance to a major highway, the number of fireplaces, the sale year, whether the housing unit was two or more full floors, and the level of tree cover. The study indicated that the landfill had a negative impact on home values. More specifically, homes situated on the landfill boundary dropped in value by as much as 12 percent, and around 6 percent for homes about one mile away. However, this effect was insignificant beyond 2 and 2.5 miles.

Boxall, Chan, and McMillan (2005) studied the impact of oil and natural gas facilities on rural housing property values in Central Alberta, Canada. They collected data on 532 home sales between January 1994 and March 2001. The authors used variables to account for the proximity to, and intensity of various nearby oil and gas facilities (e.g., the number of hazardous zones the property is within, the number of oil and gas wells within 4 km, and the distance to the nearest operating sour gas well). Variables used to account for property characteristics included the distance to Calgary, Alberta, if there is a deck or balcony, number of garage spaces, if the property had water supplied by the municipality, if there was a basement, the monthly average residential property prices in Calgary, if there was a view of the mountains, if the property was located in Rocky View Municipal District, and if the property was located in the County of Mountain View. The results of the study show that property values are negatively affected by the nearby oil and natural gas facilities. In particular, property values were reduced between 4 and 8 percent at the mean level of industry facilities within 4 km.

In a study of the positive and negative externalities from farmland, Ready and Abdalla (2005) looked at 8,090 residential property sales in Berks County, Pennsylvania for 1998 and 2002. Their model included variables that measured land use and land cover surrounding the property, proximity to mushroom production and to larger-scale animal production. They also added variables for landfills, high-traffic roads, and airports to put the disamenity effects of agriculture into context. Their independent variables for the property characteristics included finished attic, variables to account for the exterior structure of the home, central air conditioning, the condition of the home, year sold, distance to major cities and roads, slope and elevation of property, the type of zoning, public water and sewer, and school district average scores. Their model showed that agricultural open space had a positive effect on property values within 400 m, while larger-

scale animal production facilities and mushroom production have a negative impact on property values within 1,600 m.

Neupane and Gustavson (2007) used sales data for residential property in Sydney, Nova Scotia, Canada from 1989 to August 2005 and included housing unit and neighborhood characteristics as explanatory variables. More specifically, the number of levels of the house and garage spaces, and distance to the contaminated sites, the Sydney Tar Ponds and Coke Ovens Sites were used. Results showed that properties located less than 100 meters from the contaminated sites saw an average negative impact of about 13 percent on price. The adverse impacts diminished as the distance from the site increased; properties 100 to 200 m, 200 to 400 m, 400 to 1,000 m, and greater than 1,000 m away saw decreases of 1.79, 0.88, 0.41, and 0.15 percent, respectively.

The studies mentioned above show that different types of industrial facilities have a negative impact on residential property values in their surrounding area. As housing markets are a product of the real and perceived risks in their vicinity (Farber, 1998), it follows that unfavorable aspects of industrial facilities are reflected in nearby property values. In each case, home values increased as the distance from the facilities increased.

1.3 The Case Study Area and Data

The South Puget Sound Region is located in the northwestern Washington and includes Mason, Kitsap, Thurston, and Pierce Counties. Major cities in the area include Tacoma and Olympia. The South Sound Region is one of the fastest growing areas in Washington State, and according to the State of Washington Office of Financial Management (OFM), the populations in Mason, Kitsap, Thurston, and Pierce Counties are expected to increase from their 2005 levels by 52, 43, 62, and 34 percent, respectively, by 2025. The region is also home to McChord Air Force Base and Fort Lewis. According to a study by the OFM in 2004, these bases employed over 34,600 uniformed military and civilian personnel (Sommers, 2004). In particular, Fort Lewis is expected to maintain its high levels of growth over the next few years. Much of the area's population is concentrated around its shorelines, large cities, and major highways.

1.3.1 History of the Issue

Today, most of the tidelands¹ in the United States are publically owned. This is, however, not the case in Washington State. When the state was founded, all of its tidelands were publically owned. However, the 1889-1890 Washington State Legislature supported the sale of public tidelands to private individuals to supply revenue to the state, and to encourage economic development. Most of the state's tideland and shorelands were sold to private entities until the 1971 Legislature ended the sales of tidelands with an exception for public entities. Now, around 71 percent of the state's tidelands and 26 percent of its shorelands are privately owned (Washington State Department of Natural Resources, 2008). Over the years, many property owners have opted to sell off their tidelands to other private individuals and businesses.

