

**An Assessment of the Social and Economic Importance
Of Menhaden (*Brevoortia tyrannus*) (Latrobe, 1802)
In Chesapeake Bay Region**

2011



JAMES E. KIRKLEY, *Principal Investigator and Author*
Virginia Institute of Marine Science
College of William and Mary
School of Marine Science
Department of Fisheries
Gloucester Point, VA 23062

VIMS Marine Resource Report No. 2011-14



**An Assessment of the Social and Economic Importance
Of Menhaden (*Brevoortia tyrannus*) (Latrobe, 1802)
In Chesapeake Bay Region**

2011

JAMES E KIRKLEY, *Principal Investigator and Author*
Virginia Institute of Marine Science
College of William and Mary
School of Marine Science
Department of Fisheries
Gloucester Point, VA 23062

Co-Authors:

Todd Hartman, *Department of Government & Justice Studies,
Appalachian State University*

Tanga McDaniel, *Department of Economics, Appalachian State University*

Kenneth (Ted) McConnell, *College of Agriculture & Natural Resources, Department of
Agricultural & Resource Economics, University of Maryland*

John Whitehead, *Department of Economics, Appalachian State University*

Contributors:

Robert Hicks, *Department of Economics, College of William & Mary*

Edward Houde, *Chesapeake Biological Laboratory*

Douglas Lipton, *College of Agriculture & Natural Resources, Department of
Agricultural & Resource Economics, University of Maryland*

Thomas Murray, *Marine Advisory Services, Virginia Institute of Marine Science/
College of William & Mary*

John Ward, *NOAA Fisheries (retired)*

VIMS Marine Resource Report No. 2011-14



Table of Contents

<i>Executive Summary</i>	<i>i</i>
1.0 Introduction	1
1.1 Introduction: The Fishery and Issues	1
1.2 Management and Resource Conditions of Menhaden.....	3
1.3 Study Background	4
1.4 Organization of Report	4
2.0 Overview of the Menhaden Resource and Fishery	5
2.1 Menhaden: Basic Biological Characteristics	5
2.2 Menhaden and the Reduction Fishery: An Historical Perspective	5
2.3 Menhaden and the Atlantic Coastal States	12
2.4 Management and Regulation of the Atlantic Menhaden Fishery	16
3.0 OMEGA Protein: The Company	18
3.1 An Overview	18
3.2 OMEGA Protein: Reedville, VA	18
3.2.1 Reedville Profile	19
3.2.1.1 Geographic Description.....	19
3.2.1.2 Importance of Fishing	20
3.2.1.2.1 Historic Fishing	20
3.2.1.2.2 Modern fishing	20
3.2.1.3 Social Interactions.....	21
3.2.1.4 Demography.....	21
3.2.1.4.1 Education.....	22
3.2.1.4.2 Employment	22
3.2.1.4.3 Income	23
3.2.1.4.4 Housing.....	23
3.3 OMEGA Protein: 2008 Reduction Activities	23
3.3.1 An Economic Assessment (Impact) Model.....	24
3.3.2 The Economic Contribution of OMEGA Reduction Activities.....	24
4.0 Community Descriptions	26
4.1 Maryland Coastal Counties	26
4.1.2 Eastern Shore	26
4.1.2.1 Cecil County	26
4.1.2.1.1 Location	26
4.1.2.1.2 Transportation.....	26
4.1.2.1.3 Demography.....	27
4.1.2.1.4 Education.....	28
4.1.2.1.5 Employment	28

4.1.2.1.6 Income	29
4.1.2.1.7 Housing.....	29
4.1.2.2 Dorchester County	29
4.1.2.2.1 Location	30
4.1.2.2.2 Transportation.....	30
4.1.2.2.3 Demography.....	30
4.1.2.2.4 Education.....	31
4.1.2.2.5 Employment	31
4.1.2.2.6 Income.....	32
4.1.2.2.6 Housing.....	32
4.1.2.3 Kent County.....	32
4.1.2.3.1 Location	33
4.1.2.3.2 Transportation.....	33
4.1.2.3.3 Demography.....	33
4.1.2.3.4 Education.....	34
4.1.2.3.5 Employment	34
4.1.2.3.6 Income.....	34
4.1.2.3.7 Housing.....	35
4.1.2.4 Queen Anne’s County	35
4.1.2.4.1 Location	35
4.1.2.4.2 Transportation.....	36
4.1.2.4.3 Demography.....	36
4.1.2.4.4 Education.....	36
4.1.2.4.5 Employment	37
4.1.2.4.6 Income.....	37
4.1.2.4.7 Housing.....	37
4.1.2.5 Somerset County.....	38
4.1.2.5.1 Location	38
4.1.2.5.2 Transportation.....	38
4.1.2.5.3 Demographics.....	39
4.1.2.5.4 Education.....	39
4.1.2.5.5 Employment	39
4.1.2.5.6 Income.....	40
4.1.2.5.7 Housing.....	40
4.1.2.6 Talbot County.....	40
4.1.2.6.1 Location	41
4.1.2.6.2 Transportation.....	41
4.1.2.6.3 Demographics.....	41
4.1.2.6.4 Education.....	42
4.1.2.6.5 Employment	42
4.1.2.6.6 Income.....	42
4.1.2.6.7 Housing.....	43
4.1.2.7 Wicomico County	43
4.1.2.7.1 Location	43
4.1.2.7.2 Transportation.....	44
4.1.2.7.3 Demographics.....	44
4.1.2.7.3 Education.....	45
4.1.2.7.3 Employment	45
4.1.2.7.4 Income.....	46
4.1.2.7.5 Housing.....	46
4.1.2.8 Worcester County	46
4.1.2.8.1 Location	47
4.1.2.8.2 Transportation.....	47

4.1.2.8.3 Demographics.....	47
4.1.2.8.4 Education.....	48
4.1.2.8.5 Employment.....	48
4.1.2.8.6 Income.....	49
4.1.2.8.5 Housing.....	49
4.1.3 Western Shore.....	50
4.1.3.1 Anne Arundel.....	50
4.1.3.1.1 Location.....	50
4.1.3.1.2 Transportation.....	50
4.1.3.1.3 Demographics.....	50
4.1.3.1.4 Education.....	51
4.1.3.1.5 Employment.....	52
4.1.3.1.6 Income.....	53
4.1.3.1.7 Housing.....	53
4.1.3.2 City of Baltimore.....	53
4.1.3.2.1 Location.....	54
4.1.3.2.2 Transportation.....	54
4.1.3.2.3 Demographics.....	54
4.1.3.2.4 Education.....	55
4.1.3.2.5 Employment.....	55
4.1.3.2.6 Income.....	56
4.1.3.2.7 Housing.....	57
4.1.3.3 Baltimore County.....	57
4.1.3.3.1 Location.....	58
4.1.3.3.2 Transportation.....	58
4.1.3.3.3 Demographics.....	58
4.1.3.3.4 Education.....	59
4.1.3.3.5 Employment.....	59
4.1.3.3.6 Income.....	60
4.1.3.3.7 Housing.....	61
4.1.3.4 Calvert County.....	61
4.1.3.4.1 Location.....	62
4.1.3.4.2 Transportation.....	62
4.1.3.4.3 Demographics.....	62
4.1.3.4.4 Education.....	63
4.1.3.4.5 Employment.....	63
4.1.3.4.6 Income.....	64
4.1.3.4.7 Housing.....	64
4.1.3.5 Charles County.....	65
4.1.3.5.1 Location.....	65
4.1.3.5.2 Transportation.....	65
4.1.3.5.3 Demographics.....	65
4.1.3.5.4 Education.....	66
4.1.3.5.5 Employment.....	67
4.1.3.5.6 Income.....	67
4.1.3.5.7 Housing.....	68
4.1.3.6 Harford County.....	68
4.1.3.6.1 Location.....	69
4.1.3.6.2 Transportation.....	69
4.1.3.6.3 Demographics.....	69
4.1.3.6.4 Education.....	70
4.1.3.6.5 Employment.....	70
4.1.3.6.4 Income.....	71

4.1.3.6.5 Housing.....	71
4.1.3.7 St. Mary’s County	72
4.1.3.7.1 Location	72
4.1.3.7.2 Transportation.....	72
4.1.3.7.3 Demographics.....	72
4.1.3.7.4 Education.....	73
4.1.3.7.5 Employment	73
4.1.3.7.6 Income.....	74
4.1.3.7.7 Housing.....	75
4.2 Virginia Coastal Counties	76
4.2.1 Eastern Shore	76
4.2.1.1 Accomack County	76
4.2.1.1.1 Location	76
4.2.1.1.2 Transportation.....	77
4.2.1.1.3 Demography.....	77
4.2.1.1.4 Education.....	77
4.2.1.1.5 Employment	78
4.2.1.1.6 Income.....	78
4.2.1.1.7 Housing.....	78
4.2.1.2 Northampton County.....	79
4.2.1.2.1 Location	79
4.2.1.2.2 Transportation.....	79
4.2.1.2.3 Demography.....	80
4.2.1.2.4 Education.....	80
4.2.1.2.5 Employment	80
4.2.1.2.6 Income.....	81
4.2.1.2.7 Housing.....	81
4.2.2 Western Chesapeake Bay Counties	82
4.2.2.1 Essex County	82
4.2.2.1.1 Location	82
4.2.2.1.2 Transportation.....	82
4.2.2.1.3 Demography.....	82
4.2.2.1.4 Education.....	83
4.2.2.1.5 Employment	83
4.2.2.1.6 Income.....	83
4.2.2.1.7 Housing.....	84
4.2.2.2 Gloucester County.....	84
4.2.2.2.1 Location	84
4.2.2.2.2 Transportation.....	85
4.2.2.2.3 Demography.....	85
4.2.2.2.4 Education.....	85
4.2.2.2.5 Employment	85
4.2.2.2.6 Income.....	86
4.2.2.2.7 Housing.....	86
4.2.2.3 Hampton	87
4.2.2.3.1 Location	87
4.2.2.3.2 Transportation.....	87
4.2.2.3.2 Demographics.....	87
4.2.2.3.2 Education.....	88
4.2.2.3.3 Employment	88
4.2.2.3.4 Income.....	89
4.2.2.3.5 Housing.....	89

4.2.2.4 Isle of Wight County	89
4.2.2.4.1 Location	90
4.2.2.4.2 Transportation	90
4.2.2.4.3 Demographics	90
4.2.2.4.4 Education	91
4.2.2.4.5 Employment	91
4.2.2.4.6 Income	91
4.2.2.4.7 Housing	92
4.2.2.5 James City County	92
4.2.2.5.1 Location	92
4.2.2.5.2 Transportation	92
4.2.2.5.3 Demographics	93
4.2.2.5.4 Education	93
4.2.2.5.5 Economics	93
4.2.2.5.6 Income	94
4.2.2.5.7 Housing	94
4.2.2.6 King George County	94
4.2.2.6.1 Location	95
4.2.2.6.2 Transportation	95
4.2.2.6.3 Demography	95
4.2.2.6.4 Education	96
4.2.2.6.5 Employment	96
4.2.2.6.6 Income	96
4.2.2.6.7 Housing	96
4.2.2.7 Lancaster County	97
4.2.2.7.1 Location	97
4.2.2.7.2 Transportation	97
4.2.2.7.3 Demographics	97
4.2.2.7.4 Education	98
4.2.2.7.5 Employment	98
4.2.2.7.6 Income	99
4.2.2.7.7 Housing	99
4.2.2.8 Mathews County	99
4.2.2.8.1 Location	100
4.2.2.8.2 Transportation	100
4.2.2.8.3 Demographics	100
4.2.2.8.4 Education	101
4.2.2.8.5 Employment	101
4.2.2.8.6 Income	101
4.2.2.8.7 Housing	102
4.2.2.9 Middlesex County	102
4.2.2.9.1 Location	102
4.2.2.9.2 Transportation	102
4.2.2.9.3 Demographics	103
4.2.2.9.4 Education	103
4.2.2.9.5 Employment	103
4.2.2.9.6 Income	104
4.2.2.9.7 Housing	104
4.2.2.10 City of Newport News	104
4.2.2.10.1 Location	105
4.2.2.10.2 Transportation	105
4.2.2.10.3 Demographics	105
4.2.2.10.3 Education	106

4.2.2.10.4	Employment	106
4.2.2.10.5	Income	107
4.2.2.10.5	Housing.....	107
4.2.2.11	City of Norfolk	108
4.2.2.11.1	Location	108
4.2.2.11.2	Transportation.....	108
4.2.2.11.3	Demographics.....	108
4.2.2.11.4	Education.....	109
4.2.2.11.5	Employment	109
4.2.2.11.6	Income.....	110
4.2.2.11.7	Housing.....	110
4.2.2.12	Northumberland County.....	111
4.2.2.12.1	Location	111
4.2.2.12.2	Transportation.....	111
4.2.2.12.3	Demographics.....	112
4.2.2.12.4	Education.....	112
4.2.2.12.5	Employment	112
4.2.2.12.6	Income.....	113
4.2.2.12.7	Housing.....	113
4.2.2.13	City of Poquoson	113
4.2.2.13.1	Location	114
4.2.2.13.2	Transportation.....	114
4.2.2.13.3	Demographics.....	114
4.2.2.13.4	Education.....	115
4.2.2.13.5	Employment	115
4.2.2.13.6	Income.....	115
4.2.2.13.7	Housing.....	116
4.2.2.14	City of Portsmouth	116
4.2.2.14.1	Location	116
4.2.2.14.2	Transportation.....	116
4.2.2.14.3	Demography.....	116
4.2.2.14.4	Education.....	117
4.2.2.14.5	Employment	118
4.2.2.14.6	Income.....	118
4.2.2.14.7	Housing.....	119
4.2.2.15	Prince William County.....	119
4.2.2.15.1	Location	119
4.2.2.15.2	Transportation.....	120
4.2.2.15.3	Demographics.....	120
4.2.2.15.4	Education.....	121
4.2.2.15.5	Employment	121
4.2.2.15.6	Income.....	122
4.2.2.15.7	Housing.....	122
4.2.2.16	Richmond County	123
4.2.2.16.1	Location	123
4.2.2.16.2	Transportation.....	123
4.2.2.16.3	Demography	123
4.2.2.16.4	Education.....	124
4.2.2.16.5	Employment	124
4.2.2.16.6	Income.....	124
4.2.2.16.7	Housing.....	125
4.2.2.17	Stafford County	125
4.2.2.17.1	Location	125

4.2.2.17.2 Transportation.....	126
4.2.2.17.3 Demographics.....	126
4.2.2.17.4 Education.....	127
4.2.2.17.5 Employment.....	127
4.2.2.17.6 Income.....	128
4.2.2.17.7 Housing.....	128
4.2.2.18 City of Suffolk.....	128
4.2.2.18.1 Location.....	129
4.2.2.18.2 Transportation.....	129
4.2.2.18.3 Demographics.....	129
4.2.2.18.4 Education.....	130
4.2.2.18.5 Employment.....	130
4.2.2.18.6 Income.....	131
4.2.2.18.7 Housing.....	132
4.2.2.19 Surry County.....	132
4.2.2.19.1 Location.....	132
4.2.2.19.2 Transportation.....	132
4.2.2.19.3 Demography.....	133
4.2.2.19.4 Education.....	133
4.2.2.19.5 Employment.....	133
4.2.2.19.6 Income.....	134
4.2.2.19.7 Housing.....	134
4.2.2.20 City of Virginia Beach.....	134
4.2.2.20.1 Location.....	135
4.2.2.20.2 Transportation.....	135
4.2.2.20.3 Demography.....	135
4.2.2.20.4 Education.....	136
4.2.2.20.5 Employment.....	136
4.2.2.20.6 Income.....	137
4.2.2.20.7 Housing.....	138
4.2.2.21 Westmoreland County.....	138
4.2.2.21.1 Location.....	138
4.2.2.21.2 Transportation.....	139
4.2.2.21.3 Demographics.....	139
4.2.2.21.4 Education.....	139
4.2.2.21.5 Employment.....	139
4.2.2.21.6 Income.....	140
4.2.2.21.7 Housing.....	140
4.2.2.22 City of Williamsburg.....	141
4.2.2.22.1 Location.....	141
4.2.2.22.2 Transportation.....	141
4.2.2.22.3 Demographics.....	141
4.2.2.22.4 Education.....	142
4.2.2.22.5 Employment.....	142
4.2.2.22.6 Income.....	143
4.2.2.22.7 Housing.....	143
4.2.2.23 York County.....	143
4.2.2.23.1 Location.....	144
4.2.2.23.2 Transportation.....	144
4.2.2.23.3 Demographics.....	144
4.2.2.23.4 Employment.....	145
4.2.2.23.5 Income.....	145
4.2.2.23.6 Housing.....	146

5.0 Economic Impact Assessment.....	147
5.1 The Economic Impact Assessment Framework	147
5.2 The Economic Impacts of the Reduction Fishery	150
5.3 Impacts of Shutting the Reduction Operations and Reducing the Bay Quota	151
5.3.1 Economic Impacts of Varying Bay Quota Levels: No Change in Cost	153
5.3.2 Economic Impacts of Varying Bay Quota Levels: Change in Cost	154
5.3.3 Economic Impacts of Fishery Wide Quotas	155
5.3.4 Impact Assessment via the Input/Output Model	156
5.4 Economic Impacts and the Recreational Fisheries of the Bay	159
5.4.1 The Relationship between Recreational Catch/Abundance and Menhaden	159
5.4.2 The Economic Impacts of Recreational Angling	161
5.5 Review of Impact Assessment.....	167
6.0 Valuation Survey Methodology.....	169
6.1 Multi-Mode Chesapeake Bay Menhaden Survey: Data Collection Report	169
6.1.1 Mail Survey	169
6.1.2 Telephone Survey	169
6.1.3 Internet Survey	170
6.2 Survey Questionnaires and Data Summary.....	171
Appendix A: VIMS 2010 Codebook/Telephone Survey	171
Appendix B: Mail Survey (Version 1)	184
Appendix C: Zoomerang Internet Survey	193
7.0 Estimating Willingness to Pay for Policies Related to Menhaden Harvests	214
8.0 Summary and Conclusions	222
8.1 The Beginning and Purpose of Study	222
8.2 Study Methodology	223
8.3 Overview of Results.....	224
Reference	227

Executive Summary

Recreational anglers and various conservation associations have long been concerned about the harvesting of menhaden in Chesapeake Bay. Their concerns include the fact that menhaden are filter feeders, whose overharvest could affect water quality, and that menhaden are forage fish for various recreationally important predators, such as striped bass, weakfish¹, speckled trout, bluefish, as well as various marine mammals and seabirds. Equally important is the fact that the reduction fishery solely operated by OMEGA Protein is also believed to be vital to the social and economic wellbeing of Northumberland County, and in particular, Reedville, VA. In addition, the bait fisheries have recently increased their harvest of menhaden in response to reductions in the supply of herring for use as bait in the lobster and other fisheries.

These competing concerns have fueled a debate about menhaden harvesting that has resulted in every coastal state of the Northwest Atlantic having some type of regulation that either limits or prohibits the harvesting of menhaden by purse seine or for reduction purposes in their coastal waters. Massachusetts, Virginia, New York, and North Carolina are the only states that presently permit harvesting for reduction or by purse seine. None of these concerns have, however, been quantified in terms of their economic impacts or economic, social, or ecological values.

As a consequence, the Virginia Marine Resources Commission requested a study be done by the Virginia Institute of Marine Science of the social and economic importance of the fishery to Chesapeake Bay region. The emphasis of the study was to document how reallocating the Bay quota might affect the social wellbeing and economies of the region and to determine the economic value of menhaden in the region. That is, does the menhaden resource generate more benefits from the fishery or from the ecological services it provides to the various Bay resources?

The county profiles and limited interviews with employees of OMEGA Protein indicate that the menhaden fishery, dominated by the reduction industry, is a key component of the multi-cultural, ethnic, and racial communities bordering Chesapeake Bay. This is particularly true for Northumberland County and Reedville, Virginia where OMEGA Protein is headquartered. Of the 519 full and part time jobs generated by OMEGA Protein, 347 contributed to the local Northumberland County economy. In the event of a closure, the loss of the reduction industry alone would generate a 14.3% and 8.1% decline in total county output and employment; respectively. In addition, a financial simulator model was developed to conduct an assessment of different Bay-wide quotas affect on sales, income, and employment in the Maryland and Virginia region. This model found that a zero Bay quota with constant costs results in losses of \$10 million as compared to a \$7.3 million profit if costs are allowed to decline with quota reductions. Restricting coastal ocean quotas from a high of 141.1 to 50.0 thousand metric tons further reduces sales from \$59.5 to \$21.2 million and profits from \$14.2 to 2.3 million. This latter result assumes that overall costs would rise 75% as a result of the exclusively offshore operations while allowing operating cost or expenditures for fuel, repair and maintenance, and food to decline with declines in production levels.

¹Reportedly the age-structure of weakfish in the Bay has contracted (primarily ages 0-3) this species does not exert much predation pressure on menhaden.

Using these results in an input/output model, a commercial Bay quota of 75.0 thousand metric tons was not found to have a large impact on either the regional economy or on the economy of Virginia (Tables 5.9, 5.10, and Table 5.11). The regional output is reduced from \$88.2 to \$81.9 million, income is reduced from \$22.8 to \$21.1 million, and employment declines from 519 to 482 jobs. A zero Bay quota, without additional landings from the coastal ocean to compensate for the reduction, reduces total output to \$35.0 million, employment to 206 jobs, and income to \$9.0 million. Similarly, recreational angling for striped bass, bluefish, weakfish, and spotted sea trout that depends in part on menhaden as their prey did generate considerable economic activity. Anglers made a total of 2.9 million trips targeting those four species. In 2008, \$332.1 million in total sales or output, \$122.3 million in income, and nearly 3,500 jobs were generated for the region.

Obviously, an important component of this assessment is the effect of a reallocation of the commercial Bay menhaden quota on the recreational game fish catch, sales or output, income, and jobs. While a statistically significant increase of 0.05 in per pound of recreationally caught striped bass exists for each billion fish increase in menhaden, no statistically significant relationship was found between numbers of recreationally caught game fish and menhaden abundance. This latter effect of menhaden abundance on individual game fish species catch could not be assessed because of the inadequacy of the available information and data. It is possible that such an effect could exist, but the combination of species might confound the results when analyzed in the aggregate. In short, no empirical evidence exists that a reduction in or the elimination of the menhaden reduction industry in the Bay or coastal waters would result in an increase in the economic impacts derived from the recreational fishing for game fish species that depend on menhaden as a prey item.

The benefit-cost assessment of the social and economic importance of the menhaden resource was developed using a contingent valuation analysis based on an extensive survey of stakeholders in Virginia and Maryland. This resulted in estimates of the economic value to regional stakeholders from retaining or reducing the current Bay-wide commercial quota. The contingent valuation analysis indicated that the decrease in the menhaden industrial catch is valued at \$28 in net benefits per household, while its maintenance is valued at \$50 per household; a net gain in net benefits of \$110.0 million for maintaining the status quo. The result that society preferred to maintain the status quo instead of having a strong preference to reduce the allowable Bay quota was unexpected. Possible reasons for the preferences include a growing sympathy with watermen, an ailing economy and desire by individuals to prevent additional unemployment, and an inadequate understanding of the potential ecological goods and services of menhaden.