Multiple types of shellfish are harvested in the South Puget Sound region. Each species requires different harvesting techniques and equipment. For example, , hydraulic equipment, boats, barges, rafts, dredging equipment, pressure washers, and large grow bags may be used to setup,

¹ Tidelands are defined as the tidal range from ordinary high tide to extreme low tide.

operate and maintain a shellfish aquaculture operation. Harvesting time and peak growing seasons vary between the different shellfish species. Thus, the level of activity required for harvesting and maintenance activities will vary depending on the species and scale of the operation.

The ability for private individuals to own tidelands in Washington State makes it possible for shellfish growers to commercially farm their private tidelands. In addition, many property owners lease their tidelands to commercial shellfish growers and are often compensated based on the area's yield (Hudson 2009). As shellfish harvesting activities often take place on tidelands near people's homes, there is potential for them to distract and disturb those nearby. Furthermore, the fact that the tidelands of waterfront properties are sometimes owned by different individuals raises the potential for conflicts over the use of the tidelands. For example, a waterfront property owner may not like to see oyster grow bags in his or her view, but does not have a legitimate say in what activities occur on adjoining tidelands as they are owned by a different party. The negative externalities created by shellfish harvesting could have a detrimental impact to residential properties in close proximity to the shore if property owners are not in favor of commercial production.

As mentioned earlier, some waterfront property owners in the South Sound Region have voiced concerns that harvesting operations have a negative effect on their property values. The concerns range from the unsightliness of growbags, nets, and piles of shells, to the noises created by the boats, barges, and hydraulic equipment used to harvest the shellfish.

In 2008, the Washington State Department of Ecology noted that some private tideland owners are in favor of commercial geoduck harvest. Furthermore, some shellfish growers indicate that aquaculture is a priority use under the Shoreline Management Act (SMA). However, some shoreline property owners did not want what they considered "industrial-scale" activities occurring near them. Moreover, some feel that geoduck aquaculture (in particular) would harm the ecological functions of the shoreline and interpret the SMA as endorsing residential use as one of the preferred uses.

1.3.2 Key Informant Interviews

Northern Economics collected primary and secondary information from both realtors and county property assessors in the South Puget Sound Region. In all, 14 phone interviews were completed to collect qualitative data and other feedback. The survey asked realtors about:

- The different drivers for waterfront and non-waterfront property values in the area
- Positive and negative characteristics buyers mention when searching for a property
- Notable differences between waterfront and non-waterfront properties
- How the (real estate) market has changed over the past few years as the economy has slowed
- If offshore activities, to include commercial shellfish harvesting, affect potential buyers' decisions

The primary information collected from the survey describes features that affect property values in the South Puget Sound Region.

Northern Economics used the Northwest MLS to find contact information for 31 realtors in the South Puget Sound Region. Of those 31, 14 responded to the telephone interview or a follow-up email with the interview questions. This process resulted in a 45 percent response rate.

In addition to contacting realtors, Northern Economics conducted one phone interview and gathered secondary information pertaining to how property assessors from Kitsap, Thurston, Mason, and Pierce counties place values on properties. For each county, information was collected from its website.

1.3.2.1 Results of the Realtor Survey

When asked the drivers for waterfront property values, many interviewees mentioned that land is the most important attribute. Another important factor mentioned was if the adjoining tidelands were included in the land parcel. Some interviewees stated that slope stability, drainage, and view attributes of property were often more important to buyers than the house. As one Mason County realtor put it, "With waterfront properties sometimes the house itself is a side note."

When asked if there are any aspects of shellfish production that affected buyers' decisions, 12 of the respondents answered *no*. Some of these realtors commented that shellfish harvesting is a part of the culture in their area and that people are well aware of the activities, and therefore are not concerned. One of the realtors said, "If you're living down there (South Puget Sound), you have to respect it (shellfish harvesting activities)."

The two that answered *yes* both mentioned large commercial shellfish operations that raised issues with potential buyers. In one case, the realtor worked with a potential buyer who had researched mussel farming and the realtor needed to engage in additional client education. The realtor and a local shellfish grower had to work to reverse some misconceptions that the potential buyer learned in their investigation, such as the idea that mussels are harvested in the middle of the night.

In another case, a Pierce County realtor mentioned that noise from a large oyster farming operation had adverse effects on potential buyers' decisions. The interviewee mentioned that the noise came from heavy equipment used for harvesting. More specifically, it was stated that most of the noise was primarily caused by the equipment used to remove shell discards from the beach.