There are various reasons to interpret these economic value results cautiously. First, the estimates themselves are not exact due to uncertainty that is not easily quantified. Second, our valuation of the scenarios assumes that preferences are independent. However, in controversial and contentious cases of resource allocation, preferences may evolve such that not only does one side of the issue value its own management program, but it may also incur 'negative' value if the opposing side gets its way. The proportion of these individuals is probably quite small relative to the total number of interested individuals. Third, the strength of the results rests on the scientific evidence. We have presented the survey respondents with the best evidence we could provide. Weaknesses in this evidence will undermine the economic assessment of preferences.

1.0 Introduction

1.1 Introduction: *The Fishery and Issues*

Atlantic menhaden (*Brevoortia tyrannus*) (Latrobe, 1802) has been the subject of controversy and debate for nearly 200 years. The Pilgrims supposedly used menhaden as fertilizer for their crops, a practice taught to them by Indians of the Chesapeake region. The industry emerged and developed early in New England in the early 19th century; this occurred because menhaden oil was found to be a valuable alternative to whale oil for lubricants, as fuel for lamps, and in manufacturing soap and paint. By the early 1900s, menhaden was used as a component of fertilizer and animal feed, and in the manufacturing of paints and other substances such as fingernail polish and perfume (Lanier, 1985).

Initially, menhaden were caught in weirs and in haul seines worked from the shore, and to a lesser extent, by gill nets worked from canoes and small ships (Frye, 1978). According to Frye, Rhode Islanders were the first to use the purse seine, the dominant current day gear for menhaden, to catch menhaden. It was not widely used until the 1870s, when the first purse boat was developed. Today's fishery, while still based on the purse seine, is even-more technically efficient. A hydraulic power block is used to pull the net; the purse boats are now aluminum rather than wood and motorized rather than powered by oar; nylon has replaced the heavier and less durable natural fiber nets; pumps are now used to transfer the catch from the net into the fish hold; and spotter planes are used to sight the schools of menhaden.

Controversy about the harvesting of menhaden of some type has documented since the 1880s. In 1888, Assemblyman Cromwell introduced a bill to prohibit fishing using menhaden nets in Raritan Bay, New York (The New York Times, 1888). Opposition to the fishing of menhaden with nets was based on concerns about bycatch of bluefish and weakfish, depletion of important prey for various game fish, and the fact that menhaden were not used for human food but mostly for fertilizer. In 1889, Governor Ames of Massachusetts imposed a ban on the seining of menhaden in Massachusetts's waters, and especially in Buzzard's Bay. Opposition was primarily by recreational anglers and focused on the perceived value of menhaden to water quality and the abundance and biomass of various game fish.

Today, the arguments are much the same but with some new additions: (1) anglers and environmental groups are concerned that an important source of filtration of water has been diminished with the harvesting of menhaden (i.e., menhaden are believed to be important to water quality because they are filter feeders on excess microscopic algae); (2) menhaden are important prey for major game fish, seabirds, and marine mammals in the Bay, and reductions in the abundance and biomass of menhaden could have negative ramifications for the abundance and health of various game fish, seabirds, and marine mammals; (3) menhaden are harvested for manufacturing products, which do not necessarily require menhaden or any fish (e.g., feed for livestock), and thus, are more valuable in the services they provide to the Bay ecosystem than they are in terms of meal and oil; and (4) the reduction plants generate undesirable odors.

Bait and reduction are the two primary fisheries for Atlantic menhaden. Atlantic menhaden are harvested in the Northwest Atlantic, primarily between Rhode Island and North

Carolina. Yellowfin menhaden (*Brevoortia smithi*) are also harvested in the northwest Atlantic, but available landings data from the National Marine Fisheries Service does not differentiate the two species. In 2007, landings of menhaden—both bait and reduction fisheries--were reported for twelve Northwest Atlantic coastal states: (1) Virginia, (2) New Jersey, (3) Maryland, (4) Massachusetts, (5) North Carolina, (6) New York, (7) Connecticut, (8) Maine, (9) Florida East Coast, and (10) Rhode Island, (11) Delaware, and (12) New Hampshire. Of the fourteen Northwest Atlantic coastal states—Maine through Florida, nine either prohibit the use of purse seines to catch menhaden or the harvesting of menhaden by purse seines for reduction purposes. Virginia and North Carolina allow the harvesting of menhaden by purse seine for reduction purposes. The North Carolina fishery ceased operations in 2004, and Virginia in conjunction with the Atlantic States Marine Fisheries Commission imposes an overall cap or quota on landings and has seasonal and spatial limits, along with limits on by catch. The present cap on harvests from Chesapeake Bay is 109,020 metric tons. The seasonal limits are May 1 to the Saturday following the third Friday of November. In 2010, the allowable cap was increased to 122.7 thousand metric tons because of under harvesting in 2009. The current management regime allows under-harvest in one year to be credited to the next year.

The commercial reduction fishery is located in Reedville, Virginia where² OMEGA Protein is the sole harvester and processor of menhaden into meal and oil. While bait fisheries for menhaden exist in several states, purse seines are prohibited unless the harvesting is primarily for baitfish; e.g., Rhode Island, Maine, New York, New Jersey, Virginia, and North Carolina. The fact that only one company processes menhaden for meal and oil has been a point of contention by those opposed to the reduction fishery. Many incorrectly view OMEGA as a monopoly; there are substitutes available for menhaden (e.g., other species and various plants, such as soybeans). OMEGA falls more in line with what is referred to as monopolistically competitive; that is, they can differentiate their product, but there are substitutes available.

The commercial menhaden fishery is viewed as being highly important to the economy of Reedville, Virginia. During calendar year 2008, OMEGA employed up to 317 individuals in Reedville.³ The company employs approximately 127 full-time, year-round employees. The Reedville facility had total sales of approximately \$60.0 million in 2008. The latest information available indicates that the population of Reedville is 2,140 individuals, and mean income per household is \$39.3 thousand. In 2008, the population of Northumberland County was approximately 12.9 thousand individuals. The median household income for Northumberland was \$47.2 thousand in 2008. Private nonfarm employment was approximately 2.0 thousand individuals in 2007.⁴ The North Carolina Economic Intelligence System estimates that the per capita income in Northumberland County equaled \$27.5 thousand in 2008, and that the total employment for 2008 equaled 5.6 thousand individuals.

OMEGA Protein employed up to 317 individuals in 2008. Mean monthly income per employee ranged from \$2.2 thousand in February to a high of \$5.6 thousand in 2008. Mean

² Reedville is located in Northumberland County, Virginia.

³ All information on employment and statistics related directly to operations of OMEGA Protein were provided by OMEGA Protein.

⁴ Summary statistics for Northumberland County were obtained from the U.S. Census Bureau, State and County Quick Facts and are based on the most recent data available.

annual income equaled \$44.3 thousand, which is considerably higher than the per capita income for all of Northumberland County; i.e., \$27.5 thousand. The major sources of employment for Northumberland County are manufacturing, which includes OMEGA Protein's processing activities, retail trade, and construction.⁵ A report done during the 1990s, "The Economy and Demographics of Northumberland County, Virginia" listed tourism as the county's fastest growing industry. Based on the detailed North American Industry Classification of industries, seafood packaging and preparation, which includes OMEGA Protein, generated the largest employment for Northumberland County in 2008.

1.2 Management and Resource Conditions of Menhaden

Presently, the menhaden fishery is managed under the purview of the Atlantic States Marine Fisheries Commission (ASMFC) with each state implementing its own regulations consistent with realizing the goals and objectives of ASMFC. The first Fishery Management Plan (FMP) was developed in 1981. Since then, there have been several revisions and addenda. An error in the assessment was identified which resulted in a change in overfishing status. The latest stock assessment by the ASMFC concluded the stock is not overfished but it experienced overfishing in 2008 (ASMFC, 2010). Addendum V seeks to consider revision of the management plan's biological reference points and proposes new thresholds and targets. Addendum IV extended the overall cap of 109.0 thousand metric tons through 2013. Of all states between Maine and Florida, except Virginia, management and regulations are established by respective state resource agencies. In Virginia, management and regulation of menhaden is under the control of the General Assembly, and the regulations are listed in the Code of Virginia, which has been a contentious issue for many years. All states between Maine and Florida, except Massachusetts, New York, Virginia, and North Carolina, either prohibit the use of purse seines or prohibit the harvesting of menhaden for reduction purposes.

The latest stock assessment by the ASMFC concludes the stock is not overfished and overfishing is not occurring relative to the current reference points (ASMFC, 2010). This assessment, however, was based on a 2008 benchmark. A January 2011 "Quick Guide to ASMFC Species Stock Status," based on a 2009 benchmark assessment declared overfishing to be occurring. Uncertainties in the assessment, however, do not preclude the possibility that overfishing may have occurred in 2008. The stock assessment report also indicates that the determination of overfishing requires development of new reference points. The Stock Assessment Panel recommended that alternative reference points be considered and chosen on the basis of providing better protection for spawning stock biomass (SSB) or population fecundity relative to the unfished level. Addendum V proposes some alternative reference points for fishing mortality relative to spawning stock biomass.

Regardless of whether or not the resource is being overfished or overfishing is occurring, there is an issue about whether or not the ecosystem services of menhaden have declined over time. That is, has the continued harvesting of menhaden affected water quality and populations of predators, such as certain species of finfish, marine mammals, and seabirds? A recent study by Lynch et al. (2010) indicates that menhaden have little, if any, impact on water quality. The importance of menhaden to major predators has not been scientifically established, but it is well

⁵ Data on employment by industry obtained from the Virginia Employment Commission.

known that menhaden constitute a large proportion of the diet of predators, which include important game fish, seabirds, and marine mammals.

1.3 Study Background

In 2007, the Virginia Marine Resources Commission (VMRC) and the Secretary of Natural Resources expressed concern about the social and economic importance of menhaden to Maryland and Virginia. The VMRC, subsequently, commissioned a study, funded with the approval of the Recreational Fishing Advisory Board and the Commercial Fishing Advisory Board, to estimate and assess the social and economic importance of menhaden to Chesapeake Bay region. One major question the VMRC wanted answered was “what would be the changes in the social structure and economies of the region in response to different regulatory regimes?” Another major question, and possibly the more important one, was “what is the economic value of menhaden?” That is, what is the benefit to society from the menhaden resource? Alternatively, “are menhaden worth more to society in the water than on the boat?” The major focus of the impact and valuation assessment was the Virginia reduction fishery, and not any of the various state, coastal, or bait fisheries.

In this report, we present estimates of the social and economic impacts and the economic valuation of the current reduction fishery as well as changes in the allowable harvest levels of the reduction fishery. The social ramifications, while highly important, are primarily limited to descriptions of the basic social and economic structures of the various coastal counties potential affected by the menhaden fishery. In depth-interviews, of the employees of OMEGA, however, were conducted in an effort to assess how they would be affected by changes in the regulations for the reduction fishery; and these are presented in this report. We also present estimates of the economic value of menhaden to stakeholders in Maryland and Virginia. These values were based on data obtained from a three-tier survey, which included a telephone survey, an Internet survey, and a mail survey. The survey focused on obtaining data on the dollar amounts individuals would be willing to annually pay for different levels of commercial harvest of menhaden for reduction purposes.

1.4 Organization of Report

The report is organized as follows: (1) chapter 2 provides a discussion and overview of the fishery, management regime, and issues related to the fishery; (2) chapter 3 presents a discussion on the social and economic structure of the various counties, which might be affected by the fishery or resource; (3) chapter 4 presents the economic impacts associated with different allowable levels of total catch for the reduction fishery; (4) chapter 5 presents the economic valuations associated with different allowable levels of total catch; and (5) chapter 6 presents the summary and conclusions.

2.0 Overview of the Menhaden Resource and Fishery

2.1 Menhaden: Basic Biological Characteristics

The life history of Atlantic menhaden (*Brevoortia tyrannus*) is well described in numerous scientific documents (e.g., the 2006 stock assessment prepared by members of the Atlantic Menhaden Technical Committee of the Atlantic States Marine Fisheries Commission). Atlantic menhaden are found in near shore and inland tidal waters from Nova Scotia, Canada to Florida (ASMFC, 2006). They are in the Clupeidae family that includes herrings and sardines, which are viewed as filter feeders and either primary (i.e., eat phytoplankton) or secondary (i.e., eat zooplankton) consumers or both (Ahrenholz, 1991). They are also viewed as very important prey for numerous other species of fish, seabirds, and various marine mammals.

Menhaden typically migrate northward in the early spring and southward in the fall. Not all menhaden migrate equal distances. Over summer, the coastwide stock is stratified by latitude and age; older fish migrate farther distances such that they are more abundant in northerly habitats. Some spawning does occur year round, but peak spawning usually occurs off the coast of North Carolina between October and March. Menhaden are generally sexually mature by age 3 or late age 2, virtually all are mature at Age 2, and are relatively prolific spawners (ASMFC, 2006). Menhaden are viewed as being comprised of a single coastwide stock. Full (100%) recruitment to the fishery occurs at approximately age 2.

Adult menhaden are filter feeders, which feed on phytoplankton and zooplankton. Their role in affecting water quality because of the filtration properties remains uncertain. In fact, a recent study by Lynch et al. (2010) indicates that the population of menhaden may have little effect on water quality. Relative to 2008, the stock has been declared as not being overfished but overfishing was occurring (ASMFC, 2010). A more recent benchmark assessment based on 2009 does indicate, however, that overfishing is occurring. The assessment completed in 2010 indicates that the abundance of menhaden was the lowest it had ever been relative to 1955—109.0 billion in 1955 vs. 18.2 billion fish in 2008. A major concern is that while fecundity is believed to be high enough to sustain the resource, the number of young fish surviving is low. The coastwide recruitment level of menhaden has been depressed for 20 years. Young-of-the-year juveniles are the major prey of the fish and bird predators. Historically, Chesapeake Bay supplied more than 65% of the coastwide recruits to the population. So, the very low recruitments for 20+ years may have impacted the coastwide stock's abundance and its fecundity. Because of concerns about the status of the resource, new threshold and biological reference points are being established.

2.2 Menhaden and the Reduction Fishery: An Historical Perspective⁶

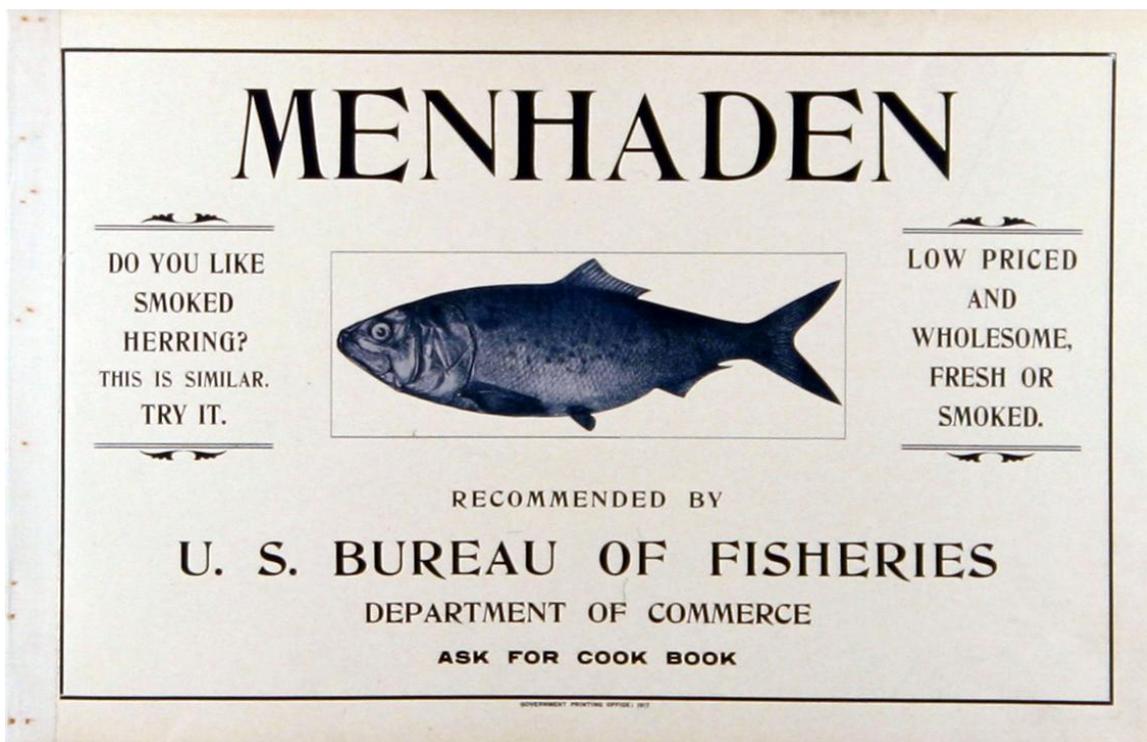
George Brown Goode (1880) wrote one of the earliest descriptions of the menhaden fishery “A History of the Menhaden with an Account of the Agricultural Uses of Fish.” The story of the fishery began in 1621, so it is said, when an Indian named Tisquantum (Squanto)

⁶ Although menhaden are harvested for both bait and reduction, the emphasis of this study and report is on the reduction fishery.

advised the colonists in Plymouth on how to use menhaden as fertilizer for their crops.⁷ As noted by Frye (1978), this advice, however, may have more of a prank to make the colonists look silly than being actual useful advice to help agricultural production.

Despite widespread use of menhaden as both bait and fertilizer, menhaden have not always been exclusively harvested for fertilizer, bait, meal, and oil. As noted by Frye (1978), menhaden were also harvested for human consumption. According to Frye, Catesby referred to menhaden as an “excellent sweet fish,” and so excessive in fat that butter is not necessary to fry them. William Byrd commended menhaden as food for a gourmet. In the latter 1800s, menhaden were regularly sold as food fish in the Washington, DC fish markets. Menhaden were also salted and shipped in large quantities to the West Indies and Guianas during the 18th and 19th centuries to feed plantation workers. In the 1870s, the American Sardine Company of New Jersey was canning and shipping sardines around the world and was given a medal of merit at Vienna in 1873. In the 1940s, menhaden were being canned as sardines and processed into fish cakes for shipment to the Soviet Union and Great Britain. At one time, the US Bureau of Commercial Fisheries had a marketing program to encourage the consumption of menhaden as food (Figure 1).

Figure 1:
Menhaden Marketing Poster: US Bureau of Commercial Fisheries



⁷ Much of the discussion in this section is based on material in John Frye’s text “The Men All Singing: The Story of Menhaden Fishing.”

In the early 1880s, exploitation of the resource substantially increased. The primary reason for increased exploitation appears to be related to the use of menhaden to produce fish oil (Frye, 1978). In 1824, an individual named Barker developed a portable device for reducing menhaden to oil. Subsequently, John Tallman constructed the first factory to cook fish by steam, and then a second factory in 1841. In 1826, the first purse seine vessel was constructed, which eventually displaced most of the other types of vessels and gears used to harvest menhaden. By 1879, there were approximately 56 factories, 279 vessels, and 3,337 fishermen landing and processing nearly 800 million fish.

In 1955, there were 23 reduction plants operating along the Atlantic coast (Smith, 1991). There were 150 vessels, which landed 641,400 metric tons of menhaden (Table 2.1). In 1960, 20 plants and 160 vessels landed and processed 529,800 metric tons of menhaden. Prior to 1997, there were two companies (AMPRO or American Protein and OMEGA Protein) processing menhaden in Virginia and one company operating in North Carolina. The North Carolina company ceased operations in 2004. In 2008, there was one plant, OMEGA Protein, harvesting and processing Atlantic menhaden for reduction. OMEGA bought out AMPRO and shuttered AMPRO operations in 1997. The current OMEGA plant is based in Reedville, Virginia (Northumberland County) and operates 10 purse seine vessels. In 2008, approximately 141,100 metric tons were landed and processed; reduction landings of menhaden equaled 143,800 metric tons in 2009 (The Atlantic Menhaden Review Team, 2010).

Table 2.1. Reduction Plants, Purse Seine Vessels, and Landings (1,000 mt), Atlantic Coast^a

Year	Plants	Vessels	Landings (1,000 mt)
1955	23	150	641.4
1956	24	149	712.1
1957	25	144	602.8
1958	22	130	510.0
1959	23	144	659.1
1960	20	115	529.8
1961	20	117	575.9
1962	19	112	537.7
1963	17	112	348.9
1964	18	111	269.2
1965	18	84	273.4
1966	17	76	219.6
1967	20	64	183.5
1968	18	59	234.8
1969	17	51	161.6
1970	15	54	258.4
1971	14	51	250.3
1972	11	51	365.9
1973	11	58	346.9
1974	10	63	292.2
1975	12	61	250.2
1976	11	62	340.5
1977	12	64	341.1
1978	12	53	344.1
1979	12	54	375.7
1980	11	51	401.5
1981	11	57	381.3
1982	11	47	382.4
1983	10	41	418.6
1984	8	38	326.3
1985	6	24	306.7
1986	5	16	238.0
1987	6	23	327.0
1988	6	30	309.3

^aSource of Data: Smith, J.W. (1991). The Atlantic and Gulf Purse Seine Fisheries: Origins, Harvesting Technologies, Biostatistical Monitoring, Recent Trends in Fisheries Statistics, and Forecasting. *Marine Fisheries Review*.

Menhaden are not currently harvested only for reduction. There appears to be a growing menhaden fishery for bait.⁸ This has occurred, in part, to rising prices and reduced supplies of Atlantic sea herring, which has been the primary bait for the American lobster fishery. Menhaden are used as bait in both the American lobster and blue crab fisheries. In 2008, 46.8 thousand metric tons of menhaden were harvested for bait; in 2009, landings of menhaden for bait declined to 37.9 thousand metric tons (Table 2.2).

Table 2.2. Menhaden Landings for Bait, by Region^a (1000's of Metric Tons)

Year	New England	Mid-Atlantic	Chesapeake Bay	South Atlantic	Total
1985	6.15	1.82	16.42	2.27	26.66
1986	13.75	1.33	10.46	2.44	27.98
1987	13.28	1.29	13.50	2.56	30.63
1988	19.73	1.21	12.43	2.88	36.25
1989	9.54	1.58	16.48	3.41	31.02
1990	11.19	4.49	11.06	4.07	30.80
1991	14.47	7.98	10.40	3.39	36.23
1992	12.44	13.04	10.45	3.10	39.03
1993	11.64	13.40	15.65	2.10	42.80
1994	0.43	17.81	17.72	3.17	39.14
1995	4.08	17.18	19.55	1.57	42.39
1996	0.04	16.20	18.49	0.58	35.31
1997	0.14	17.60	17.13	1.66	36.53
1998	0.21	15.34	22.49	1.33	39.37
1999	0.15	12.78	21.94	1.32	36.20
2000	0.19	14.50	19.65	0.97	35.30
2001	0.08	12.18	22.67	1.37	36.31
2002	0.69	11.50	23.73	1.14	37.06
2003	0.12	8.00	24.93	0.79	33.85
2004	0.03	9.60	25.33	0.50	35.47
2005	1.02	8.18	28.97	0.66	38.83
2006	1.56	9.89	14.50	0.51	26.45
2007	2.61	17.10	22.54	0.55	42.80
2008	7.78	17.55	21.15	0.31	46.79
2009	3.71	15.00	18.17	0.99	37.87

^aSource of Data: Atlantic States Marine Fisheries Commission (2010). 2010 Review of the Fishery Management Plan and State Compliance for the 2009 Atlantic Menhaden Fishery.

⁸ It should be acknowledged that monitoring of bait landings has greatly improved over time, so the trend given by the data could be tracking quality/coverage of sampling as much as changes in bait landings.

In 1950, total reported landings for reduction and bait of menhaden equaled 317.6 thousand metric tons (Table 2.3). Landings increased to an all time high between 1950 and 2009 of 697.4 thousand metric tons in 1956. In 2009, total reported landings equaled 183.8 thousand metric tons. During the 1950s, average annual landings equaled 535.1 thousand metric tons. Average annual landings were below 350.0 thousand metric tons for all decades after the 1950s. Between 2000 and 2009, average annual landings equaled 204.9 metric tons. For the past 30 years, there has been a generally downward trend in total landings of menhaden (Figure 2) which it should be remember has been concurrent with the decline in fishing effort.

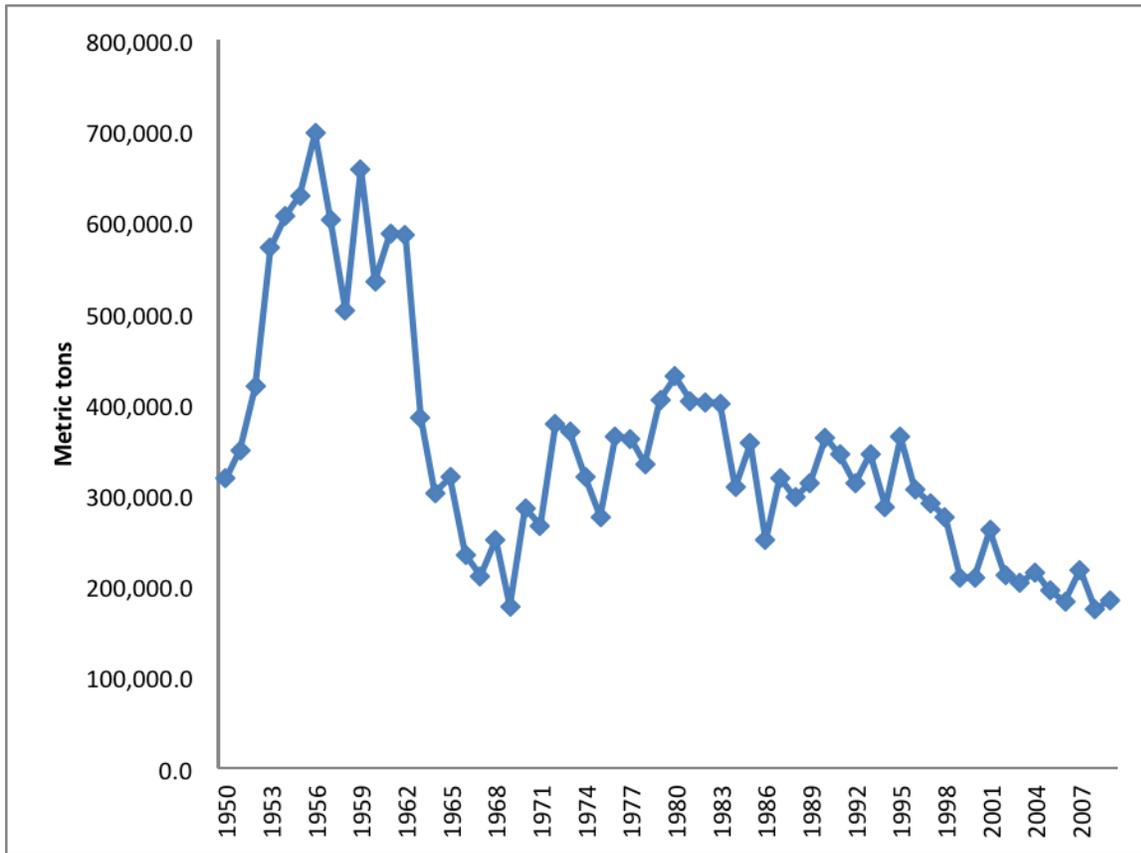
Table 2.3. Total Landings (metric tons) of Menhaden, Atlantic Coastal States, 1950 – 2009

Year	Metric Tons	Virginia Landings	Virginia's Share of Landings	Average Total 10 year	Average VA 10 year	Average VA 10 year Share
1950	317,648.4	77,027.5	24.25			
1951	348,861.8	57,604.1	16.51			
1952	418,945.6	41,245.4	9.85			
1953	571,092.3	72,609.9	12.71			
1954	606,243.0	129,244.6	21.32			
1955	629,043.9	142,166.1	22.60			
1956	697,362.1	85,751.2	12.30			
1957	602,193.6	120,408.7	20.00			
1958	501,802.0	145,383.2	28.97			
1959	658,122.4	187,019.0	28.42	535,131.5	105,846.0	19.7
1960	534,045.6	111,585.5	20.89			
1961	587,065.3	133,857.0	22.80			
1962	585,738.0	146,781.4	25.06			
1963	384,697.7	115,994.7	30.15			
1964	302,016.0	150,008.4	49.67			
1965	318,992.6	159,490.7	50.00			
1966	233,619.8	123,555.5	52.89			
1967	210,296.0	99,912.4	47.51			
1968	250,269.3	122,342.9	48.88			
1969	177,051.3	80,828.9	45.65	358,379.2	124,435.7	39.4
1970	284,870.8	202,286.1	71.01			
1971	266,192.2	178,783.0	67.16			
1972	378,038.7	249,204.7	65.92			
1973	369,109.7	224,967.2	60.95			
1974	319,762.7	172,027.4	53.80			
1975	275,189.1	143,238.4	52.05			

(Continued)

Year	Metric Tons	Virginia Landings	Virginia's Share of Landings	Average Total 10 year	Average VA 10 year	Average VA 10 year Share
1976	363,636.4	199,927.7	54.98			
1977	361,776.7	227,376.2	62.85			
1978	333,988.8	190,879.7	57.15			
1979	404,113.9	206,549.9	51.11	335,667.9	199,524.0	59.7
1980	429,722.3	243,682.3	56.71			
1981	402,762.2	181,760.0	45.13			
1982	401,521.3	271,537.2	67.63			
1983	400,124.6	292,440.0	73.09			
1984	307,779.7	220,373.3	71.60			
1985	356,432.9	290,083.2	81.39			
1986	249,856.6	202,156.6	80.91			
1987	318,592.0	279,199.4	87.64			
1988	296,756.7	249,730.7	84.15			
1989	313,157.0	277,675.0	88.67	347,670.5	250,863.8	73.7
1990	362,590.5	319,588.5	88.14			
1991	343,833.1	272,697.0	79.31			
1992	311,927.1	260,739.7	83.59			
1993	344,856.9	289,995.6	84.09			
1994	286,443.1	232,817.6	81.28			
1995	363,588.1	319,535.3	87.88			
1996	305,787.6	265,034.8	86.67			
1997	291,133.6	225,510.7	77.46			
1998	275,425.1	230,757.4	83.78			
1999	208,214.6	171,531.4	82.38	309,380.0	258,820.8	83.5
2000	208,871.3	166,529.5	79.73			
2001	260,690.8	220,967.0	84.76			
2002	210,918.6	165,536.3	78.48			
2003	203,103.8	169,585.2	83.50			
2004	214,088.9	181,347.1	84.71			
2005	194,281.2	169,000.2	86.99			
2006	182,732.5	168,279.6	92.09			
2007	217,028.1	190,525.1	87.79			
2008	173,567.4	160,294.0	92.35			
2009	183,822.6	159,392.6	86.71	204,910.5	175,145.7	85.7

Figure 2. Total Landings (metric tons) of Atlantic Menhaden, 1950-2009



2.3 Menhaden and the Atlantic Coastal States

What are the Atlantic coastal states with menhaden fisheries? Between 1950 and 2009, all 14 Atlantic coastal states had some level of landings (Table 2.4). In 1950, all states except Georgia and New Hampshire had reported landings of menhaden. Between 1950 and 2009, only five states landed menhaden in each year—Connecticut, Florida, New York, North Carolina, and Virginia. Maryland and New Jersey had landings in nearly all years. Maryland had no reported landings in 1995 and 1996, and New Jersey had no reported landings in 2008. Georgia had landings in only one year—1982, and the level was 0.1 metric tons. New Hampshire had landings in only ten years between 1950 and 2009. It is clear that Virginia stands out with the highest level of landings among all the states. In 1950, Virginia landings accounted for 24.3% of total Atlantic menhaden landings; in 2009, Virginia landings accounted for nearly 87.0% of total landings; and over the entire period, 1950-2009, landings of menhaden in Virginia accounted for 53.3% of the total landings of Atlantic menhaden.

Table 2.4. Landings (metric tons) and Share of Total Landings by Coastal State.

State	1950-2009	Share of Total	1950	Share of Total	2009	Share of Total
Connecticut	4,162.80	0.02	19.80	0.01	73.30	0.04
Delaware	1,692,800.00	8.10	68,882.10	21.69	31.80	0.02
Florida	466,470.90	2.23	9,642.90	3.04	23.90	0.01
Georgia	0.10	0.00	0.00	0.00	0.00	0.00
Maine	181,192.00	0.87	222.30	0.07	75.70	0.04
Maryland	137,878.30	0.66	497.80	0.16	4,337.40	2.36
Massachusetts	308,294.90	1.47	3,974.40	1.25	3,174.60	1.73
New Hampshire	230.80	0.00	0.00	0.00	0.00	0.00
New Jersey	2,859,900.00	13.68	62,858.80	19.79	15,543.10	8.46
New York	652,507.30	3.12	37,426.50	11.78	157.50	0.09
North Carolina	3,296,700.00	15.77	56,656.50	17.84	963.80	0.52
Rhode Island	149,426.00	0.71	3.70	0.00	48.90	0.03
South Carolina	15,420.70	0.07	436.10	0.14	0.00	0.00
Virginia	11,146,000.00	53.30	77,027.50	24.25	159,392.60	86.71
Total	20,911,000.00	100.00	317,648.40	100.00	183,822.60	100.00

Data discrepancies, however, complicate the assessment of trends in landings of Atlantic menhaden. First, more than one type of menhaden is harvested in the bait and reduction fisheries. Occasionally, yellowfin menhaden may be caught, but the National Marine Fisheries Service (NMFS) does not uniquely identify the two types of menhaden. Then, there are data reporting discrepancies. NMFS, in its electronic data base available on line, indicates that in 2009, Virginia landings from 0 to 3 miles equaled 30,836,000 pounds of Atlantic menhaden; 319,979,000 pounds were landed from 3 – 200 miles. In their Fisheries of the US Report for 2009, NMFS reports total menhaden landings for Atlantic coastal states equaling 33,139,000 for 3 - 200 miles and 368,560,000 for 0 – 3 miles.

Landings data for the menhaden purse seine fishery, as well as several other fisheries, are usually viewed as confidential. If it is possible to uniquely identify a company from the data, then typically landings data are grouped into some other species grouping. A recent memo from Joe Smith to NMFS personnel with special interest in menhaden (December 17, 2010), however,

reports that landings by the purse seine fleet in Reedville, VA equaled 473,030,000 standard fish⁹ or 143,754 metric tons; landings in 2010 equaled 602,450,000 standard fish or 183,085 metric tons. Landings in 2010 represent a 27.4 % increase over the landings in 2009.¹⁰

In 1955, Atlantic purse seine landings equaled 641.4 thousand metric tons (Table 2.5). In 2009, purse seine landings equaled 143.8 thousand metric tons, which represents a decline of 77.6 % relative to landings in 1955. Again, effort has declined considerably over this time period as the infrastructure of the reduction operation has deteriorated along the coast. In 2008 and 2009, only one company was harvesting Atlantic menhaden via purse seine for reduction purposes. The 2008 fishing year had the lowest effort level on record. While the total landings have substantially declined, the landings per unit effort (LPUE) have substantially increased. In 1955, LPUE equaled 233.4 metric tons per vessel week but increased to 479.3 metric tons per vessel week in 2009. How much of the increase is associated with changes in resource conditions versus changes in technical efficiency is not known. Given that the 2010 stock assessment for menhaden indicates a substantial decline in the number of Atlantic menhaden, it appears that gains in LPUE were driven mostly by improvements in technical efficiency especially searching strategies, locating capability, and more careful allocation of effort to raise efficiency (ASMFC, 2010).

⁹ 1000 standard fish equals 670 lbs. This is then converted to kg and mt. NMFS.

¹⁰ There was a shift in effort by OMEGA to the Atlantic given the Deep Water Horizon spill in April 2010. Through Sep 30, 2011, landings of gulf menhaden are 85% higher in 2011 than 2010

Table 2.5 Menhaden Landings, Atlantic Purse Seine Fishery, 1955-2009^a

<i>Year</i>	Fishing effort vessel-weeks	Landings (1000's metric tons)	<i>Year</i>	Fishing effort vessel-weeks	Landings (1000's metric tons)
1955	2,748	641.4	1982	948	382.4
1956	2,878	712.1	1983	995	418.6
1957	2,775	602.8	1984	892	326.3
1958	2,343	510.0	1985	577	306.7
1959	2,847	659.1	1986	377	238.0
1960	2,097	529.8	1987	531	327.0
1961	2,371	575.9	1988	604	309.3
1962	2,351	537.7	1989	725	322.0
1963	2,331	346.9	1990	826	401.2
1964	1,807	269.2	1991	926	381.4
1965	1,805	273.4	1992	794	297.6
1966	1,386	219.6	1993	626	320.6
1967	1,316	193.5	1994	573	260.0
1968	1,209	234.8	1995	600	339.9
1969	995	161.6	1996	528	292.9
1970	906	259.4	1997	616	259.1
1971	897	250.3	1998	437	245.9
1972	973	365.9	1999	382	171.2
1973	1,099	346.9	2000	311	167.2
1974	1,145	292.2	2001	334	233.7
1975	1,218	250.2	2002	318	174.0
1976	1,163	340.5	2003	302	166.1
1977	1,239	341.1	2004	345	183.4
1978	1,210	344.1	2005	291	146.9
1979	1,198	375.7	2006	322	157.4
1980	1,158	401.5	2007	333	174.5
1981	1,133	381.3	2008	262	141.1
			2009	300	143.8

^aSource of Data: National Marine Fisheries Service, Sustainable Fisheries Branch, Beaufort, NC. Forecast for the 2010 Gulf and Atlantic Menhaden Purse-Seine Fisheries.

2.4 Management and Regulation of the Atlantic Menhaden Fishery

The Atlantic States Marine Fisheries Commission (ASMFC) maintains a list of current menhaden regulations by state (Table 2.6). The first Fishery Management Plan (FMP) for Atlantic menhaden was developed in 1981. The original FMP did not provide or require any specific management measures. In 1982, the Atlantic menhaden Management Board recommended seasonal limits, but the proposed limits were never fully implemented (ASMFC, 2004). The FMP was revised in 1992, but the revisions focused primarily on data collection activities and research needs. Amendment 1 was subsequently implemented in 2001 (ASMFC, 2001). This amendment developed a new overfishing definition and required all purse seiners to report their catches. Since 2001, there have been four addenda to the FMP. Addendum III established an annual harvest limit or cap of 109.0 thousand metric tons on reduction harvest levels from Chesapeake Bay. Addendum IV, the most recent, extends the harvest cap through 2013. Addendum V (2011) is the subject of public hearings at the time of this report.

Each Atlantic coastal state has its own set of regulations for menhaden. Most of the regulations prohibit the harvesting of menhaden either by purse seine or for reduction (Table 2.6). The states of Rhode Island and New Jersey explicitly prohibit the harvesting of menhaden for reduction purposes. The states of New Hampshire, Connecticut, Delaware, Maryland, South Carolina, Georgia, and Florida either prohibit purse-seine operations or mobile gear fisheries in state waters. Massachusetts, Virginia, New York, and North Carolina permit the harvesting of menhaden either by purse seine or for reduction purposes subject to spatial and temporal restrictions. The Virginia reduction fishery is also subject to an annual quota of 109.0 thousand metric tons from Chesapeake Bay.

Table 2.6. Atlantic Menhaden Regulations by State^a

Maine	Reporting requirements cover all baitfish fisheries, including gillnets and purse seines.
New Hampshire	State law prohibits the use of mobile gear in state waters
Massachusetts	No specific menhaden regulations. Purse seining prohibited in some areas. Mandatory dealer reporting (SAFIS).
Rhode Island	Menhaden harvest by purse seine for reduction (fish meal) purposes is outlawed. Mandatory dealer reporting (SAFIS).
Connecticut	Purse seines prohibited in state waters. Menhaden can be caught by other gear and sold as bait.
New York	Mandatory reporting for all commercial food fish license holders, this includes all who harvest menhaden. Purse seines limited to certain times/areas.
New Jersey	Prohibited purse seining for reduction purposes in state waters. Mandatory reporting for purse seine (bait) fishery. Bait fishery subject to gear restrictions and closed seasons.
Delaware	Purse-seine fishery prohibited since 1992. No specific regulation of gillnetting for menhaden.
Maryland	Purse-seine fishing prohibited; menhaden primarily harvested by pound net

Potomac River Fisheries Commission	All trawling and purse nets are prohibited. Mandatory commercial fishing reporting
Virginia	Implemented reporting requirement for bait seine/snapper rigs in 2002. The reduction fishery landings in VA are reported via daily catch records and CDFRs to the NMFS. Required cap on reduction harvest from Chesapeake Bay.
North Carolina	Mandatory commercial fishery reporting (trip ticket). Combination of gear restrictions and seasonal and area closures
South Carolina	Purse seines prohibited in state waters; mandatory dealer reporting; requests <i>de minimis</i> status
Georgia	Mandatory commercial fishery reporting (trip ticket); state waters closed to purse seine fishing; requests <i>de minimis</i> status.
Florida	Purse seines prohibited in state waters; primarily a cast net fishery; mandatory commercial fishery reporting (trip-ticket).

^aSource of Information: Atlantic States Marine Fisheries Commission. “Managed Species, State by State Regulations.”

3.0 OMEGA Protein: The Company

3.1 An Overview

OMEGA Protein goes back to 1878 when John and Thomas Haynie established a fish processing facility in Reedville, VA.¹¹ Initially, the company was called the John A. Haynie Company. In 1903, the company merged with Snow, Fallin Company. In 1913, William Brusstar joined the company and it became known as Reedville Oil and Quano. In 1968, the company became Haynie Products, Inc., and in 1970, Haynie merged with Zapata Oil and became known as Zapata Haynie Corporation.¹² The company was renamed Zapata Protein, and subsequently, changed its name in 1997 to OMEGA Protein.

In the early stages of the company, production focused on producing guano for fertilizer and oil. Today, the company produces meal, oil, and solubles but their intended uses have dramatically changed. Uses of menhaden based products include food items, health supplements, fishmeal for use in livestock, poultry, and aquaculture production, a wide array of industrial applications, and in animal nutrition. Menhaden oil is even used in various yogurts, breakfast cereals, margarine, and shortenings.

Since 2005, OMEGA Protein has been the only company harvesting and processing Atlantic menhaden for oil, meal, and soluble in the Northwest Atlantic region. In 2005, reduction landings equaled 146.9 thousand metric tons; increased to 174.5 thousand metric tons in 2007; and fell to 143.8 thousand metric tons in 2009 (Sustainable Fisheries Branch, NMFS, 2010).

Currently, OMEGA Protein maintains its corporate office in Houston, Texas. It is incorporated in the state of Nevada. The company maintains operations in both the northwest Atlantic and the Gulf of Mexico. It has processing facilities in Louisiana, Mississippi, and Reedville, Virginia. In 2009, OMEGA Protein had operating revenues of \$164.9 million, and an operating loss of \$4.3 million (Annual Report, 2009¹³). It had a net income loss of \$6.2 million. Between 2006 and 2008, the company had positive operating income and net income in all years. During 2009, the company employed between 503 (December 2009, offseason) and 1,148 (August, peak season) individuals. In 2008 and 2009, the company had export sales of fishmeal and fish oil of \$81.0 million in each year. In 2008, total fish catch equaled 458.1 thousand tons, and increased to 469.1 thousand tons in 2009. Its production of fishmeal, oil, and solubles equaled, respectively, 178.7 and 180.1 thousand tons in 2008 and 2009. In 2008 and 2009, total sales equaled, respectively, \$177.4 and \$164.9 million.

3.2 OMEGA Protein: Reedville, VA

The harvesting and processing activities conducted by the Reedville, Virginia facility are at the center of the controversy about the harvesting of Atlantic menhaden from the Northwest

¹¹ Much of the material in this section is based on information available from the OMEGA Protein web site and John Frye's (1978) text "The Men All Singing: The Story of Menhaden Fishing."

¹² George W. Bush started Zapata Oil for oil and natural gas exploration in 1952.

¹³ www.omegaproteininc.com/investors/annual-report.aspx

Atlantic. Various individuals and associations have complained about odor from the plant; the company is overfishing the menhaden resource and jeopardizing water quality of Chesapeake Bay; major predators, particularly various game fish such as striped bass, bluefish, and spotted sea trout, are being deprived of important prey species; the company is a monopoly; menhaden are not directly consumed as human food; few states allow harvesting menhaden for reduction purposes; and the products produced using menhaden could be produced from other raw materials.

The validity of the various concerns and issues is uncertain. For example, Lynch et al. (2010) concluded that menhaden had little, if any, effect on water quality. A textbook type analysis of the sales and distribution of menhaden products, as well as the argument that other products could be used to produce the same product, negates the argument that OMEGA Protein is a monopoly. It is true that major predators do consume menhaden, but the dependence on menhaden for the well being of the predator populations is unknown. Nevertheless, the Commonwealth of Virginia's concern about the social and economic importance of menhaden to the region resulted in their request for a study of the reduction fishery. Issues to be addressed were as follows: (1) the economic importance of the reduction fishery and related activities to the economy of Commonwealth and Maryland; (2) the communities or counties which might be affected by reductions in the allowable harvest of menhaden from Chesapeake Bay; and (3) the economic value of ecosystem services of menhaden vs. the value of the harvesting and reduction activities.

3.2.1 REEDVILLE PROFILE

The harvesting and reduction activities are based in Reedville, which is located in Northumberland County, Virginia. In the following section, we provide a brief profile of Reedville, Virginia.¹⁴

3.2.1.1 Geographic Description

Reedville is located at the distal end of the Northern Neck, projecting into Chesapeake Bay. While Cockrell's Creek is most associated with Reedville, the community is proximate to the Wicomico River, and northerly portions of the community are adjacent to the Potomac River.

Reedville, like many fishing communities in Virginia, is unincorporated, and unfortunately is not a census designated place making data availability limited from the U.S. Census Bureau. Reedville, in general, focuses around Cockrell Creek, with a portion of the community in the village of Fleeton, situated to the east of the creek, another portion to the west of the creek in Fairport, and "downtown" or Main Street Reedville projecting into the creek from the north. Somewhat further north, toward Burgess (another unincorporated community in Northumberland County), is Greenfield, which is also within the Reedville zip code. Also recognized within Reedville are villages of Tibitha and Chesapeake Beach.

¹⁴ Information for this community profile was collected from interviews and community visits in the area in 2008. Additional information was gathered from existing published data and citations are provided. The profile of Reedville, the geographic description, and the descriptions of the historic and modern menhaden fisheries was prepared by Winnfred Ryan (formerly a VIMS employee).

The community of Reedville is predominantly a fishing and residential community. In the last 10 or 15 years additional residential development has been, but no additional large employment bases have developed in the locale.