We also heard from a realtor in Thurston County that said, "I have another property on Totten (Inlet) where the tidelands are owned by [a shellfish company] and they have the beach covered with oyster bags...not the best selling point for us if you cannot use the beach and you do not receive any proceeds from the production."

Another factor mentioned as having an effect on property values are land use regulations imposed by local, state, and federal government entities. Respondents mentioned that there are various laws and regulations such as the SMA that make property improvements like remodeling, and building or expanding a dock or boathouse very difficult, and sometimes impossible.

Many of the interviewees identified much of the South Puget Sound Region as largely a retirement and vacation/second home community. They explained that many of the region's towns lack industries and have a large percentage of residents who commute to work. It was

mentioned that commuting is less attractive to today's buyers as many people are looking to live closer to where they work, and some are afraid of losing their jobs.

Property taxes were also mentioned as having a substantial effect on buyers' decisions. Interviewees explained that taxes are much higher for waterfront properties than they are for non-waterfront properties. One realtor from Mason County said that property taxes have led many to sell their waterfront properties as annual taxes can range from \$10,000 to \$12,000 on high valued properties.

It was mentioned that while the entire property market has slowed along with the national economy, the high end property market has slowed the most. Many respondents said that there are an increasing number of short sales, foreclosures, and bank-owned properties.

1.3.2.2 Results of the Assessor Interview and Research

Northern Economics contacted the Thurston County Assessor and accessed the county assessor websites for Mason, Pierce, Thurston, and Kitsap Counties. Each county indicated that it values most residential property using the market and cost approaches. The market approach takes sales data from similar properties as evidence of market value. The cost approach considers the value of an existing property to be the value of the land plus the cost to replace the existing building minus depreciation. The final step in the process was making an adjustment at the neighborhood level according to its specific attributes compared to other neighborhoods in its respective county.

Each county indicated that it revalues property on an annual basis to keep up with market trends. It was pointed out that the appraisal process consists of a physical inspection of the property to determine its attributes, such as the number of bedrooms, bathrooms, view, and size of the building and lot. These characteristics are then weighed against similar properties in the neighborhood that were sold recently. Thus, the sales of homes with similar attributes are used to determine the value of other properties in the surrounding neighborhood.

During the phone interview, the Thurston County Assessor stated that the levels of assessment are equal for both waterfront and non-waterfront properties. Items mentioned as drivers for waterfront property values include bank height (low, medium, and high), view, and if the property has a lagoon or exposed waterfront. The assessor stated that there were no variables used to account for offshore activities such as commercial shellfish production.

Information provided by the Kitsap County Assessor indicated that the assessed values for 2008 showed a decline in value of most all non-waterfront properties by three to four percent from 2007.² Conversely, most waterfront properties had no change in value.

1.4 Summary and Conclusions

This study indicates that the potential for discernable quantitative effect on property values exists, but this effect may be so specific to individual buyers or sellers that it is not discernable in

² In order to compare these statistics nationwide please see the Case-Shiller 20-City Housing Index for 2007 and 2008. <http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexid=spusa-cashpidff-p-us>.

a qualitative interview effort such as this one. Identifying a specific numerical effect of shellfish production on property values will require a full-scale hedonic analysis which can account for specific property attributes including the negative and positive externalities associated with shellfish production. Even with a full-scale statistical analysis, the numerical effect may not be statistically significant from zero. The fact that so few of our interviewees noted a market effect could mean that at this point there is no discernable broad-based market effect and that buyers who are turned off by commercial shellfish operations are replaced by willing buyers willing to tolerate or take advantage of these operations. The following is a non-inclusive list of variables that could be used to explain the sales price of properties in the South Puget Sound Region. This list is based on information collected from the key informant interviews and research on studies that used hedonic property valuation models. Most of the data for the variables identified above are available through the local MLS and other public records. Other items such as the specific location of the properties and distance to major cities and highways may require the use of geographic information systems (GIS).

Figure 1. List of Hedonic Variables for Future Analysis

- Specific location of residential properties
- Number of bedrooms
- Number of bathrooms
- Lot size
- Garage
- Age and condition of building
- Square footage of the home
- Property taxes
- Shore/beach access
- View (e.g. sound, river, lake, etc.)
- Waterfront or non-waterfront property
- Bank height
- Distance to major highways
- Distance to major employment centers
- Proximity to tidelands used for commercial shellfish harvesting activities
- Existence of shellfish culture contracts providing income to the property

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