3.2.1.2 Importance of Fishing

Fishing is important in Reedville. There is a crab processor that receives some fresh crab in the area of Greenville; a crab house that handles soft crab; another fish house that handles several types of fish; a seafood restaurant and a major bait provider on Main Street; on the Fleeton side, there is a fish house that handles several types of fish and has associated a deli and retail fish shop in addition to a major processor and a marina with the Smith Island Ferry, and several crabbers with numerous pots located on their docks are observed in the area; and on the Fairport side there is a now predominantly closed down fish factory, a marina with seafood restaurant, and the Tangier Island Ferry. Otherwise for economic activity, there is some limited retail shopping, with two small “general store” type groceries, one located nearer Greenfield, and one near Tibitha, a fabric and quilt store, a thrift shop, a boat dealer, a hardware store, an exercise studio, and four restaurants (one an ice cream parlor), in addition to a bank and an acupuncturist, which were observed in the locality.

3.2.1.2.1 Historic Fishing

Fishing has been an activity in the area since pre-Colonial days. Native Americans in Virginia used weirs and spears, and Colonial era farmers took advantage of anadromous fish runs to supplement farming (Wharton, 1957), even to feed the slaves that worked plantations along the rivers of Virginia, including those of the Northern Neck. In the mid-1800s, Elijah Reed brought menhaden fishing and processing to Cockrell’s Creek. By 1912, there were eight plants capitalized at two million dollars in and around Reedville on the creek with more than 60 fish boats steaming forth weekdays in the summer (Frye, 1978). At that time there were 20 plants in Virginia, and an additional eight were situated on Northern Neck, in adjacent counties to Northumberland, but the greatest concentration on the entire Atlantic Coast was at Reedville (Turrentine, 1913.).

Reflecting the history of fishing, on Main Street is the former millionaire’s row of homes now on the National Register of Historic Places, which is formally known on the register as the Reedville Historic District. These homes were the homes of menhaden captains and factory owners, which were built mainly in the late 1800s. Included among these is the Reedville Fisherman’s Museum, which is also home to two additional National Register properties, vessels the Elva C, a deck boat, and the Claud W. Somers, a skipjack.¹⁵ Much of the museum’s emphasis is on the menhaden fishery, but other local fisheries, including pound net fishing and crab pot fishing are also described and interpreted.

3.2.1.2.2 Modern fishing

The menhaden purse seine fleet for Virginia is associated with Reedville and the menhaden processing company located in Fleeton. The industry consists of eleven vessels, and a reduction plant that processes menhaden into oils and solids for various uses. The plant operates

¹⁵http://www.nr.nps.gov/iwisapi/explorer.dll?IWS_SCHEMA=NRIS1&IWS_LOGIN=1&IWS_REPORT=100000066

year round for the oil processing, but only from approximately March to December for fishing, offloading, net mending, and other activities. While the menhaden purse seine fleet is important to Reedville, as well as the county, as its largest employer, other menhaden fishing – using snapper rigs, and pound nets for provision of bait- is also important.

At least two locations on Cockrell’s Creek provide bait for local fishermen – one on Main Street, and one in Fleeton. Menhaden is also important to the local crab fishery where it is used by crabbers for bait, which is off-loaded in Greenfield. The Cockrell’s Creek fish house provides fish for two other processors in the area, one of which is within Northumberland County, the other is in Westmoreland County. It is assumed that the fish would be used as bait or other non-edible uses. The Main Street location is part of a multiple location bait provider and trucking company that provides bait for fishermen from New Jersey to Florida and westward to Louisiana.

The fish house - deli/restaurant on Cockrells Creek serves as a fisherman’s hangout. Watermen stop in for lunch, and discuss local fishing conditions. In part this is because it is one of only a few locations open for lunch that is convenient for watermen offloading catch or in need of fuel or bait. It also provides a location that watermen can interact with local residents to discuss the season and menhaden availability. During one visit, for example, a patron asked one waterman if he had “provided lunch,” acknowledging the links between watermen and other businesses.

3.2.1.3 Social Interactions

Social connections in this community for long-term residents are generally recognized as having some association with fishing. The first person met in March of 2009 was a fisherman on a menhaden vessel, who has a brother who is a pound netter, and whose parents own a seafood restaurant. Similar interactions were revealed in a series of interviews of 20 employees at the menhaden plant and other interviews around the community, with a substantial number of long term residents (“born heres” as they are referred to in the local newspaper) have family members past or present who work in fishing. In general, those with connections to fishing have a sense of appreciation of fisheries and what it means to the community’s history, traditions and economy. Even the odor generated by the menhaden processing is referred to in a more positive light as “the smell of money” (Garrity-Blake, 1994)

Not all local residents have connections to fisheries or are as appreciative, though. Newcomers tend to want to change the situation, particularly with regard to the smell and/or the visual aesthetics of the menhaden plant from the creek. The plant has undertaken efforts to reduce odors, but even plant employees admit that on occasion the odor can be unpleasant in Reedville.

3.2.1.4 Demography¹⁶

The population of Reedville in 2000, as defined by zip code 22539, was 2315 people. The population was slightly higher for females (52.1%) than males (47.9%). The median age of the locality’s population in 2000 was 55.5 years.

¹⁶ Demographic statistics were only available for 2000 at the time these profiles were being developed.

In 2000, the ethnic composition of Reedville consisted of 99.7% of the population self-identifying a single race. Of those who self identified a single race, 80.7% identified white, 18.4% identified black or African American, and less than 1% for each of the other racial categories ¹⁷Hispanic or Latino people made up 1.3% of the locality's population in 2000.

In 2000, 98.2% of the population of Reedville was native born Americans. For the 1.8% of the population that was foreign born, the most frequently reported regions of birth included Europe (66.7%), Northern America (21.4%), and Latin America (11.9%). The most commonly reported ancestries in 2000 were English (22.3%), other ancestries (19.6%), and United States or American (16.3%).

In 2000, the average household size for Reedville was 2.14 persons, and the average family size was 2.57 persons. For people 15 years of age and over, 64.3 % were married in 2000. Single parent families with children comprised 7.2% of all families in the locality. Single person households comprised 27.9% of all households in the county and nonfamily households comprised 31.5% of all households in the county in 2000. Of the population 5 years of age and over in 2000, 23.7% reported having a disability. The group most frequently reporting having a disability (35.8%) is the segment of the population 65 years of age and over.

3.2.1.4.1 Education

In 2000, for the population of Reedville 25 years of age and over, 71.2% had high school graduate or higher levels of education and 15.9% had a bachelor's degree or higher levels of educational attainment. At that time 5.3% had graduate or professional degrees.

3.2.1.4.2 Employment

In 2000, 38.1% of the locality's population 16 years of age and over was in the labor force, and 1.4% was unemployed. Of women 16 years of age and over, 33.3% were in the labor force, and 33.3% were employed.

In Reedville, the most common occupation was management, professional, and related occupations (27.3%). This was followed by service occupations (18.6%) and sales and office occupations (17.1%). Farming, fishing, and forestry occupations were reported by 6.3% of the county's workers. In 2000, 73.7% of the county's workers were private wage and salary workers, 13.5% were government workers, 11.3% were self-employed in own not incorporated business, and unpaid family workers were 1.5%.

The industries in which most workers most frequently participated in 2000 included educational, health and social services (14%) professional, scientific, management, administrative, and waste management services (12.4%), and manufacturing (11.9%). Agriculture, forestry, fishing and hunting, and mining employed 6.2% of the locality's residents who are workers in 2000.

¹⁷ American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and some other race.

3.2.1.4.3 Income

The median household income in Reedville in 1999 was \$39,310, and the median family income was \$44,811. In 1999, 27.7% of households in the locality had incomes under \$25,000 and 15.9% of families had equivalent incomes. The per capita income at that time was \$22,492. The median earning of male full-time, year-round workers in 2000 were \$31,739, and the median earnings for female full-time, year-round workers synchronously were \$22,750.

In 1999, 4.4% of families in the locality had income below the poverty level. Families with a female householder, no husband present, were more likely to be in poverty, with 32% of these families having incomes below the poverty level in 1999.

3.2.1.4.4 Housing

In 2000 there were 1,798 total housing units in the locality, of which 62.1% were occupied. The median value for owner occupied units in 2000 was \$143,900 and the median rent was \$509.

In 2000, housing stock in the county was mainly comprised of single unit detached (87.3%), and mobile homes (10.2%). Homes in excess of 30 years of age in 2000 comprised 36.3% of the county's housing stock at that time.

3.3 OMEGA Protein: 2008 Reduction Activities

In this section, a brief overview of the underlying economic metrics associated with reduction activities in 2008 is presented.¹⁸ Some information, although used to prepare this report and analyses, is omitted from the report because of extreme confidentiality of data.

In 2008, the Reedville facility had total sales of meal, oil, and soluble equal to nearly \$60.0 million. The total payroll for vessel and plant employees was approximately \$11.4 million, which was nearly evenly divided between plant and vessel employees. OMEGA Protein also paid approximately \$1.2 million in union dues on behalf of its employees. Total operating expenditures, excluding payroll, equaled \$18.9 million. In 2008, OMEGA Protein of Reedville donated approximately \$70,000 to charity.

In 2008, the company employed 159 individuals, of which 157 were full time seasonal workers, to harvest menhaden. They employed 140 individuals of which 126 were full time year round employees, to process and distribute menhaden-based products. The company provides health care, paid holidays, and retirement programs for all employees. Plant employees also receive paid life insurance and vacation days.

¹⁸ Detailed data on company operations in Reedville were provided directly by OMEGA in response to a request for information about company operations. The request for information was made in early 2009 and asked for information about 2008 activities. Reduction refers to the processing of menhaden by drying and milling to produce meal and oil products for both animal and human consumption.

3.3.1 AN ECONOMIC ASSESSMENT (IMPACT) MODEL

The detailed information provided by OMEGA Protein was subsequently used to develop an input/output or IO model. An IO model facilitates the estimation and assessment of the economic impacts of economic activity (e.g., the sales, income, and employment generated in a county, state, or region by OMEGA Protein operations). The model was initially developed using IMPLAN, an off the shelf IO software package for developing impact models, based on 2006 multipliers and associated coefficients. The model was, subsequently, updated using IMPLAN for 2008, which became available in late 2009. The 2008 IMPLAN reflects multipliers and coefficients for 2008.

3.3.2 THE ECONOMIC CONTRIBUTION OF OMEGA REDUCTION ACTIVITIES

In 2008, OMEGA Protein of Reedville had approximately 141.1 thousand metric tons of landings. They had total sales of nearly \$60.0 million and expenditures (payroll and operating expenses) of nearly \$31.5 million. OMEGA employed up to 317 individuals (December of 2008) but uses an employment base of 299 individuals. Of the 299 employees, 280 were residents of Virginia; one was a resident of Florida; one was a resident of Tennessee; one was a resident of Maryland; and 16 were residents of North Carolina. Of the 280 Virginia residents, 217 were residents of Northumberland County, VA, and 55 were residents of Reedville, VA.

The economic impacts or contributions are measured in terms of total sales or output, employment, and income generated by harvesting and processing activities of OMEGA Protein. The metrics are defined as follows:

- Output is the gross sales by businesses within the economic region affected by an activity.
- Labor income includes employee compensation (wages and salaries) and proprietors' income (income from self-employment).
- Employment is specified on the basis of full-time and part-time jobs. There is significant part-time and seasonal employment in commercial fishing and many other industries.

Impacts are measured in terms of direct, indirect, and induced impacts:

- Direct effects express the economic impacts (for output, income or employment) in the sector in which the expenditure was initially made. For example, the direct income multiplier for the harvesting sector would show the total income generated among harvesting employees and proprietors by demand for services from the harvesting sector. This direct impact would result, for example, from expenditures made by commercial fishermen to suppliers of gear and equipment.
- Indirect effects measure the economic impacts in the specific sectors providing goods and services to the directly affected sector. For directly affected harvesters, indirect effects would include the purchases of products from manufacturers and purchases of accounting services. These indirect impacts extend throughout the economy as each supplier purchases from other suppliers in turn. For example, the accounting firms would need to purchase

office supplies and business equipment. Thus, the indirect output multiplier would represent the total output generated in the various supplier sectors resulting from demand for goods or services from the direct sector.

- Induced effects are the economic activity generated by personal consumption expenditures by employees in the directly and indirectly affected sectors, as fishermen, accountants, and other directly and indirectly affected employees spend their paychecks. These household purchases have additional “indirect” and “induced” effects as well, all of which are defined as induced effects.

In terms of the economic contributions of OMEGA Protein to the economies of Maryland and Virginia, OMEGA Protein generated \$59.9 million in total direct sales and \$88.2 million in total output (direct + indirect + induced impacts) to the economies of Maryland and Virginia (Table 3.1).¹⁹ The majority of the economic impacts were generated for the economy of Virginia. Of the total output generated for Maryland and Virginia, 99.9 % of the total sales impact was generated for the economy of Virginia. Total employment generated equaled 519 full and part-time jobs, and total income equaled \$22.8 million. We stress that despite the fact the total impacts, particularly in employment and income terms, are relatively low, most of the direct sector impacts occur in Northumberland County, Virginia. Of the 299 employees, 217 individuals are residents of Northumberland County, and 55 individuals are residents of Reedville, VA. In addition, OMEGA paid nearly \$185.0 thousand in property taxes to Northumberland County in 2008.

Table 3.1 Economic Activity Generated by OMEGA Protein, 2008

<i>Total impacts in VA</i>	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	299	114	106	519
Income (thousands)	\$12,562	\$6,191	\$3,988	\$22,741
Output (thousands)	\$59,919	\$15,750	\$12,459	\$88,127
<i>Total impacts in MD</i>				
Employment (full- and part-time jobs)	0	0	0.2	0.2
Income (thousands)	\$0	\$0	\$9	\$9
Output (thousands)	\$0	\$0	\$27	\$27
<i>Total impacts in VA and MD</i>				
Employment (full- and part-time jobs)	299	114	106	519
Income (thousands)	\$12,562	\$6,191	\$3,997	\$22,750
Output (thousands)	\$59,919	\$15,750	\$12,486	\$88,155

¹⁹ Although the Reedville facility has employees who are residents of other states, we attribute all direct and indirect sector employment, sales, and income to the economy of Virginia. Employees who are residents from other states may actually reside in Virginia but use a year round address of another state.

4.0 Community Descriptions

4.1 Maryland Coastal Counties

All Maryland counties adjacent to Chesapeake Bay and the Atlantic Ocean are considered affected by the menhaden's ecosystem services, which include water quality effects. The City of Baltimore is considered separately since the U. S. Bureau of Census, and the State of Maryland consider it a county equivalent.²⁰ In the descriptions below the counties will be divided by eastern shore and western shore of Chesapeake Bay (with Worcester County included in the Eastern Shore although it is truly the Atlantic county), then presented in alphabetical order.

4.1.2 EASTERN SHORE

4.1.2.1 Cecil County

Cecil County is a predominantly rural county in the Philadelphia-Camden-Vineland Metropolitan Statistical Area. The county is midway between Baltimore and Philadelphia. Major employers in the county include W. L. Gore with facilities to manufactures electronics and medical devices, several medical providers, a medical products R&D firm, a company that provides propellants and rocket motors, a home furnishings, a plastics R&D firm, a food products distributor, a large plant nursery, a grocery, a producer of residential millwork, a publisher and two truck terminals.²¹

There are eight incorporated towns in the county: Cecilton, Charlestown, Chesapeake City, Elkton, North East, Perryville, Port Deposit, and Rising Sun. Elkton is the county seat. The nearest city of substantial size is Newark, DE, which abuts the county on its eastern border. The nearest large cities include Baltimore, MD which is approximately 50 miles from the county and Philadelphia which is also approximately 50 miles from the county.

4.1.2.1.1 Location

Cecil County is in the northeastern corner of the state, on the state lines of Delaware and Pennsylvania. Across the state line in Delaware is New Castle County, and across the state line in Pennsylvania is Chester County. The county shares boundaries with the Maryland counties of Kent County to the south of Cecil County, and with Harford County to the west and across the Susquehanna River. Cecil County is located at the northern end of the main stem of Chesapeake Bay and surrounds the widest portions of the Elk River and the North East River as well as being situated on the east side of the Susquehanna as it opens into the Bay.

4.1.2.1.2 Transportation

Cecil County is well connected to the rest of the United States in terms of transportation. Interstate 95, one of the major transportation linkages on the east coast of the United States, runs

²⁰ The counties, in alphabetical order, included in these descriptions are Anne Arundel, The City of Baltimore, Baltimore, Calvert, Cecil, Charles, Dorchester, Harford, Kent, Prince George, Queen Anne's, Somerset, St. Mary's, Talbot, Wicomico, and Worcester.

²¹ <http://www.choosemaryland.org/Resources/pdf/briefeconomicfacts/CecilBEF.pdf>

through the county. Other highways in the county include U.S. Highways 1 and 301 and State Highways 213 and 272. Rail service is available in the county. Cecil County has a privately owned but publicly available general aviation airport in the county near Elkton. Major airports with commercial service are available at Philadelphia International Airport approximately 40 miles away, and Baltimore-Washington Airport approximately 65 miles away.

4.1.2.1.3 Demography

The total population of Cecil County in 2000 was 85,951 according to the U.S. Bureau of Census. The population was evenly split between males (49.6%) and females (50.4%). The median age of the county's population in 2000 was 35.5 years. In 2006, the population of Cecil County was estimated to be 99,506 people; with an estimated 49% of the population male and 51% of the population female. The median age remained 35.5 years.

In 2000, the ethnic composition of the county was comprised of 98.8% of the population self-identifying a single race. Of those who self identified a single race, 93.4% identified white, 3.9% identified black or African American, and less than 1% for each of the other racial categories (American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, some other race). Hispanic or Latino people made up 1.5% of the county's population in 2000. In 2006, 98.6% of the population was estimated to be a single race. Of the single race population, 91.7% was estimated to be white, 4.9% was estimated to be black or African American, and 1.5% was estimated to be Asian. The remaining groups were estimated to be below 1%. Hispanic or Latino people were estimated to comprise 2.1% of the county's population in 2006.

In 2000, 98.2% of the population of Cecil County was native born Americans. For the 1.8% of the population that was foreign born, the most frequently reported regions of birth included Europe (46.4%), Asia (24.8%), and Latin America (19%). In 2006, 97.8% of the county's population was estimated to be native-born Americans. The most commonly reported ancestries in 2000 were German (19.6%), Irish (17.9%), and English (14.5%).

In 2000, the average household size for Cecil County was 2.71 persons, and the average family size was 3.12 persons. For people 15 years of age and over, 61.2% of males and 58.3% of females were married. Single parent families with children comprised 12.2% of all families in the county. Single person households comprised 19.9% of all households in the county and nonfamily households comprised 5.4% of all households in the county in 2000. In 2006, the average household size had increased slightly to 2.75 persons and the average family size had also increased slightly to 3.26 persons. For persons 15 years of age and over, 55.5% of males and 50.6% of females were married. Single parent families with children comprised 14.7% of all families in the county in 2006. Single person households comprised 24.2% of all households and nonfamily households comprised 28.3% of all households in the county in 2006.

Of the population 5 years of age and over in 2000, 18.3% reported having a disability. The group most frequently reporting having a disability (39.1%) is the segment of the population 65 years of age and over. In 2006, the population 5 years of age and over reporting a disability had declined to 15.5%.

4.1.2.1.4 Education

In 2000, for the population of Cecil County 25 years of age and over, 81.2% had high school graduate or higher levels of education and 16.4% had a bachelor's degree or higher levels of educational attainment. At that time 5.7% had graduate or professional degrees. In 2006, 87.3% of the population 25 years of age and over had high school graduate or higher levels of education and 23% had bachelor's degree or higher levels of education. In 2006, 7.2% of the population 25 years of age and over had graduate or professional degrees.

4.1.2.1.5 Employment

In 2000, 69.3% of the county's population 16 years of age and over was in the labor force, and 2.8% were unemployed. Of women 16 years of age and over, 63.6% were in the labor force, and 60.7% were employed. In 2007, 70.2% of the county's population 16 years of age and over was in the labor force and 5.1% were unemployed. In 2006, 62.4% of women in the 16 and over age cohort were in the labor force and 58.5% were employed.

The most common occupations for county workers included management, professional, and related occupations (28.1%), sales and office occupations (26.4%), and production, transportation, and material moving occupations (17.2%) in 2000. Farming, fishing and forestry occupations were reported by 0.6% of the county's workers. In 2006, the most common occupations for county workers included management, professional and related occupations (33.2%), sales and office occupations (24.9%), and service occupations (15.1%). Farming, fishing and forestry remained at 0.6% of the occupations of the county in 2006. In 2000, 78.9% of the county's workers were private wage and salary workers, 15.1% were government workers, 5.8% were self-employed in own not incorporated business, and 0.2% were unpaid family workers. In 2006, 80.8% of the county's workers were private wage and salary workers, 15% were government workers, 4.1% were self-employed in own not incorporated business, and 0.1% were unpaid family workers.

The industries in which most workers most frequently participated in 2000 included educational, health and social services (17.6%), manufacturing (15.8%), and retail trade (11.8%). Agriculture, forestry, fishing and hunting, and mining employed 2.4% of the county's workers in 2000. In 2006, the industries which were reported most frequently employing county workers included educational serviced, and health care, and social assistance (20.4%, manufacturing (11.3%) and professional, scientific, and management, and administrative and waste management services (11%). Agriculture, forestry, fishing and hunting, and mining employed 2.7% of the county's workers in 2006.

Cecil County appears to have no fishing employment within the county according to the Bureau of Labor Statistics. This means that there are no fin fishing, shell fishing or fish processing establishments, which contribute to unemployment insurance. There may indeed be people who participate in fishing activities who are self-employed or who work on vessels that are individually incorporated but do not participate in contributing to unemployment insurance.

4.1.2.1.6 Income

The median household income in Cecil County in 1999 was \$50,510, and the median family income was \$56,469. In 1999, 19.9% of households in the county had incomes under \$25,000 and 13% of families had equivalent incomes. The per capita income at that time was \$21,384. The median earning of male full-time, year-round workers in 2000 were \$40,350, and the median earnings for female full-time, year-round workers synchronously were \$28,646. In 2005, the median household income in the county was \$56,509, and the median family income was \$66,931. In 2005, 19.6% of households had incomes less than \$25,000 and 12.5% of families had equivalent incomes. The per capita income for the county had increased to \$26,869. Median earnings for male full-time year-round male workers in 2006 had increased to \$51,056 and for female full-time year-round workers they had increased to \$36,638.

In 1999, 5.4% of families in the county had income below the poverty level. Families with a female householder, no husband present, were more likely to be in poverty, with 21.4% of these families having incomes below the poverty level in 1999.

In 2006, 6.2% of all families had income below the poverty level in the previous 12 months. Families with a female householder, no husband present are more likely to be in poverty, with 22.3 % estimated to have been in poverty in the previous 12 months. Especially hard hit are those families with a female householder with a female householder, no husband present, with related children under 5 years only, with 33.4% of these families reporting incomes below the poverty level.

4.1.2.1.7 Housing

In 2000 there were 34,461 total housing units in the county, of which 90.6% were occupied. Of the occupied units, 75% were owner occupied and 25% were renter occupied. The vacancy rate was 9.4%. Assuming all vacation homes were vacant when the census was taken, 4.3% of units in the county were for seasonal, recreational or occasional use. The median value for owner occupied units in 2000 was \$132,300 and the median rent was \$617. In 2006, there were 39,758 total units in the county, of which 90.8% were occupied. Of the occupied units in 2006, 71.7% were owner occupied and 28.3% were renter occupied. The vacancy rate was 9.2%. The median value of an owner occupied unit in 2006 had risen to \$243,200, and the median rent had increase to \$789.

In 2000, housing stock in the county was mainly comprised of single unit detached (70.3%), single unit attached (8.6%) and mobile homes (8.2%). This pattern is similar in 2006, with 66.4% of the housing stock being single unit detached, 11% single unit attached, and 7% mobile homes. Homes in excess of 30 years of age in 2000 comprised 39.2% of the county's housing stock at that time.

4.1.2.2 Dorchester County

Dorchester County is a predominantly rural county, more recently considered a Micropolitan Statistical Area by the U.S. Bureau of Census. Micropolitan areas are areas with a central urban core of between 10,000 and 50,000 people, and the largest city in the statistical area is designated the "principal city".²² The county is designated the Cambridge Micropolitan

²² <http://www.census.gov/population/www/estimates/aboutmetro.html>

Statistical Area in the 2004 area map that is available online at the U.S. Bureau of Census' website.²³ Major employers in the county include food processing including seafood and poultry processing, a resort and conference center, discount retail, and printing. The county promotes itself as having a low cost of living. There is a hospital in the county. There are several historical museums in the county and art galleries are also within county boundaries for cultural activities.²⁴

The county has two island areas in the Chesapeake, which are somewhat isolated, Hooper Island, which is actually an archipelago of three islands, and Bloodworth Island, also an archipelago, which is owned by the U. S. Navy.²⁵ Hooper Island is accessible by a series of bridges, but Bloodworth Island is not, which may be fortunate, because it was a former bombing and ordinance range with remaining ordinance and soil contamination.²⁶

Municipalities within the county include Brookview, Cambridge, Church Creek, East New Market, Eldorado, Galestown, Hurlock, Secretary, and Vienna. The nearest sizable city is Salisbury, approximately 30 miles away from the middle of the county, and the nearest large city Washington, DC approximately 85 miles away, but requiring use of Chesapeake Bay Bridge.

4.1.2.2.1 Location

Dorchester County is located approximately midway north south along the Eastern Shore of Chesapeake Bay on the Delmarva Peninsula. It shares boundaries on its north with Talbot and Caroline Counties. On the east, its boundary is concurrent with the state line of Delaware, and Sussex County, DE. To the southeast, it shares boundaries with Wicomico and Somerset Counties. Across the bay to the west are St. Mary's and Calvert Counties.

4.1.2.2.2 Transportation

The major highway in the county is U.S. 50 that provides access to Salisbury and Easton then toward Annapolis and the Washington DC metropolitan area. There is a general aviation public-use airport in the county, the Cambridge-Dorchester Airport. The Maryland 2005-2006 official Transportation Map shows a rail line in the county, but it is limited in extent and appears to be a special purpose line.

4.1.2.2.3 Demography

The total population of the county in 2000 was 30,674 people. There slightly more females (52.7%) than males (47.3%). The median age of the county's population was 52.7%.

The county's ethnic composition for the 99.1% of the population who self-identified a single race included 69.4% white people, 28.4% black or African American people, and less than 1% each of the remaining groups (American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, or "some other race").

²³ http://ftp2.census.gov/geo/maps/metroarea/stcbsa_pg/Nov2004/cbsa2004_MD.pdf

²⁴ <http://www.dorchestereconomic.com/>

²⁵ http://www.mde.state.md.us/assets/document/brownfields/USN_Bloodworth_Island_Archipelago.pdf

²⁶ http://www.mde.state.md.us/assets/document/brownfields/USN_Bloodworth_Island_Archipelago.pdf

In 2000, 98% of the county's population was native born Americans. For the 2% of the population that was foreign born, the most frequently reported regions of birth were Asia (36.3%), Europe (28.6%), and Latin America (26.7%). The most frequently reported ancestries for residents of the county included "other ancestries" (29.3%), United States or American (14.6%), and English (12.3%).

The average household size was 2.36 persons and the average family size was 2.86 persons in 2000. For the age cohort 15 years of age and over, 57.7% of males were married, and 49.3% of females were married. Single parent families comprised 15.1 % of all families in the county. Single person households comprised 28.1% of all households in the county and nonfamily households comprised 4.4% of all households in the county.

For the population age 5 and over, 22.9% had a disability. The age cohort that was most likely to report having a disability (41%) was the group 65 years of age and over.

4.1.2.2.4 Education

The population of Dorchester County approached the national level of high school graduates or higher level of educational attainment (80.4% for the national rate), but fell behind with regard to higher education by having approximately half the national rate (24.4%) of bachelor's degree or higher level of education. In 2000, 74.2% of Dorchester County's population 25 years of age and over had a high school graduate or higher level of educational attainment and 12% had a bachelor's degree or higher level of education. Graduate or professional degrees were held by 5.2% of the county's population 25 years of age and over.

4.1.2.2.5 Employment

Of the 13,053 people in the county 16 years of age and over, 62.2% were in the labor force and 3.6% were unemployed. For women 16 year of age and over 56.9% were in the labor force and 53.1% were employed.

The most common occupations for employed workers residing in the county were sales and office occupations (23.8%), management, professional, and related occupations (23.3%), and production, transportation and material moving occupations (21.5%). Farming, fishing and forestry occupations were reported by 2.5% of the county's workers. By class of worker, the county's composition was 73.3% private wage and salary worker, 17% government worker, 9.5% self-employed workers in own not incorporated business, and 0.2% unpaid family workers.

The most frequently cited industries in which employed workers residing in the county were participating included educational, health, and social services (19.7%), manufacturing (19.6%), and retail trade (11.6%). Agriculture, forestry, fishing and hunting and mining provided employment for 4.1% of the county's working population.

Fishing employment in the county is important from review of the data from the Bureau of Labor Statistics.²⁷ Dorchester County has the highest concentration of fishery employment in Maryland for those counties with disclosed data. In 2001 there were 16 seafood processing establishments, and undisclosed number of shellfish fishing establishments employing at least

²⁷ <http://www.bls.gov/data/home.htm>

681 people, while in 2006 there were nine seafood processors and shellfish fishing establishments employing 724 and 73 people respectively. In 2001 the total wages were in excess of 14 million dollars for seafood processing alone, while in 2006 the total wages for seafood processing were approximately \$17 ½ million and total wages for shellfish fishing were over \$2 ½ million.

4.1.2.2.6 Income

The median household income in Dorchester County in 1999 was \$34,077 and the median family income at that time was \$41,917. At that time, 36.5% of households in the county had incomes under \$25,000 and 26.7% of families had equivalent incomes. Per capita income for the county was \$18,929 in 1999. Median earnings for male full-time, year-round workers were \$29,014 and median earnings for female full-time year-round workers were \$22,284.

In 1999, 10.1% of families in the county had income below the poverty level. Families with a female householder, no husband present, were approximately three times more likely (28.8%) to have income below the poverty level.

4.1.2.2.6 Housing

In Dorchester County in 2000, there were 14,681 housing units of which 86.5% were occupied. Of the occupied units, 70.1% were owner occupied and 29.9% were renter occupied. The vacancy rate was 13.5%. Assuming that seasonal and recreational units were vacant at the time of the census questionnaires, 4.6% of the county's housing units are for seasonal, recreational or occasional use. The median value of owner occupied units in the county was \$92,300, and the median rent was \$456.

Housing stock in the county was predominantly single unit detached structures (72.8%) and mobile homes (10.3%). Housing units in excess of 30 years old comprised 60% of the county's housing stock.

4.1.2.3 Kent County

Kent County, across Chesapeake Bay from Baltimore, is a rural county in no metropolitan or micropolitan area. The major employers in the area include medical services, a college, a valve and coupling company, an asphalt paving/road construction company, a poultry processor, a plant nursery, a nursing care facility, a chemical testing equipment company, and a restaurant. The poultry processor, the plant nursery and the restaurant's inclusion in major employers could be dependent upon seasonal employees.²⁸

The county has one isolated area, Eastern Neck Island that is designated a National Wildlife Refuge, but which appears to be under cultivation and has some minor development (houses and/or barns) visible in the Google Earth aerial photos and the US Geological Survey Digital Orthophoto Quadrangles.²⁹ Eastern Neck Island is accessible via bridge with connection to Rush Island then toward Rock Hall.

²⁸ <http://kentcounty.com/bus/pdf/facts07.pdf>

²⁹ <http://terraserver-usa.com/image.aspx?T=1&S=11&Z=18&X=987&Y=10797&W=3>

There are five municipalities within Kent County, Betterton, Chestertown, Galena, Millington, and Rock Hall. The county seat is Chestertown. The nearest city of substantial size is Dover, DE, approximately 35 miles away, and the nearest large cities are Baltimore, MD approximately 85 miles away via roads (taking the Bay Bridge) and Philadelphia, PA approximately 70 miles.

4.1.2.3.1 Location

Kent County is directly across the bay from Baltimore, or the second most northerly county on the eastern shore of Chesapeake Bay. It shares boundaries with Cecil County, defined by the Sassafras River to the north, and Queen Anne’s County, defined by the Chester River to the south. To the west of the county is Chesapeake Bay, and across the bay are Baltimore County, the City of Baltimore, and Anne Arundel County. To the east is the state line with Delaware where it abuts New Castle and Kent Counties, DE.

4.1.2.3.2 Transportation

The major highway in the county is US 301, found in the eastern section of the county. A number of state highways, including 299, 444, and 213 provide additional access within the county. The local public use airport is a small general aviation, grass airstrip known as Massey Field. Rail service is available in the county, with lines running to Chestertown, and to Millington.

4.1.2.3.3 Demography

The total population of the county in 2000 was 19,197 people. It was fairly evenly split between males (47.9%) and females (52.1%). The median age of the population in the county was 41.3 years.

The ethnicity of the population in terms of race for those who self-identified a single race in 2000 was 79.6% white, 17.4% black or African American, and 1% “some other race,” the remaining categories comprised less than 1% each for American Indian and Alaska Native, Native Hawaiian or other Pacific Islander, or Asian. Hispanic or Latino people comprised 2.8% of the population in the county.

In 2000, 97.1% of the population in the county was native born Americans. For the 2.9% of the population that was foreign born, the most common regions of birth included Latin America (51.8%), Europe (28.3%) and Asia (8.5%). The most common ancestries for the residents of Kent County included “other ancestries” (22.8%), English (17.2%) and German (15.7%).

The average household size in 2000 in Kent County was 2.33 persons, and the average family size was 2.81 persons. For the population 15 years of age and over, 58.7% of males and 51% of females were married. Single parent families with children under 18 years of age comprised 13.7% of families in the county. Single person households comprised 27.7 % of households in the county, and nonfamily households comprised 5.1% of all households in the county.

For people age five and over, 20.5% of the population had a disability. The most affected group was the age cohort age 65 years and over which had 38.2% of the population reporting a disability.

4.1.2.3.4 Education

The population of Kent County 25 years of age and over is generally well educated. In 2000, 78.8% of the population had a high school graduate or higher level of educational attainment, and 21.7% had a bachelor's degree or higher level of education, which was roughly comparable to the national rates of 80.4% high school graduate or higher level of education and 24.4% bachelor's degree or higher level of education. Graduate or professional degrees were held by 9.1% of the population of Kent County in 2000.

4.1.2.3.5 Employment

The population 16 years of age and over in 2000 in Kent County totaled 15,657 people. Of the people in the 16 years of age and over cohort, 62.2% were in the labor force, and 2.7% were unemployed. For females 16 years of age and over, 57% were in the labor force and 54.9% were employed.

The most frequently reported occupations for employed workers residing in the county management, professional and related occupations (31.6%), sales and office occupations (22.7%), and service occupations (18%). Farming, fishing and forestry occupations were reported by 4% of the county workers. By class of worker, 73.1% of workers were private wage and salary workers, 15% were government workers, 11.3% were self-employed workers in own not incorporated business, and 0.6% were unpaid family workers.

The industries in which workers residing in the county most frequently were employed included educational, health, and social services (24%), manufacturing (12.3%), and construction (9.8%). Agriculture, forestry, fishing and hunting, and mining employed 6.3% of the county's workers.

Fishing employment has and is currently occurring in Kent County. Although the number of establishments is not disclosed by the Bureau of Labor Statistics, in 2002 there was finfish fishing in the county, and in 2001 there was an undisclosed number of establishments and then again in 2005 and 2006 a single establishment undertaking seafood processing.

4.1.2.3.6 Income

The median household income in 1999 in the county was \$39,869 and the median family income concurrently was \$46,708. At that time, 30.8% of households in the county had incomes under \$25,000 and 21.9% of families had similar incomes. Per capita income in the county was \$21,573. Median earnings for male full-time, year-round workers were \$31, 899 and median earnings for female full-time, year-round workers were \$24,513.

In 1999, 9.3% of families were found to have incomes below the poverty level. Families with a female householder, no husband present, were much more likely to be in poverty, with 33.2% of these families having incomes below the poverty level.

4.1.2.3.7 Housing

There were 9,410 housing units in Kent County in 2000, of which 81.5% were occupied. For those occupied units, 70.4% were owner occupied and 29.6% were renter occupied. The vacancy rate was 18.5%. Assuming that all vacation or seasonal properties were vacant during the census taking, 11.1% of the housing units in the county were for seasonal, recreational or occasional use. The median value of owner occupied units in 2000 was \$115,500 and the median rent was \$526.

Housing stock in the county is primarily single unit detached structures (77.9%). The next highest percentage is mobile homes (4.4%). Units in excess of 30 years old comprise 53.7% of the county's housing stock.

4.1.2.4 Queen Anne's County

Queen Anne's County is across Chesapeake Bay from Annapolis, connected via the Bay Bridge. This umbilical allows Queen Anne's County to be a part of the Baltimore-Towson Metropolitan Statistical Area, with enhanced development in the areas nearer Annapolis and increased interaction with the larger communities. The eastern portion of the county is still in agricultural uses, but Kent Island, the westernmost part of the county is the most developed. Major employers, those employing over 100 persons, in the county according to the county's office of economic development include a canned food firm which has peak employment seasonally, two seafood restaurants, a custom guitar firm, a door and window firm, a mailing service, a "big box" store, a grocery store, and a printer.

Although Kent Island could be considered an isolated area of the county since it is an island, the island is well connected to both the county and across the bay via U.S. Highway 50/301. Kent Narrows, where the island is separated from the county, is so narrow that it appears built over in some aerial photos in locations, so determining that the island is separate is difficult in places.

Municipalities in the county include Barclay, Centreville, Church Hill, Millington, Queen Anne, Queenstown, Sudlersville and Templeville. The county seat is Centreville. The nearest city of substantial size is Annapolis, approximately 15 miles away and the nearest large cities are Baltimore, approximately 35 miles away from the western side of the county, and Washington, DC, approximately 45 miles away from Kent Island.

4.1.2.4.1 Location

Queen Anne's County is located on the eastern shore of Chesapeake Bay across the bay from Annapolis and Anne Arundel County. The county shares its southern border with Talbot County and its northern border with Kent County. The county's eastern boundary is shared with Caroline County on the southern section and the state line with Delaware on the northern section. The Delaware County that abuts Queen Anne's County is Kent.

4.1.2.4.2 Transportation

The major highways in the county are U.S. Highways 50 and 301. U.S. 50 connects to Annapolis and Washington to the west via the Bay Bridge and toward Salisbury and Ocean City to the south and east. U. S. Highway 301 connects northerly toward corridors leading to Wilmington, DE and Philadelphia, PA. A network of state highways includes State Highways 213, 309, 300 and 405 provide access within the county. Rail service is available in the county for freight. There is a general aviation airport in the county with charter service at the Bay Bridge Airport, and commercial air service is provided at the Baltimore/Washington Airport, approximately 50 miles from the county seat.

4.1.2.4.3 Demography

The population of Queen Anne's County in 2000 totaled 40,563 persons. The population was evenly split between males (49.8%) and females (50.2%). The median age of the county's population was 38.8 years.

Nearly the entire population of the county (99.1%) is self-identified as a single race. For those who identified a single race, the most frequently identified were white (89%), black or African American (8.8%), and Asian (0.6%). Hispanic or Latino people comprised 1.1% of the county's population.

In 2000, 97.6% of the county's population was comprised of native-born Americans. For the remaining 2.4% of foreign-born people, the most common regions of birth included Europe (32.8%), Asia (30%), and Latin America (24.4%). The most frequently reported ancestries for residents of the county included German (19.9%), Irish (17.3%), and English (15.4%).

The average household size for Queen Anne's County in 2000 was 2.62 persons and the average family size was 2.99 persons. For people 15 years of age and over, 64.3% of males and 62 % of females were married. Single parent families with children under 18 years of age comprised 9.9% of all families in the county. Single person households comprised 19.4% of households in the county and nonfamily households comprised 4.9% of all households in the county.

For the population of the county 5 years of age and over in 2000, 17.2% reported having a disability. The most affected segment of the population was the cohort 65 years of age and over, which reported 33.5% having a disability.

4.1.2.4.4 Education

The population of Queen Anne's County was well educated in 2000 with 84.2% of the county's population 25 years of age and over having a high school graduate or higher level of education and 25.4% having a bachelor's degree or higher level of education. These levels were slightly above the national rates of 80.4% high school graduate or higher level of education and 24.4% bachelor's degree of higher level of education. Graduate or professional degrees were held by 9% of the county's population 25 years of age and over.

4.1.2.4.5 Employment

The total population in the county 16 years of age and over in 2000 was 31,417. Of that population, 69.5% was in the labor force and 1.9% was unemployed. For females in the appropriate age cohort, 63.2% were in the labor force, and 61.4% were employed.

The most frequently reported occupations for workers residing in the county included management, professional and related occupations (36.3%), sales and office occupations, and service occupations (13.8%). Farming, fishing, and forestry occupations were reported by 1.5% of workers residing in the county. The composition of workers in the county by class of worker was 70.4% private wage and salary workers, 20.3% government workers, 9.2% self-employed workers in own not incorporated business and 0.2% unpaid family workers.

The industries that employed the greatest number of workers residing in the county included educational, health, and social services (17.9%), construction (11.7%), and retail trade (11.4%). Agriculture, forestry, fishing and hunting, and mining provided employment for 3.4% of county residents.

Fishing employment in the county has increased slightly in terms of establishments since 2001³⁰ with a decline in the number of fish processing establishments from three to two, and an increase to one each of finfish fishing and shellfish fishing establishments from none. In 2002, the most recent year for which data is disclosed, there were 149 people employed in seafood processing, with \$4.36 million in total wages.

4.1.2.4.6 Income

The median household income in the county in 1999 was \$57,037 and the median family income was \$63,713. At that time, 19% of households had incomes under \$25,000 and 12.7% of families had incomes under \$25,000. The median earnings for male full-time, year-round workers were \$44,644, while synchronously female full-time, year round worker's median earnings were \$30,144. The per capita income for Queen Anne County was \$26,364.

In 1999, 4.4% of the county's families were found to have income below the poverty level. For families with a female householder, no husband present, there is a higher poverty rate, with 17.4% of these families having income below the poverty level.

4.1.2.4.7 Housing

In 2000, there were 16,674 housing units in the county, of which 91.8% were occupied. For those occupied units, 83.4% were owner occupied and 16.6% were renter occupied. The vacancy rate was 8.2%. Assuming all seasonal and vacation homes were vacant during the census taking, these units comprised 4.4% of all units in the county. The median value of owner occupied housing units was \$160,000, and the median rent was \$622.

The housing stock in the county was predominantly single unit detached (83.2%), single unit attached (5.5%), and mobile homes (5%). Units in excess of 30 years old comprised 30.4% of the county's housing stock.

³⁰ <http://www.bls.gov/data/home.htm>

4.1.2.5 Somerset County

Somerset County is the southernmost Maryland County on the eastern shore of Chesapeake Bay. It is part of the Salisbury-Ocean Pines Metropolitan Statistical Area. According to the county's economic development department, the major employers of the county include a food services company, a hospital, a seafood processor, two poultry processors, a bank, a correctional institution, a tool fabricator (paint applicators), and a college.³¹ Of interest for review of the importance of Chesapeake Bay to the county is that half of the county's festivals celebrate fish, fishing or water-based activities.³²

Somerset County is home to what is considered the only occupied offshore island in Chesapeake Bay for the State of Maryland, Smith Island. Smith Island has been and is currently highly fishery dependent, and is only accessible to the mainland via ferries between Chrisfield and Ewell for the eastern shore connection, and between Point Lookout and Ewell for the western shore connection, one additional vessel provides services between Reedville, VA and Ewell. There are three communities on Smith Island, one of which, Tylerton, is accessible only by boat, the other two, Rhodes Point and Ewell, are connected to each other by roadway on the island. While the island is currently highly fishery dependent, a recent article in the *Washington Post* has described vacationers buying properties for sale by watermen, and that the watermen's lifestyle is becoming a disappearing way of life. Although people are interested in buying homes on the island, factors such as the lack of a major grocery store and the quality of the local infrastructure has prohibited some from purchasing.³³ There is no air service on Smith Island, unlike on Tangier Island, VA.

There are two municipalities in Somerset County, Chrisfield, and Princess Anne; Princess Anne is the county seat. The nearest substantial city is Salisbury, MD, which is approximately 15 miles away from the county seat. The nearest large cities are Baltimore, which is approximately 130 miles away, Washington, DC, also approximately 130 miles away, and Norfolk, VA, approximately 120 miles away.

4.1.2.5.1 Location

Somerset County is the southernmost Maryland County located on the eastern shore of Chesapeake Bay. It shares its northern boundary with Dorchester and Wicomico Counties. To the east is Worcester County, MD, and to the south and west is the Virginia State line, with Accomack County on the Virginia side. Across the bay from Somerset County is St. Mary's County MD and Northumberland County, VA.

4.1.2.5.2 Transportation

The major highway in the county is U.S. Highway 13, which is the major connector north south on the Delmarva Peninsula. State Highways in the county include 383, 667, and 413 that provide linkages within the county to Deal Island and to Crisfield from Princess Anne and the Pocomoke City area. There is a publicly owned jointly by the city of Crisfield and Somerset

³¹ <http://www.somersetcountyedc.org/pages/living.htm>

³² <http://www.somersetcountyedc.org/pages/living.htm>

³³ <http://www.washingtontimes.com/apps/pbcs.dll/article?AID=/20070811/METRO/108110043/1004>

County general aviation airport near Crisfield. Rail service is available for freight within the county.

4.1.2.5.3 Demographics

The total population of Somerset County in 2000 was 24,747 persons. Males slightly (53.4%) outnumbered females (46.6%). The median age was 36.5 years.

For the 98.8% of the population that self-identified a single race, 56.4% identified white, 41.1% identified black or African American, and none of the remaining ethnic/racial categories (American Indian and Alaska native, Asian, native Hawaiian and other Pacific Islander, or some other race) comprised over 0.5% of the population. Hispanic or Latino people comprised 1.3% of the county's population in 2000.

In 2000, 97.5% of the population was native born Americans. For the remaining 2.5% of the population, the most common regions of birth included Africa (30.6%), Asia (30.5%), and Latin America (26.8%). The most frequently reported ancestries for residents of the county included "other ancestries" (29.3%), English (11.7%), and United States or American (11.2%).

The average household size in the county was 2.37 persons, and the average family size was 2.92 persons. For the population 15 years of age and over, 55.1% of males were married and 44.5% of females were married. Single parent families with children comprised 15.5 % of all families in the county. Single person households comprised 29.4% of all households in the county and nonfamily households comprised 4.4% of households in the county.

For the population 5 years of age and over, 24.7% reported having a disability. The segment of the population having the highest reports of having a disability (47.2%) was the group age 65 years and over.

4.1.2.5.4 Education

The population of Somerset County had lower levels of educational attainment than the national levels. For the population 25 years of age and over in the county, 69.5% had high school graduate or higher level of education and 11.6% had a bachelor's degree or higher level of education. For the national levels, 80.4% of the population 25 years of age and over had high school graduate or higher levels of education and 24.4% had bachelor's degree or higher levels of education. Graduate or professional degrees were held by 4.2% of the county's population 25 years of age and over.

4.1.2.5.5 Employment

In 2000, 20,646 people in the county were 16 years of age and over; 50.3% were in the labor force, and 4.9% were unemployed. For females in the age cohort, 54% were in the labor force, and 47.7% were employed.

The most common occupations for employed workers residing in the county included management, professional and related occupations (24.8%), sales and service occupations (23.5%), and service occupations (21.2%). Farming, fishing and forestry occupations comprised

3.8% of those reported. By class of worker, 62% were private wage and salary workers, 27.8% were government workers, 9.4% were self-employed workers in own not incorporated business, and 0.9% were unpaid family workers.

The industries which provided employment for the greatest proportions of workers residing in the county include educational, health and social services (24.5%), retail trade (12.4%), public administration (10.7%). Agriculture, forestry, fishing and hunting, and mining provide employment for 5.5% of the county's workers.

Fishing establishments in the county are restricted to seafood processing according to the Bureau of Labor Statistic .³⁴ For 2001 to 2003, data were not disclosed on the number of establishments within the county, but for 2004 there were four establishments, declining to three in 2005 and finally to three in 2006. Data were not disclosed for wages or number of employees of these establishments.

4.1.2.5.6 Income

The median household income in 1999 was \$29,903, and the median family income at that time was \$37,643. In 1999, 41.6% of households in the county had income less than \$25,000 and 30.8% of families had equivalent income. Per capita income for the county was \$15,965. Median earnings for male full-time, year-round workers were \$27,496, and median earnings for female full-time, year-round workers were \$23,035.

In 1999, 15% of families in the county had incomes below the poverty level. Families with a female householder, no husband present, were more severely affected, with 33.3% of these families having incomes below the poverty level.

4.1.2.5.7 Housing

In 2000, there were 10,092 housing units in the county of which 82.8% were occupied. For the occupied units, 69.6% were owner occupied and 30.4% were renter occupied. The vacancy rate was 17.2%. Assuming all vacation and seasonal units were vacant during the period of census taking, 7.6% of the county's housing units are determined to be for seasonal, recreational, or occasional used. Median value for an owner occupied unit was \$81,100 and the median rent in Somerset County was \$429.

Housing stock in the county is predominantly single unit detached structures (67.8%) and mobile homes (17.1%). The reliance on mobile homes may be the highest observed in counties surrounding Chesapeake Bay. Units in excess of 30 years old in 2000 comprised 47.7% of the county's housing stock.

4.1.2.6 Talbot County

Talbot County is the central county on the Eastern Shore of Maryland. It is in the Easton Micropolitan Area as designated by the U.S. Census Bureau in 2004. Major employers in the county include a health care provider, two retirement community/healthcare providers, a building

³⁴ <http://data.bls.gov/PDO/outside.jsp?survey=en>

systems company, two printing firms, a hardware and home supply big box store, a packaging firm, a temporary agency, a delivery company, a grocery, and a fast food restaurant.³⁵

Tilghman Island and Oxford within the county have a substantial number of marinas, and therefore a level of reliance on recreational activities associated with fishing and boating. Neither area appears to be isolated in the sense of Smith or Tangier Islands, or as strongly dependent upon fishing at first blush.

There are five municipalities in Talbot County, Easton, Oxford, Queen Anne, St. Michaels, and Trappe. Easton is the county seat. The nearest substantial cities are Salisbury, MD, approximately 50 miles from the county seat, and Dover, DE, also approximately 50 miles from the county seat. The nearest large cities are Baltimore, MD, approximately 59 miles from the county seat, using the Bay Bridge, and Washington, DC, approximately 73 miles away, also via the Bay Bridge.

4.1.2.6.1 Location

Talbot County is roughly central located on a north-south line along the Eastern Shore of Maryland. To the north of the county, across the Wye River, is Queen Anne's County and to the east is Caroline County. To the south, across the Choptank River, is Dorchester County. Chesapeake Bay is to the west and across the bay are Anne Arundle and Calvert County.

4.1.2.6.2 Transportation

The major highway in the county is U.S. Highway 50, which in the county runs primarily north to south. State Highways in the county provide access east and west; these include State Highways 33, 333, 331, and 309. Freight rail service is available in the county to Easton. There is a publicly owned, county airport that has charter flights near Easton.

4.1.2.6.3 Demographics

The population of the county totaled 33,812 in 2000. There were slightly more females (52.3%) than males (47.7%). The median age of the county's population was 43.3 years.

Nearly all the county's population (99.2%) is self-identified as a single race. For those identifying a single race, 82% identified white, 15.4% identified black or African American, and 0.8% identified Asian. Hispanic or Latino people made up 1.8% of the county's population.

In 2000, 96.7% of the county's population was native born Americans. For the 3.3% of the population that was foreign born, the most common regions of birth included Europe (41.1%), Latin America (38.2%) and Asia (17.9%). The most frequently reported ancestries for residents of the county included "other ancestries" (21%), English (18.3%), and German (17.4%).

The average household size in Talbot County was 2.32 persons in 2000 and the average family size in the county was 2.82 persons. For the population 15 years of age and over, 63% of

³⁵<http://www.talbotcountymd.gov/uploads/File/Economic/Economic%20Analysis%20%2011%2030%2006%20doc%202.pdf>

males were married and 57.1% of females were married. Single parent families with children under 18 years of age comprised 9.9% of all families in the county. Single person households comprised 27.8% of households in the county and nonfamily households comprised 4.8% of all households in the county.

For the population age 5 years and over, 19.3% had a disability. The cohort in the population having the highest rates of reporting disability (35.7%) was the population 65 years of age and over.

4.1.2.6.4 Education

For the population of Talbot County 25 years of age and over, 84.4% had a high school graduate or higher level of education and 27.8% had a bachelor's degree or higher level of education. Graduate or professional degrees were held by 10.8% of the county's population 25 years of age and over.

4.1.2.6.5 Employment

The total population of the county 16 years of age and over numbered 27,193, of which 61.7% were in the labor force, and 2.1% were unemployed. For females in the age cohort, 56% were in the labor force and 53.7% were employed.

The most frequently reported occupations in Talbot County in 2000 included management, professional, and related occupations (34.9%), sales and office occupations (24.9%), and service occupations (16.6%). Farming, fishing, and forestry occupations were reported by 1.7% of the workers residing in the county. Composition of workers by class was 72.6% private wage and salary workers, 14.2% government workers, 13% self employed workers in own not incorporated business, and 0.1% unpaid family workers.

The most common industries in which workers residing in the county were employed included educational, health, and social services (20.9%), retail trade (11.6%), and manufacturing (10.1%). Agriculture, forestry, fishing and hunting and mining provide employment for 3.5% of the county's workers.

Fishing establishments in the county recognized by the Bureau of Labor Statistics³⁶ include shellfish fishing and seafood product preparation and packaging. For years 2001 and 2002, data are not disclosed on number of establishments, number of employees or wages for either type of establishment. In 2003, it appears that the shellfish fishing establishment closed and has remained so to the present. The processing establishment(s) were undisclosed until 2004 at which time two are listed in the data set. No data are disclosed on numbers of employees or wages for these establishments.

4.1.2.6.6 Income

The median household income in 1999 was \$43,532, and the median family income was \$53,214. In 1999, 27.6% of households and 16.5% of families had incomes under \$25,000. Per capita income for Talbot County was \$28,164. Median earnings for male full-time, year-round

³⁶ <http://data.bls.gov/PDO/outside.jsp?survey=en>

workers were \$33,757 and median earnings for female full-time, year-round workers were \$26,871.

In 1999, 5.3% of families had incomes below the poverty level. At that time families with female householders, no husband present, had substantially higher rates, with 20.2% having incomes below the poverty level.

4.1.2.6.7 Housing

In 2000, there were 16,500 housing units in the county, of which 86.7% were occupied. For those occupied units, 71.6% were owner occupied, and 28.4% were renter occupied. The vacancy rate was 13.3%. Assuming that all vacation and seasonal units were vacant during the census-taking period, 7.8% of the county's housing units were for seasonal, recreational or occasional use. The median value of owner occupied units was \$149,200 and the median rent for units in the county was \$552.

Housing stock in the county is predominantly single unit detached (77%) and single unit attached (5.2%). Structures in excess of 30 years old in 2000 comprised 46.1% of the county's housing stock.

4.1.2.7 Wicomico County

Wicomico County is has the least shoreline on the bay of the eastern shore counties directly on the bay, and is located second most southerly on the eastern shore of the bay. The county does, however, have aquatic communication with the bay via the Nanticoke and Wicomico Rivers. The county is part of the Salisbury Metropolitan Statistical Area, and contains the central city, Salisbury of the metropolitan area. Major employers in the county include two yacht companies, a poultry processor, a printer, a vitamin company, a cable manufacturer, three electronics companies, a machining firm, a health care provider, a commercial airport with two airlines, a telecommunications firm, a pharmaceutical company, a plastics/vinyl company and a university).³⁷

Wicomico County has no isolated areas within the county in terms of island areas that are inaccessible other than by a single bridge or by ferry. Municipalities in the county include Delmar, Fruitland, Hebron, Mardela Springs, Pittsville, Salisbury Sharptown, and Willards. Salisbury is the county seat. The nearest substantial city is Dover, DE, approximately 56 miles away, and the nearest large cities are Baltimore, MD, approximately 105 miles away, Washington, DC, approximately 120 miles away, and Philadelphia, PA, and Norfolk, VA, both approximately 130 miles away.

4.1.2.7.1 Location

Wicomico County is the second most southerly county on Maryland's eastern shore of Chesapeake Bay. It shares its southern boundary with Somerset County, and its eastern boundary with Worcester County. To the north and east, the county extends to the state line with Delaware, and Sussex County, Delaware is on the opposing side of the state line. To the

³⁷ <http://www.swed.org/images/2007%20County%20Profile.pdf>

northeast is Dorchester County. At the southwestern-most corner of the county, Chesapeake Bay is intersected in the area of Tangier Sound at the confluence of the Nanticoke and Wicomico Rivers.

4.1.2.7.2 Transportation

Major highways in the county include U.S. Highways 13 and 50. U.S. Highway 13 connects the Delmarva Peninsula north-south via Chesapeake Bay Bridge Tunnel south to Norfolk, VA and north toward Wilmington DE and Interstate 95 to Philadelphia. U.S.50, via the Bay Bridge allows westward travel toward Baltimore and Washington, DC. State Highways providing access within the county include 349, 346, and 350. Rail service for freight is available in the county. The airport in the county has commercial service with flights to major hubs in Philadelphia, Washington, and Charlotte.³⁸

4.1.2.7.3 Demographics

The total population of Wicomico County in 2000 was 84,644 people, and in 2006 it was estimated to have risen to 91,987 people. In 2000, there were slightly more females (52.3%) than males (47.7%), which persisted until 2006 with 52% of the population being female and 48% being male. The median age of the county's population in 2000 was 35.8 years and in 2006 was 36.6 years.

The ethnic composition of the community in terms of race in 2000 was that 98.7% of the population self-identified a single race; 72.6% identified white, 23.3% identified black or African American, 1.7% identified Asian, and 0.8% identified "some other race." In 2000, 2.2% of the population was comprised of Hispanic or Latino people. The ethnic composition of the population was similar with 71.5% of the population self-identified as white, 23.8% self-identified as black or African-American, 2% self-identified as Asian, and 1.1% "some other race." In 2006, Hispanic or Latino people comprised 3.1% of the population.

The average household size in 2000 was 2.53 persons and the average family size at that time was 3 persons. In 2006, the average household and family sizes had declined slightly to 2.48 and 2.93 persons, respectively. In 2000, for the population 15 years of age and over, 54.4% of males were married and 46.2% of females were married, while in 2006, for the same age cohort, 47.8% of males were married and 40.2% of females were married. In 2000, single parent families with children under 18 years of age comprised 16.5% of all families in the county; in 2006, single parent families with children under 18 years of age had increased to 21% of all families in the county. Single person households comprised 24.8% of households and nonfamily households comprised 7.2% of households in the county in 2000. In 2006, single person households had increased to 34% of all households in the county and nonfamily households had increased to 9.5% of all households in the county.

For the population five year of age and over in 2000, 18.5% had a disability, and the segment of the population with the highest reporting of disabilities (40.5%) was the population 65 years of age and over. For the population five years of age and over in 2006, the reporting of disabilities had decreased to 12.8%, and for the population 65 years of age and over, 31.7% reporting having a disability.

³⁸ <http://www.swed.org/images/2007%20County%20Profile.pdf>

4.1.2.7.3 Education

In 2000, 80.7% of the county's population 25 year of age and over had a high school graduate or higher level of education and 21.9% had a bachelor's degree or higher level of education. Graduate or professional degrees were held by 8.2% of the county's population in this age cohort. In 2006, 82.2% of the population 25 years of age and over had a high school graduate or higher level of education, and 25.6% had a bachelor's degree or higher level of education. Graduate or professional degrees were held by 9% of Wicomico County's population in this cohort.

4.1.2.7.3 Employment

The population 16 years of age and over in the county totaled 66,207 in 2000, of which 67.7% were in the labor force. At that time 3.7% of the population over 16 years of age was unemployed. In 2000, 62.6% of females were in the labor force, and 59% were employed. In 2006, 73,103 persons in the county were 16 years of age and over and 67.6% were in the labor force. At that time 4.3% were unemployed. In 2006, 61.9% of females were in the labor force, and 58% were employed.

The most frequently reported occupations for Wicomico County's workers in 2000 included management, professional and related occupations (30.8%), sales and office occupations (26.7%), and service occupations (17.2). Farming, fishing and forestry occupations were reported by 0.9% of county workers. Private wage and salary workers comprised 75.7% of workers in the county, government workers made up 18.1%, self-employed workers in own not incorporated business comprised 5.8%, and unpaid family workers comprised 0.3% in 2000. In 2006, the most common occupations included management, professional, and office occupations (34.1%), sales and office occupations (27.8%), and production, transportation, and material moving occupations (13.3%). Farming, fishing and forestry occupations were reported by 0.7% of workers residing in the county. The distribution of workers by class was similar in 2006 with 76.7% private wage and salary workers, 18.3% government workers, 4.8% self-employed workers in own not incorporated business, and 0.1% unpaid family workers.

The industries in which workers residing in Wicomico County in 2000 were employed most frequently included educational, health and social services (24.1%), manufacturing (14.5%), and retail trade (12.3%). Agriculture, forestry, fishing and hunting, and mining provided employment for 2.2% of the county's resident workers in 2000. In 2006, the most commonly reported industries for county workers included educational services, health care, and social assistance (23.1%), retail trade (14.5%), and arts, entertainment, and recreation, and accommodation and food services (11.3%). Agriculture, forestry, fishing and hunting, and mining provide employment for 1.7% of the county's workers.

According to the Bureau of Labor Statistics,³⁹ there were two establishments in fisheries, one in finfish fishing and one in seafood product preparation and packaging, active in 2004 and 2005 for which data were disclosed. The finfish fishing establishment was still active in 2006.

³⁹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

Data regarding numbers of employees and wages were not disclosed for the time period between 2001 and 2006.

4.1.2.7.4 Income

In 1999, the median household income was \$39,035 and the median family income was \$47,129. At that time, 31.2% of households and 22.2% of families had incomes under \$25,000. Per capita income in the county was \$19171 in 2000. Median earnings for male full-time, year-round workers in Wicomico County in 2000 were \$32,481 and for female full-time, year-round workers median earnings were \$23,548. In 2006, the median household income was 47,540 and the median family income was \$58,498 in 2006 inflation-adjusted dollars. In 2006, 24.3% of households and 16.4% of families had incomes below \$25,000. Per capita income in 2006 was \$24,641. Median earnings for male full-time, year-round workers were \$38,080, and median earnings for female full-time year-round workers were \$31,600.

In 1999, 8.7% of families in the county had incomes below the poverty level. Families with a female householder, no husband present were more likely to be in poverty with 26.8% of these families having income below the poverty level. In 2006, conditions for families in general had improved slightly for families in general with 7.2% of families estimated to have incomes in the previous year below the poverty level, but the situation had stayed stable for families with female householders, no husband present, at 26.8% of the families still having incomes below the poverty level.

4.1.2.7.5 Housing

In 2000 there were 34,401 housing units in Wicomico County, of which 93.7% were occupied. For the occupied units, 66.5% were owner occupied and 33.5% were renter occupied. The vacancy rate was 6.3%. Assuming all vacation and seasonal units were vacant at the time of census taking, 0.8% of the units in the county are for seasonal, recreational or occasional use. In 2006, the number of housing units had increased to 39,390, and 90% were occupied. Of the occupied units in 2006, 67.6% were owner occupied and 32.4% were renter occupied. The median value of an owner occupied unit in 2000 was \$94,500 and the median rent was \$567; in 2006, the median value of an owner occupied unit increased to \$165,400 and the median rent increased to \$843.

The housing stock in the county was predominantly composed of single unit detached structures (72.9%) and mobile homes (7.7%) in 2000. In 2006, this remained the case, but there was an increase in multiple unit structures in the 10 to 19 unit classification that nearly equaled the percentage of mobile homes. Units in excess of 30 years old in 2000 comprised 43% of the county's housing stock.

4.1.2.8 Worcester County

Worcester County is the sole county in Maryland that has Atlantic shoreline. It is the easternmost of the eastern shore counties, and is among the two most southerly (the other is Somerset). The county is within the Ocean Pines Micropolitan Area. Major employers, those employing more than 100 people, included three hotels/restaurants, two health care providers, a

big box discount store, a candy products company, a manufacturer of plastic laboratory equipment, and an electrical contractor.⁴⁰

Although the barrier island area at Assateague and Ocean City can be considered isolated, Assateague is reasonably unpopulated, and the highly populated area of Ocean City has two major bridges, one off US Highway 50 and the other from State Highway 90. Additionally, just beyond the state line into Delaware, Delaware State Highway 54 provides additional access to the mainland for Fenwick Island that adjoins the Ocean City barrier island complex.

There are four municipalities within the county, Berlin, Ocean City, Pocomoke City, and Snow Hill. Snow Hill is the county seat. The nearest cities of substantial size are Salisbury, MD, approximately 18 miles from the county seat, and Dover, DE, approximately 75 miles from the county seat. The nearest large cities are Norfolk, VA, approximately 115 miles away via Chesapeake Bay Bridge-Tunnel, Washington, DC, approximately 132 miles away via Chesapeake Bay Bridge, and Philadelphia, PA approximately 150 miles away.

4.1.2.8.1 Location

Worcester County is the southeastern-most of the Eastern Shore counties. Unlike the other Eastern Shore counties, it is not on Chesapeake Bay, but on the Atlantic Ocean. The county extends from the Delaware to Virginia borders and on its western boundary shares borders with Wicomico and Somerset Counties. The corresponding counties in Delaware and Virginia are Sussex and Accomack, respectively. Although Worcester County is not on Chesapeake Bay, it does have embayments as part of the local physical structures, including but not exclusive to Chincoteague, Assateague, Assawoman, Isle of Wight and Sinepuxent Bays.

4.1.2.8.2 Transportation

Major highways in the county include U.S. Highways 13, 113, 50 and State Highway 90. U.S. Highway 13 provides major access north south for the entire Delmarva Peninsula, and U.S. Highway 50 connects the Eastern Shore with Washington DC metropolitan area. State Highways 12, 365, 375, and 611 provide access within the county. Rail service for freight is available in the county. A general aviation airport for small planes is available at Ocean City.

4.1.2.8.3 Demographics

The population of the county in 2000 totaled 46,543. The population was relatively evenly split between males (48.8%) and females (51.2%). The median age of residents of the county was 43 years.

The ethnic composition of the county's population for the 99% self-identifying a single race was predominantly white people (81.2%), with a smaller population of black or African-American people (16.7% and a small proportion (under 1% each) Asian, American Indian and Alaska native, native Hawaiian or other Pacific islander, or peoples of some other race. Hispanic and Latino people comprised 1.3% of the county's population in 2000.

⁴⁰ <http://www.co.worcester.md.us/econ/busclimate.htm>

In 2000, 97.3% of the county's population was native born Americans. For the 2.7% of the population that was foreign born, the most common regions of birth included Europe (40.4%), Latin America (27.9%) and Asia (22.3%). The most frequently reported ancestries for residents of the county included "other ancestries" (20.8%), German (17.9%), and Irish (15.1%).

The average household size in the county in 2000 was 2.33 persons and the average family size was 2.79 persons. For the population 15 years of age and over, 60.8% of male and 55.7% of females were married. Single parent families with children under 18 years of age comprised 11.6% of families in the county. Single person households comprised 26.2% of all households and nonfamily households comprised 5.7% of all households in the county.

For the population age 5 and over, 21% had a disability. The highest reporting of disabilities (37.2%) came from the population 65 years of age and over.

4.1.2.8.4 Education

For the cohort 25 years of age and over, 81.7% had a high school graduate or higher level of education, and 21.6% had a bachelor's degree or higher level of education. These rates are slightly higher at the high school level, but slightly lower at the bachelor's degree level than the national reporting (80.4 and 24.4% respectively).

Graduate or professional degrees were held by 7.1% of the county's population aged 25 and over.

4.1.2.8.5 Employment

The population in 2000 in Worcester County 16 years of age and over totaled 38,103, of which 60.7% were in the labor force. At that time, 4.1% of the population 16 years of age and over was unemployed. For the same age cohort, 54.8% of females were in the labor force and 51.2% were employed.

The most frequently reported occupations for workers residing in the county included management, professional and related occupations (29.3%), sales and office occupations (27.8%), and service occupations (21.2%). Farming, fishing and forestry occupations were reported by 2.2% of the county's workers. By class of worker, the types of worker were distributed as follows: private wage and salary workers 74.6%, government workers 16.2%, self-employed workers in own not incorporated business 8.9%, and unpaid family workers 0.3%.

The industries in which workers residing in the county most commonly participated included arts, entertainment, recreation, accommodation and food services (17.7%), educational, health, and social services (17.2%), and retail trade (13.4%). Agriculture, forestry, fishing and hunting, and mining employed 2.2% of the county's workers.

Employment in fisheries in the county according to the Bureau of Labor Statistics⁴¹ is associated with establishments in "other marine fishing," with the number of establishments not disclosed in 2002 and 2003, and a single establishment in 2004 and 2005; a maximum of seven finfish fishing establishments in 2001 and 2003 (the number was not disclosed in 2002) which declined to six in 2004 and 2005 and finally to five in 2006; five shellfish fishing establishments in 2001 and 2002, no disclosure of data in 2003, and two shellfish fishing establishments remaining from 2004 through 2006; and finally numbers not disclosed of seafood product preparation and packaging establishments for 2001 through 2003 and a single establishment in 2004 to none in 2005 through 2006. The maximum number of employees disclosed was in 2001 with 28 employees (21 in shellfish fishing and seven in finfish fishing). The maximum total disclosed wages were \$619 thousand in 2001.

4.1.2.8.6 Income

The median household income in 1999 was \$40,650, and the median family income was \$47,293. At that time, 28.3% of households and 20.1% of families had incomes under \$25,000. Per capita income in Worcester County was \$22,505. Median earnings for male full-time, year-round workers were \$31,735 and median earnings for female full-time, year-round workers were \$24,319.

In 1999, 7.2% of families in the county had incomes below the poverty level. Families with a female householder, no husband present, were more likely to be in poverty with 26.1% of these families having incomes below the poverty level.

4.1.2.8.5 Housing

In 2000 there were 47,360 total housing units, of which 41.6% were occupied. Of the occupied units, 75% were owner occupied, and 25% were renter occupied. The vacancy rate was 58.4%. Assuming all vacation and other seasonal housing units were vacant during the period of census taking, 38.1% of all housing units in the county are for seasonal, recreational or occasional use. The median value of an owner occupied unit in the county was \$121,500 and the median rent was \$574 in 2000.

Housing stock in the county is a mix of multiple and single unit structures with a slight dominance of single unit detached structures (39.2%), but followed by 20 or more unit structures providing 25.4% of the housing stock. Housing units in excess of 30 years in 2000 comprised 21.6% of the county's housing stock.

⁴¹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.1.3 WESTERN SHORE

4.1.3.1 Anne Arundel

Anne Arundel County is approximately midway north and south along Maryland's western shore of Chesapeake Bay. It is the county that is home to Annapolis and the U.S. Naval Academy, and is the location for the western terminus of the Bay Bridge. Much of the northern two-thirds of the county are considered urban areas.⁴² Anne Arundel is part of the Baltimore-Towson Metropolitan Area. Major employers in the county include three military installations including the Naval Academy, the county school system, the regional airport, state government, city government, a community college, the postal service, four government/military contractors, an avionics communications firm, two healthcare companies, an airline and a telecommunications firm.⁴³

The county has no isolated areas insofar as there are no islands that are separate from the mainland or other areas that are difficult to obtain transportation linkages.

The municipalities in the county include Annapolis and Highland Beach. Annapolis is both the county seat and the state capitol. Nearby large cities include Baltimore and Washington, DC, both approximately 30 miles away.

4.1.3.1.1 Location

Anne Arundel County is located along the middle section of Maryland's western shores of Chesapeake Bay. Its northern boundaries are shared from east to west with Baltimore County, the City of Baltimore, and Howard County. Its western boundary is shared with Prince George's County. Its southern boundary is shared with Calvert County. To the east is Chesapeake Bay, and across the bay are Kent, Queen Anne's, and Talbot Counties.

4.1.3.1.2 Transportation

Major highways in the county include Interstates 295, 97, 895 and U.S.50. These highways provide major linkages between Washington, Baltimore and Annapolis. In addition State Highways 258, 261 468 214 178 173, and 177 provide access within the county. Rail service including Amtrak and MARC (service to Baltimore and Washington) is available in the county. Three general aviation airports are located within the county, along its southern border. The regional Baltimore/Washington Airport with international service is located in the northwest corner of the county.

4.1.3.1.3 Demographics

In 2000, the total population of the county was 489,656 persons. The population was evenly split between males (48.8%) and females (50.2%). The median age was 36 years. In 2006, the total population of the county had increased to an estimated 509,300 persons. The population was still evenly split between males (49.6%) and females 50.4%). The median age had increased slightly to 37.6 years.

⁴² http://www.msa.md.gov/msa/govpub/e/033000/033711/pdf/anne_ua.pdf

⁴³ http://www.aaedc.org/top_employers.html.

The ethnic composition of Anne Arundel County in 2000 for those self-identifying a single race (98.3% of the population) was predominantly white people (81.2%) with a smaller proportion of black or African American people (13.6%), Asian people (2.3%), and a small percentage of other races. In 2000, Hispanic or Latino people comprised 2.6 of the county's population. In 2006, there was a slight shift in the ethnic composition of Anne Arundel County. Although much of the county (97.6%) still self-identified a single race, and white people still predominated (78.7%), the percentage of black or African American people had increased slightly to 14.4%, the percentage of Asian people had increased to 3% and the percentage of "some other race" had increased to 1.4%. In addition the percentage of Hispanic or Latino people in the county had increased to 3.7% of the county's population.

In 2000, 95.3% of the county's population was native born Americans. For the 4.7% of the population that was foreign born, the most frequently reported areas of birth included Asia (33.8%), Europe (27.4%), and Latin America (23.9%). In 2006, 93.9% of the county's population was native born Americans. The regions of birth most commonly reported for the foreign-born included Asia (41.4%), Latin America (25.1%) and Europe (23.1%). The most common ancestries reported for residents of the county in 2000 included "other ancestries" (22.9%), German (21.1%), and Irish (17.1%).

In 2000 the average household size was 2.65 persons and the average family size was 3.09 persons, in 2006 the average household size had decreased to 2.59 persons, but the average family size was similar at 3.1 persons. For people 15 years of age and over, 59.6% of males and 56.1% of females were married in 2000; in 2006, these rates had declined to 53.5% for males and 52.8% for females. In 2000, single parent families with children under 18 years of age comprised 11.2% of families in the county. In 2006, single parent families with children under 18 years of age comprised 12.1% of families in the county. In 2000, single person households comprised 21.2% of households and nonfamily households comprised 6% of all households in the county. In 2006, single person households made up 24.5% of households and nonfamily households comprised 30.9% of all households in the county.

In 2000, for the population 5 years of age and over, 15.5% of the population reported having a disability, and the highest rate of reporting a disability (38%) was for the cohort 65 years of age and over. In 2006, 12.4% of the population 5 years of age and over reported having a disability. The cohort most likely to report a disability remained the cohort aged 65 years and over with a rate of 33.7%.

4.1.3.1.4 Education

The population of Anne Arundel County is well educated. In 2000, 86.4% of the county's population 25 years of age and over had a high school graduate or higher level of education, and 30.6% had a bachelor's degree or higher level of education. These rates were high in comparison to the national levels of 80.4% having a high school graduate or higher level of education and 24.4% having a bachelor's degree or higher level of education. At that time 11.5% of the county's population 25 years of age and over had graduate or professional degrees. In 2006, 90.3% of the county's population 25 years of age and over had a high school or higher level of education and 35.2% had a bachelor's degree or higher level of education. Again, these are higher than the national rates, which were 84.1% having a high school level or higher of

education and 27% having a bachelor's degree or higher level of education. Graduate or professional degrees were held by 14.8% of the county's population age 25 and over in 2006.

4.1.3.1.5 Employment

The population of the county, 16 years of age and over in 2000, numbered 379,394, of which 71.1% were in the labor force. At that time 2.1% of the population 16 years of age and over was unemployed. For females in the age cohort, 65.3% were in the labor force and 62% were employed. In 2006, 400,985 people in the county were 16 years of age and over; 70.2% of the cohort was in the labor force and 2.7% of the cohort was unemployed. For females in the age cohort, 66.3% were in the labor force and 62.6% were employed.

The most frequent occupational categories reported for workers residing in the county included management, professional and related occupations (40.5%), sales and office occupations (28%), and service occupations (12.5%) in 2000. Farming, fishing and forestry occupations accounted for 0.1% of those reported in the county in 2000. By class of worker, the composition of workers in the county included 73.1% private wage and salary workers, 21.7% government workers, 5% self-employed workers in own not incorporated business, and 0.2% unpaid family workers in 2000. In 2006, the major occupations were management, professional, and related occupations (43.1%), sales and office occupations (27.3%) and service occupations (12.3%). Farming, forestry and fishing occupations were reported by 0.2% of workers residing in the county. By class of worker, the composition of workers had shifted somewhat to 70.4% private wage and salary workers, 23.7% government workers, 5.7% self-employed workers in own not incorporated business, and 0.2% unpaid family workers.

The industries in which workers residing in the county were most often employed in 2000 included educational, health, and social services (17.1%), professional, scientific, management, administrative, and waste management services (12.1%), and public administration (11.9%). Agriculture, forestry, fishing and hunting, and mining employed 0.2% of the county's workers in 2000. In 2006, the industries which most frequently employed county workers included educational services, health care, and social assistance (17.7%), professional, scientific, management and administrative, and waste management services (14.3%), public administration (13.2%). Agriculture, forestry, fishing and hunting, and mining provided employment for 0.3% of county residents in 2006.

According to the Bureau of Labor Statistics,⁴⁴ there are currently no establishments in fishing currently in Anne Arundel County, although the data set consulted is based upon unemployment insurance, so there may be people who are self employed in fishing and/or people employed on vessels that are incorporated but do not pay into unemployment insurance who were not included in the data set. In the recent past (2001 and 2002) there were an undisclosed number of finfish fishing establishments and in 2001-2003 there were also an undisclosed number of seafood product preparation and packaging establishments in the county. No data were disclosed with regard to numbers of employees or wages for these establishments.

⁴⁴ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.1.3.1.6 Income

In 1999, the median household income was \$61,768 and the median family income was 69,019. At that time of 13.9% of households and 9.4% of families had incomes under \$25,000. In 2006, the median household income was \$76,160 and the median family income was \$91,171 in 2006, adjusted for inflation dollars. In 2006, 11.4% of households and 6.1% of families had income under \$25,000. Per capita income in 2000 was \$27,578, and in 2006 was \$35,753. Median earnings for male full-time, year-round workers were \$43,747 in 2000 and \$57,025 in 2006, whereas for female full-time, year-round workers median earnings were \$32,348 in 2000 and \$43,623 in 2006.

In 2000, 3.6% of families in the county had incomes below the poverty level, and 13.4% of families with a female householder, no husband present, had incomes below the poverty level. In 2006, 2.7% of families had incomes below the poverty level and 8.9% of families with a female householder, no husband present, had incomes below the poverty level.

4.1.3.1.7 Housing

In 2000, there were 186,937 total housing units in the county, of which 95.6% were occupied. Of the occupied units, 75.5% were owner occupied and 24.5% were renter occupied. The vacancy rate was 4.4%. Assuming all vacation and seasonal units were vacant during the census taking, 1.1% of the housing units in the county were for seasonal, recreational or occasional use. In 2006 there were 201,602 housing units of which 93.7% were occupied. Owner occupancy had increased to 77.6% and renter occupancy had decreased to 6.3%. In 2000 the median value of an owner occupied unit was \$159,300, but in 2006 it had increased to \$379,200. In 2000 the median rent was \$798, but in 2006 it had increased to \$1,151.

Housing stock in the county in 2000 consisted primarily of single unit detached (64%) and single unit attached (17.3%) structures. In 2006, similar results were found with a slight decrease in the single unit detached and attached structures and a slight increase in multi-unit structures, reflecting increased construction of multi-unit structures in the intervening years. Structures in excess of 30 years old in 2000 comprised 39.7% of the county's housing stock.

4.1.3.2 City of Baltimore

The City of Baltimore became a county equivalent by adoption of the Maryland Constitution in 1851.⁴⁵ The city located two-thirds of the way north-south on Maryland's western shores of Chesapeake Bay, on the Patapsco River providing an inland port for goods coming from the Atlantic. The city is highly developed with high-density building on the harbor and in the city boundaries and substantial transportation services including rail, subway, and bus systems. The port is still important for provision of cargo to the Midwestern U.S., the regional center for international commerce in the region is the World Trade Center in Baltimore which houses the US headquarters for several major shipping lines.⁴⁶ Exports from Baltimore include coal, corn, soybeans, lignite (a form of coal), coal coke, petroleum, and fuel oils; imports include cars and small trucks, iron ore, petroleum products, gypsum, sugar, cement, aluminum ore, salt,

⁴⁵ <http://www.msa.md.gov/msa/mdmanual/01glance/html/county.html>

⁴⁶ <http://www.msa.md.gov/msa/mdmanual/01glance/html/port.html>

crude mineral substances, fertilizer and fertilizer materials, iron alloys, wood pulp and paper.⁴⁷ Major employers in the city include ten medical care providers or medical research groups, a university, an energy products firm, a telecommunications firm, a newspaper publisher, a large-scale commercial bakery, and a specialty chemical firm.⁴⁸

Considering the inland nature of the city and its location around the river, there are no isolated areas. Transportation in the city is abundant, but may not be available to all city residents dependent upon income.

4.1.3.2.1 Location

The City of Baltimore is located approximately one third of the way south on the western side of Chesapeake Bay in Maryland. It is somewhat inland, on the Patapsco River with linkage to the main stem of the bay. Wrapping around the county to the east, north and west of the city is Baltimore County, to the south is Anne Arundel County.

4.1.3.2.2 Transportation

The City of Baltimore is along a major transportation corridor with Interstate 95 linking the major east coast cities including Washington, DC, Baltimore, Philadelphia, New York, and Boston. The proximity of Baltimore and Washington is such that additional highways have been required to handle the traffic, including Interstate 195. Interstate 97 links Baltimore with Annapolis, and Interstate 87 links Baltimore with Harrisburg, PA. Baltimore is the eastern terminus for Interstate 70, which runs to the Rocky Mountains. Rail service is provided on Amtrak, MARC (Maryland Rail Commuter Service) and for freight. In addition there is subway and light rail service in the city, in addition to bus routes. The nearest commercial airport is the Baltimore Washington International airport, in adjoining Anne Arundel County, and two additional international airports, Dulles and Reagan National are available within 50 miles.

4.1.3.2.3 Demographics

In 2000 the total population of the city was 651,154 people. There were slightly more females (53.4%) than males (46.6%). The median age was 35 years. In 2006, the total population of the city had declined to 631,366 people. Females still outnumbered males (53.5% to 46.5% respectively). The median age of the population of the city had increased slightly to 35.6 years.

In 2000, 98.5% of the population described their ethnicity in terms of a self-identified single race. The racial composition of the city of Baltimore was roughly two thirds black or African American people (64.3%), with approximately one third white people (31.6%) and a small percentage (1.5% each) Asian and people who reported two or more races. Hispanic and Latino people comprised 1.7% of the city's population in 2000. In 2006, 98.5% of the population again self-identified as a single race. The composition of the city's population was estimated to have remained at roughly two thirds black or African American (64.4%), but the white population had declined slightly to 30.9%, and the Asian population had increased slightly

⁴⁷ <http://www.msa.md.gov/msa/mdmanual/01glance/html/port.html>

⁴⁸ http://www.baltimoredevelopment.com/info_employers.html

to 1.9%, and the group “some other race” increased to 1.1%. People self-identifying two or more races remained at 1.5%. Hispanic and Latino people had increased to 2.4% of the population.

In 2000, 95.4% of the population was native born Americans. For the 4.6% of the population, the most common regions of birth include Latin America (34.4%), Asia (26.6%), and Europe (24.3%). The most frequently reported ancestries in 2000 were “other ancestries” (56%), German (7.4%) and Irish (6%). In 2006, 93.3% of the population was native born Americans. For the 6.1% of the population who were foreign born, the most common regions of birth include Latin America (33.2%), Asia (24.2%), and Africa (20.3%).

The average household size in the city in 2000 was 2.42 persons and the average family size was 3.16 persons. For the population 15 years of age and over, 35.9% of males and 28.8% of females were married in 2000. Single parent families with children under 18 years of age comprised 26.8% of families in the city in 2000. Single person households comprised 35% of households and nonfamily households comprised 7.6% of households in the city in 2000. In 2006, the average household size was 2.57 persons and the average family size was 3.57 persons. For the population 15 years of age and over, 29.7% of males and 24% of females were married in 2006. Single parent families with children under 18 years of age had declined slightly to 24.9% of families in the city. Single person households comprised 39.8% of households in the city and nonfamily households comprised 46.8% of households in the city.

In 2000, 27.2% of the city’s population five years of age and over had a disability. The segment of the population most likely to report having a disability (51.2%) was the cohort 65 years of age and over. In 2006, 19.2% of the city’s population five years of age and over had a disability. The cohort 65 years and over had a decline in disability reporting to 49.2% having a disability.

4.1.3.2.4 Education

The population that is 25 years of age and over in the city of Baltimore have lower levels of educational attainment than the national levels. In 2000, 68.4% of the population had a high school level or higher level of education and 19.1% had a bachelor’s degree or higher level of education compared to the national overall rates of 80.4% having high school or higher levels of education and 24.4% having bachelor’s degrees or higher levels of education. In 2000, graduate or professional degrees were held by 8.7% of the city’s population 25 years of age and over. In 2006, 74.2% of the population 25 years of age and over had high school graduate or higher levels of education and 23.3% of the cohort had a bachelor’s degree or higher level or higher level of education. The national levels of education were 84.1% having high school graduate or higher levels of education and 27% having bachelor’s degree or higher levels of education in 2006. Graduate or professional degrees were held by 11.1% of the population 25 years of age and over of the city in 2006.

4.1.3.2.5 Employment

The population of the city 16 years of age and over in 2000 totaled 507,534. Of these, 56.6% were in the labor force and 6% of the population 16 years of age and over were unemployed. For females in the age cohort, 54.5% were in the labor force and 48.8% were employed. In 2006, there were 494,336 people 16 years of age and over, of which 60.4% were

in the labor force and 6.4% were unemployed. For females in the age cohort, 58.7% were in the labor force and 52.5% were employed.

In 2000, the most frequent occupations were management, professional and related occupations (32.4%), sales and office occupations (27.1%), and service occupations (20%). Farming, fishing, and forestry occupations were held by 0.1% of the workers residing in the city in 2000. By class of the worker, the composition of the city's workers were 73.2% private wage and salary workers, 22.3% government workers, 4.3% self-employed workers in own not incorporated business and 0.2% unpaid family workers in 2000. In 2006, the most frequent occupations were management, professional, and related occupations (34.1%), sales and office occupations (26%), and service occupations (21.9%). Farming, fishing and forestry occupations were held by 0.16% of the city's workers in 2006. The composition of classes of workers had shifted somewhat in 2006 with 75.9% private wage and salary workers, 20.7% government workers, 3.4% self-employed workers in own not incorporated business and 0.1% unpaid family workers (totals 100.1% due to rounding.)

The industries in which workers residing in the county were employed most commonly in 2000 included educational, health and social services (26.8%), professional, scientific, management, administrative, and waste management services (10.2%), and public administration (9.3%). Farming, forestry, fishing and hunting, and mining provide employment for 0.1% of the city's workers. In 2006, the most common industries in which the city's workers participated included educational services, and health care, and social assistance (28.9%), professional, scientific, and management, and administrative and waste management services (10.7%), and retail trade (9.5%). Farming, forestry, fishing and hunting, and mining provide employment for 0.25% of the city's workers.

The City of Baltimore had a limited number of fishing establishments between 2001 and 2006 for which data could be disclosed according to the Bureau of Labor Statistics.⁴⁹ At peak, there were two shellfish fishing establishments and one seafood product preparation and packaging establishment, which were functioning in 2006. No data was disclosed on number of employees or wages for establishments in either category.

4.1.3.2.6 Income

The median household income for the City of Baltimore in 1999 was \$30,078 and the median family income was \$35,438. At that time, 42.8% of households and 35.5% of families had incomes under \$25,000. The per capita income in 2000 was \$16,978. In 2000, the median earnings for male full-time, year-round workers were \$31,767 and the median earnings for female full-time, year-round workers were \$26,832. The median household income for the city of Baltimore in 2006 was \$36,031, and the median family income was \$43,889 in 2006 inflation-adjusted dollars. In 2006, 34.6% of households and 25.8% of families had incomes under \$25,000 dollars. The per capita income in 2006 was \$20,791. Median earnings for male full-time, year-round workers had increased to \$36,620 and the median earnings for female full-time, year-round workers had increased to \$32,203.

⁴⁹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

In 1999, 18.8% of the families in the city had incomes below the poverty level. This is perhaps the highest rate for any city/county equivalent around Chesapeake Bay. Families with a female householder, no husband present, were nearly twice as likely to be in poverty in the city with 31.5% having incomes below the poverty level in 1999. In 2006, 15.8% of all families had incomes below the poverty level in the previous 12 months, and families with a female householder, no husband present were about twice as likely (26.5%) to have income below the poverty level, and even more likely to be in poverty if these families had children under 5 years old only (47.4%).

4.1.3.2.7 Housing

In 2000 there were 300,477 housing units in the city of which 85.9% were occupied. Of the occupied units, 50.3% were owner occupied, and 49.7% were renter occupied. The vacancy rate was 14.1%. Assuming all vacation and seasonal housing units were vacant during the census taking, 0.6% of all units in the city were for seasonal, recreational or occasional use. In 2006, there were 296,064 total housing units in the city of which 80.3% were occupied. Of the occupied units, 50.7% were owner occupied, and 49.3% were renter occupied. The median value of owner occupied units was \$69,100 in 2000 and had increased to \$126,400 in 2006. The median rent was \$498 in 2000, and had increased to \$750 in 2006.

Housing stock in the city was predominantly single unit attached (51.8%), single unit detached (13.4%), and multi-unit structures (10.3% 20 or more units) in 2000. The proportions remained similar in 2006 with 53% of housing units being single unit attached, 13.9% single unit detached, and 10.3% in 20 or more unit structures. Housing units in excess of 30 years old in 2000 comprised 85% of the city's housing stock.

4.1.3.3 Baltimore County

Baltimore County is the second most northerly county on the western shore of Chesapeake Bay. Baltimore County is within the Baltimore-Towson Metropolitan Area, which is a subsection of the Baltimore-Washington-Northern Virginia Combined Statistical Area. The county wraps around the northern area of the City of Baltimore, and the southern half of the county is largely urbanized and forms the city's suburban areas. Although much of the southern portion of the county is urbanized, it has no municipalities, and, thus, only county level of government. Unincorporated Towson is the county seat. In the county's information on its economy, the economic development department notes that the county "has become the largest employment base in the region and the second largest in the State." Among major employers in the area (employers of over 2000 employees), included are the Social Security Administration with nearly 10,000 employees, three hospitals, the centers for Medicare and Medicaid Services, the headquarters of a retirement communities and some of the retirement communities, financial and investment services, a health care provider, and a food products company which produces spices and flavorings.⁵⁰

There are three islands in the county that are isolated property and are only accessible by boat, but are held as state park. They comprise Hart-Miller Island State Park, and include Hart, Miller and Pleasant Islands. Hart-Miller Islands, now together as a diked property consisting of

⁵⁰ <http://www.co.ba.md.us/Agencies/economicdev/gateway/bizcommunities/employers.html>

dredged material is managed for birds that prefer mudflats. Pleasure Island, nearer the shore is wooded, and while it once was developed as an amusement park is now closed.⁵¹

4.1.3.3.1 Location

Baltimore County is located second most northerly along the western shore of Chesapeake Bay. It shares its northeastern boundary with Harford County, and its northern boundary is the state line with Pennsylvania. Across the state line is York, County, PA. To the west are Carroll and Howard Counties, north and south respectively, and to the south of Baltimore County is Anne Arundel County and the apparently embedded, but politically and jurisdictionally distinct City of Baltimore. To the east is Chesapeake Bay, and across the bay is Kent County.

4.1.3.3.2 Transportation

Major highways in the county include Interstates 95, 695, 195, 795 and 83. State Highways 25, 130, 145, 146, and 147 among others provide circulation within the county. Amtrak and MARC rail service is provided in the county in addition to freight rail services. There are two general aviation airports in the county, both near the area of Essex.⁵² Commercial air service is available in adjacent Anne Arundel County at the Baltimore Washington Airport.

4.1.3.3.3 Demographics

In 2000 the population of the county was 754,292 people. There were slightly more females (52.6%) than males (47.4%). The median age of the county's population was 37.7 years. In 2006, the population of the county had increased to an estimated level of 787,384 people. Females in the estimate still were slightly more abundant than males (52.4% females, 47.6% males). The median age of the population in 2006 had increased to 38.8 years.

In 2000, 98.6% of the population of Baltimore County self-identified as a single race. Of these people, 74.4% were white, 20.1% were black or African American, and 3.2% were Asian. People who identified their races as American Indian and Alaska native, native Hawaiian and other pacific islander, or some other race comprised less than 1% each of the population. Hispanic and Latino people comprised 1.8% of the population of the county at that time. In 2006, the racial composition of the county had shifted to a slightly more diverse population with a higher percentage of black/African American, and Asian people. In 2006, for those who self-identified a single race, 68.7% were white, 24.4 % were black or African American, and 4.2% were Asian. As in 2000, people who self-identified as American Indian and Alaska native, native Hawaiian and other pacific islander, or some other race comprised less than 1% each of the population. Hispanic and Latino people comprised 2.7% of the population in 2006.

In 2000, nearly 93% of the county's population was native born Americans. For the 7.1% of the population that was foreign born, the most common regions of birth included Asia (39.2%), Europe (30.6%), and Latin American (17.6%). In 2006, 91.3% of the county's population was native born Americans. For the 8.7% of the population that was foreign born, the most common regions of birth included Asia (40.3%), Europe (21.4%), and Latin America

⁵¹ <http://www.dnr.state.md.us/naturalresource/summer2004/hartmiller.html>

⁵² <http://www.marylandregionalaviation.aero/content/mdpublicuseairports/index.html>

(20.6%). The most frequently reported ancestries in 2000 included “other ancestries” (27.5%), German (22%), and Irish (14.6%).

In 2000, the average household size was 2.46 persons and the average family size was 3 persons. In 2006, the average household size remained at 2.46 persons but the average family size had decreased slightly to an estimate of 2.99 persons. For people 15 years of age and over, 57.2% of males and 49.3% of females were married in 2000; in 2006, 52.4% of males were married and 45.9% of females were married. In 2000, single parent households with children under 18 years of age comprised 13.3% of families in the county, whereas in 2006, single parent households with children under 18 years of age comprised 16.3% of families. Single person households comprised 27.3% of households and nonfamily households comprised 6.1% of households in 2000; in 2006, single person households comprised 27.5% of households and nonfamily households comprised 34.4% of households in the county.

For people five years of age and over, 18.2% had a disability in 2000. At that time, the population most likely to have a disability (38.1% reported having a disability) was the cohort 65 years of age and over. In 2006, 14% of the population five years of age and over reported having a disability. For the cohort aged 65 and over, 39.5% reported having a disability.

4.1.3.3.4 Education

The population of Baltimore County, unlike the population of the adjoining City of Baltimore is highly educated. In 2000, 84.3% of the county’s population 25 years of age and over had a high school graduate or higher level of education, and 30.6% had a bachelor’s degree or higher level of education. Compared to the national rates with 80.4% of the population having a high school graduate or higher level of education and 24.4% of the population in that cohort having a bachelor’s degree or higher level in 2000, the county compares favorably. At that time 12.5% of Baltimore County’s population held graduate or professional degrees. In 2006, for the same age cohort, 88.1% of the county’s population had a high school graduate or higher education, and 34.3% had a bachelor’s degree or higher level of education. This compares with national rates of 84.1% for the high school graduate or higher level of education and 27% for bachelor’s degree or higher levels of education. In 2006, 14.5% of the county’s population 25 years of age and over held graduate or professional degrees.

4.1.3.3.5 Employment

In 2000, the population 16 years of age and over totaled 595,770, of which 66.5% were in the labor force, and 2.8% were unemployed. For females in the age cohort, 61% were in the labor force and 58.5% were employed. In 2006, the population 16 years of age and over totaled 633,025 of which 68.1% were in the labor force and 3.2% were unemployed. For females in the age cohort, 63.6% were in the labor force and 60.4% were employed.

The most common occupations for workers residing in Baltimore County in 2000 included management, professional and related occupations (39.5%), sales and office occupations (29%) and service occupations (13.2%). Farming fishing and forestry occupations were reported by 0.1% of the county’s workers. By class of worker, the composition of those residing in the county in 2000 were predominantly private wage and salary workers (76.5%), then government workers (18.4%), followed by self-employed workers in own not incorporated

business (4.9%), and unpaid family workers (0.2%). In 2006, the most common occupations were management, professional and related occupations (41.6%), sales and office occupations (26.4%), and service occupations (14.2%). Farming, fishing and forestry were estimated to be the occupations for 0.1% of the county's workers in 2006. By class of worker, the county's employment was even more dominantly wage and salary workers (77.6%), with slightly fewer government workers (17.6%), self-employed workers in own not incorporated businesses (4.6%) and unpaid family workers (0.1%).

The most frequently reported industries in which workers residing in the county were employed in 2000 included educational, health and social services (22.9%), retail trade (11.3%) and professional, scientific, management, administrative, and waste management services (10.5%). In 2000, agriculture, forestry, fishing and hunting, and mining provided employment for 0.2% of workers residing in the county. In 2006, the most frequently reported industries in which workers residing in the county participated included educational services, and health care, and social assistance (24.6%), professional, scientific, and management, and administrative and waste management services (12.5%), and retail trade (10.6%). Agriculture, forestry, fishing and hunting, and mining employment remained at 0.2% of the county's workers.

For the last three years for which there are data (2004 – 2006) there were active establishments in finfish fishing (one), shellfish fishing (two in 2004, declining to one for 2005 and 2006), and seafood product preparation and packaging (two in 2004 increasing to 3 in 2005 and 2006) according to the Bureau of Labor Statistics;⁵³ data were not disclosed for the prior three years. Data were not disclosed for numbers of employees or wages during the time period for these employment categories.

4.1.3.3.6 Income

The median household income in the county in 1999 was \$50,667, and the median family income was \$59,998. At that time, 20.4% of households and 12.7% of families had income under \$25,000. The per capita income for the county was \$26,167 in 2000. Median earnings for male full-time, year-round workers were \$41,048 and median earnings for female full-time, year round workers were \$31,426. In 2006, the median household income was \$59,995 and the median family income was \$70,716 in 2006 inflation-adjusted dollars. In 2006, 16.8% of households and 11.1% of families had income under \$25,000 in the previous year. The per capita income in 2006 was \$31,086. Median earnings for male full-time, year-round workers in 2006 were \$49,615 and median earnings for female full-time, year-round workers were \$40,187.

In 1999, 4.5% of families residing in the county had incomes below the poverty level. Families with a female householder, no husband present were approximately four times more likely to be in poverty with 13.8% of these families having incomes below the poverty level in 1999. In 2006, 5.5% of families residing in the county had incomes below the poverty level in the previous 12 months, which is one of the few areas where an increase in families below the poverty level has been detected for Chesapeake Bay area. Families with a female householder, no husband present, were in even more precarious situations with an increase to 16.8% of these families having incomes below the poverty level.

⁵³ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.1.3.3.7 Housing

In 2000 there were 313,734 housing units in the county of which 95.6% were occupied. Of the occupied units, 67.6% were owner occupied and 32.4% were renter occupied. The vacancy rate was 4.4%. Assuming that all vacation and seasonal units were vacant during the census taking, 0.5% of all units were for seasonal, recreational or occasional use. In 2006, there were 326,023 housing units in the county of which 95.6% were occupied. Home ownership rates had declined slightly, with owner occupied units making up 66.9% of the occupied units and 33.1% of units being renter occupied. The vacancy rate remained at 4.4%. The median value of owner occupied units in 2000 was \$127,300, but in 2006 it had increased to \$253,600; the median rent in 2000 was \$670, and the median rent had increased to \$924.

The housing stock in the county was comprised mainly of single unit detached (47%) and single unit attached (24.5%) units in 2000. In 2006, these proportions were similar with 47.4% single unit detached and 24.4% single unit attached structures in the county. Housing units in excess of 30 years old in 2000 accounted for 54.9% of the county's housing stock.

4.1.3.4 Calvert County

Calvert County is located along the main stem of Chesapeake Bay, and is the second most southerly county in Maryland on the main stem of the Bay, just north of St. Mary's County. The county is part of the Baltimore-Towson Metropolitan Statistical Area within the Washington-Baltimore-Northern Virginia Combined Statistical Area. The county is a peninsula, separated from the more mainland counties of Prince George's and St. Mary's by the Patuxent River. Although segments of the county are more rural in nature, three areas were recognized as urbanized with populations of less than 50,000 in 2000.⁵⁴ Major industries of the area include defense contracting, information technology, tourism and administrative services according to the county profile on the official website for Calvert County.⁵⁵

There are no isolated islands in Calvert County, but the peninsula is a maximum of 9 miles wide at its widest point, so connections are slightly limited. A bridge connects the Solomon's Island area at the southern portion of the county to St. Mary's county. Prior to that construction in the 1970s, ferries connected the two counties, and the county now attributes better roadway connections in part to its enhanced growth.⁵⁶

There are two municipalities in Calvert County, Chesapeake Beach and North Beach, both located on the northeast corner of the county. Additional "town centers" have been designated in the county's comprehensive plan, including Dunkirk, Owings, Huntingtown, Prince Frederick, St. Leonard, Lusby and Solomons listed north to south.⁵⁷ Prince Frederick is the county seat.

⁵⁴ http://www.msa.md.gov/msa/govpub/e/033000/033711/pdf/calv_ua.pdf

⁵⁵ <http://www.co.cal.md.us/visitors/profile/>

⁵⁶ <http://www.co.cal.md.us/visitors/profile/history>

⁵⁷ <http://www.co.cal.md.us/visitors/profile/>

4.1.3.4.1 Location

Calvert County is the second most southerly county on the main stem of Chesapeake Bay, it is a peninsular area separated from Prince George's, Charles, and St. Mary's Counties to the west by the Patuxent River. It shares its northern boundary with a portion of the southern boundary of Anne Arundel County. Across the bay to the east are Dorchester and Talbot counties.

4.1.3.4.2 Transportation

The major highways in Calvert County are State Highways 2 and 4. State Highway 2 connects with Highway 50/301 which links into the eastern shore. State Highway 4 connects southward to St. Mary's County, and northward toward the Washington, DC area. State Highways 260, 263, and 575 provide circulation within the county. The county does not have rail service. Commercial airports are Dulles, Baltimore Washington International and Reagan National. Calvert County does not have a public use general aviation airport, but one is available each in adjoining counties, St. Mary's and Charles Counties, four in adjoining Prince George's, and three in Anne Arundel County.

4.1.3.4.3 Demographics

The population of the county totaled 74,563 persons in 2000. The population was evenly split between males (49.3%) and females (50.7%). The median age of the county's population in 2000 was 35.9 years. In 2006, the population had increased to 88,804 persons, with an equivalent distribution of males and females. The median age had increased to 37.9 years.

The ethnic composition of the county was predominantly people of a single race (98.7% self-identifying a single race) in 2000. White people comprised 83.9% of the county's population, black or African American people comprised 13.1%, and the remaining racial groups (American Indian or Alaska native, native Hawaiian or other Pacific Islander, Asian, and some other race) made up a composite 1.7% of the population, with no one group comprising 1% or more of the total county population. Hispanic or Latino people comprised 1.5% of the county's population in 2000. In 2006, the county's population was still predominantly comprised of people self-identifying a single race (97.7%), and still dominantly white with 83.3% of the population self-identifying as white. A shift had occurred among the minority populations within the county, however; the black or African American population had declined slightly to 12.1%, while the Asian population had increased slightly to 1.4% of the total county population. Hispanic or Latino people had also increased in the county population to 2.1%.

In 2000, 97.8% of the county's population was comprised of native-born Americans. For the 2.3% of the population that was foreign born, the most frequently reported regions of birth included Europe (31.2%), Asia (29.1%) and Latin America (26%). In 2006, 97.9% of the county's population was native born Americans. The 2006 data is based on sample information, and the US Census Bureau determined the data cannot be displayed because the number of sample cases is too small.⁵⁸

⁵⁸ http://factfinder.census.gov/servlet/ADPTTable?_bm=y&-geo_id=05000US24009&-qr_name=ACS_2006_EST_G00_DP2&-ds_name=ACS_2006_EST_G00_-&-lang=en&-redoLog=false&-sse=on

The average household size was 2.61 persons and the average family size was 3.26 persons in 2000. In 2006, the average household size had increased to 2.9 persons and the average family size had increased slightly to 3.28 persons. For people 15 years of age and over, 63.1% of males and 60.6% of females were married in 2000; in 2006, 58.5% of males and 53.5% of females 15 years of age and over were married. Single parent families with children under 18 years of age comprised 10.3% of families in the county in 2000, and in 2006 single parent families with children under 18 years of age comprised 12.4% of families in the county. Single person households comprised 16.3% of households and nonfamily households comprised 4.2% of households in the county in 2000. In 2006, single person households comprised 16.1% of households and nonfamily households comprised 21.3% of households in the county.

In 2000, 15.9% of the county's population five years of age and over had a disability. The age cohort most likely to have a disability (36.1%) was the group 65 years of age and over. In 2006, 15% of the population five years of age and over had a disability; for those in the population age 65 and over, 52.8% had a disability.

4.1.3.4.4 Education

In 2000, 86.9% of the county's population 25 years of age and over had a high school graduate or higher level of education and 22.5% had a bachelor's degree or higher level of education. This compares favorably with national rates of 80.4% of the population having a high school graduate or higher level of education and slightly less favorably with the national rate of college degree holders with 24.4% having a bachelor's degree or higher level of education. Graduate or professional degrees were held by 8.3% of the county's population 25 years of age and over in 2000. In 2006, 92% of the county's population 25 years of age and over had a high school graduate or higher level of education and 27.6% had a bachelor's degree or higher level of education. These both exceeded the national rates of 84.1% with high school graduate or higher levels and 27% having bachelor's degrees or higher levels of education. In 2006, graduate or professional degrees were held by 10% of the county's population 25 years of age and over.

4.1.3.4.5 Employment

In 2000, there were 54,988 people in the county over 16 years of age of which 71.5% participated in the labor force and 2.1% were unemployed. For females in this cohort, 65.6% were in the labor force and 62.9% were employed at that time. In 2006, 69,919 people 16 years of age and over in the county; 72.1% were in the labor force, and 2.3% were unemployed. For females in this age cohort, 66.7% were in the labor force and 63.7% were employed.

The most frequently reported occupations in the county in 2000 included management, professional and related occupations (36.8%), sales and office occupations (24.4%), and construction, extraction and maintenance occupations (15%). Farming, fishing and forestry occupations were reported by 0.2% of county workers in 2000. In 2006, the most common occupations were management, professional and related occupations (40.5%), sales and office occupations (24.2%), and service occupations (14.7%). Farming, fishing and forestry occupations were reported by 0.1% of county workers in 2006. By class of worker, the distribution of workers residing in the county in 2000 was 67.1% private wage and salary

workers, 26.5% government workers, 6.1% self-employed workers in own not incorporated business, and 0.3% unpaid family workers. In 2006, the distribution by class of worker was 66.9% private wage and salary workers, 27.5% government workers, 4.7% self-employed workers in own not incorporated business, and 0.9% unpaid family workers.

The industries in which workers residing in the county were most commonly employed included educational, health, and social services (17%), public administration (14.9%), and construction (13.7%) in 2000. Agriculture, forestry, fishing and hunting, and mining provide employment for 0.7% of the county's workers. In 2006, the industries in which workers most commonly were employed included educational services, and health care, and social assistance (19%), public administration (14%), professional, scientific, and management, and administrative and waste management services (12.2%) and construction (12.2%). Agriculture, forestry, fishing and hunting, and mining employed 0.5% of the county's workers in 2006.

Fishing employment in Calvert County recognized by the Bureau of Labor Statistics quarterly survey⁵⁹ was restricted to seafood product preparation and packaging in 2001 and 2002. For those years data was not available for numbers of establishments, numbers of employees, or wages. No data was available for subsequent years.

4.1.3.4.6 Income

In 1999 the median household income for Calvert County was \$65,945, and the median family income was \$71,545. In 2000, 12 % of households and 7.6% of families had income below \$25,000. Per capita income in 2000 was \$25,410. At that time the median earnings for male full-time, year round workers was \$48,664 and the median earnings for female full-time year round workers was \$32,265. In 2006, the median household income was \$84,891 and the median family income was \$91,175 in 2006 inflation-adjusted dollars. In 2006, 9.6% of households and 5.2% of families had income below \$25,000. Per capita income was \$34,628 in 2006. Median earnings for male full-time year round workers were \$57,002, and median earnings for female full-time year round workers were \$42,174.

In 1999, 3.1 % of families in the county had incomes below the poverty level, and 15.2% of families with a female householder, no husband present, were found to be in poverty. In 2006, 1.5% of all families in the county had income below the poverty level in the previous 12 months, and 5.5% of families with a female householder, no husband present, had incomes below the poverty level.

4.1.3.4.7 Housing

In 2000, there were 27,576 housing units in the county, of which 92.3% were occupied. For the occupied units, 85.2% were owner occupied and 14.8% were renter occupied. The vacancy rate was 7.7% in 2000. Assuming that all vacation and seasonal properties were vacant at the time of census taking, 3.8% of units in the county were for seasonal, recreational or occasional use. In 2006, there were 32,106 units in the county, of which 94.3% were occupied. Of the occupied units, 84.9% were owner occupied and 15.1% were renter occupied. At that time the vacancy rate was 5.7%. The median value of an owner occupied unit in 2000 was

⁵⁹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

\$169,200 which had increased to \$394,700 in 2006, and the median rent in the county was \$834 in 2000 which increased to \$1,021 in 2006.

Housing stock in the county in 2000 consisted predominantly (88.7%) of single-family detached units. In 2006, this dominance persisted at 87.5% of housing units. Housing units in excess of 30 years old in 2000 comprised 21.5% of the county's housing stock.

4.1.3.5 Charles County

Charles County is the central county located along the Potomac River between Chesapeake Bay and Washington, DC. The county is predominantly inland in nature so there are no especially isolated areas in the county. The northern part of the county is more urbanized while the southern portion, nearer the Potomac, is reasonably rural in character with substantial woodlands and some agricultural uses as can be seen in the Google Earth aerial photography. Major employers (over 100 employees) in the county include a development corporation, an engineering consultant, a commercial printer, a fuel oil provider, a provider of concrete, block and gravel, a building supply company, a construction firm, a naval base, a paving contractor, a non-profit center for the disabled and a newspaper.⁶⁰

Municipalities within the county include La Plata, Port Tobacco and Indian Head. La Plata is the county seat. The nearest large city is Washington, DC, approximately 35 miles from the county seat.

4.1.3.5.1 Location

Charles County is located predominantly on the Potomac River, upstream from St. Mary's County and separated from St. Mary's County in part by the Wicomico River. On the northern border of Charles County is Prince George's County. To the east is the Patuxent River, and across the river is Anne Arundel County.

4.1.3.5.2 Transportation

Major highways in the county include US 301 linking Virginia with Maryland via the Potomac River Bridge, State Highway 5 which links St. Mary's county to Charles County, and State Highway 210 which links Indian Head to Prince George's County. State Highways 224, 6, 234, 257, 227, provide the transportation network within the county. Rail service is available for freight within the county, but passenger service is available in adjoining Prince George's County for both Amtrak and MARC. There is a general aviation airport near Waldorf, and commercial air services are available at Washington Dulles, approximately 60 miles away, Reagan National, approximately 35 miles away, and Baltimore Washington International approximately 55 miles away.

4.1.3.5.3 Demographics

In 2000, there were 120,546 people residing in Charles County. The population had slightly more females (51.2%) than males (48.8%). The median age of the population at that time was 34.6 years. In 2006, the population was estimated to have increased to 140,416 people.

⁶⁰ <http://www.ccbiz.org/employers.asp>

The estimates remained slightly higher (51.3%) for females than for males (48.7%). The median age was estimated at 35.2 years.

The ethnic composition of the county was approximately two thirds (68.5%) of the people self identifying a single race as white people, and remaining third of the population predominantly black or African American people (26.1%). Only Asian people made up a component over 1% at 1.8%. Hispanic and Latino people comprised 2.3% of the county's population in 2000. In 2006, the ethnic composition of the county had shifted fairly substantially with the white population declining to 56.9% of the county's population, black and African American people making up 36.2% of the population and Asian people making up 2.4% of the county's population. In addition, people reporting two or more races increased from 2.1% in 2000 to 3.3% in 2006. Hispanic or Latino people comprised 3.3% of the county's population in 2006.

In 2000, 97.1% of the county's population was native born Americans. For the nearly 3% of the population which was foreign born, the most common regions of birth included Asia (40.5%), Europe (28%) and Latin America (23%). In 2006, 96.4% of the county's population was native born Americans. The population of foreign-born people was too small to present data on regions of birth, and the census bureau withheld data. The most common ancestries in 2000 included "other ancestries" (33.4%), German (13.9), and Irish (13.3%).

The average household size in 2000 was 2.86 persons and the average family size was 3.21 persons. For people 15 years of age and over, 59.8% of males and 55.3% of females were married. Single parent families with children under 18 years of age comprised 14.9% of families in the county in 2000. Single person households comprised 17.1% of households and nonfamily households comprised 4.9% of all households in the county in 2000. In 2006, the average household size was 2.85 persons and the average family size was 3.23 persons. For people 15 years of age and over, 54.6% of males and 49.6% of females were married in 2006. Single parent families with children under 18 years of age comprised 19.4% of families in the county in 2006. Single person households comprised 18.9% of households and nonfamily households comprised 23% of all households in the county.

In 2000, 16.7% of the population age five and over had a disability. The most affected segment of the population was the cohort age 65 years and over which had 42.5% of its population with a disability. In 2006, 11.6% of the population five years of age and over had a disability. The age cohort 65 years and over had 38.7% reporting a disability in 2006.

4.1.3.5.4 Education

For Charles County's population 25 years of age and over in 2000, 85.8% of the population had high school graduate or higher levels of education and 20% had a bachelor's degree or higher level of education. At time, 6.8% of the age cohort held graduate or professional degrees. In 2006, 89.2% of the county's population 25 years of age and over had a high school graduate or higher level of education and 25% had a bachelor's degree or higher level of education. In 2006, 8.1% of the county's population had a graduate or professional degree.

4.1.3.5.5 Employment

In 2000, there were 89,512 people in the county 16 years of age and over, of which 72.6% were in the labor force and 2.4% were unemployed. For women in the age cohort, 67.5% were in the labor force and 64.1% were employed. In 2006, there were 108,609 people 16 years of age and over in the county, of which 73.5% were in the labor force and 3.7% were unemployed. For females in the age cohort, 68.1% were in the labor force in 2006, and 63.9% were employed.

In 2000, the most frequent occupations for workers residing in the county included management, professional, and related occupations (35.7%), sales and office occupations (28.3%), and service occupations (13.9%). Farming fishing and forestry occupations were reported by 0.2% of the county's workers. By class of worker, the composition was 66.2% private wage and salary workers, 29.2% government workers, 4.3% self-employed workers in own not incorporated business, and 0.3% unpaid family workers in 2000. In 2006, the most frequent occupations for workers in the county included management, professional and related occupations (42.2%), sales and office occupations (25.5%), and service occupations (12.9%). In 2006, no one was found for farming, fishing or forestry occupations. By class of worker the composition of the county was 65.8% private wage and salary workers, 30.5% government workers, and 3.7% self-employed workers in own not incorporated business. There were no unpaid family workers found in 2006.

The industries in which workers residing in the county were employed in 2000 most commonly included public administration (18%), educational, health and social services (16.1%), and retail trade (12%). Agriculture, forestry, fishing and hunting, and mining provide employment for 0.8% of the county's workers in 2000. In 2006, the major industries were public administration (18.7%), educational services, and health care, and social assistance (15.9%) and professional, scientific, and management, and administrative and waste management services (15.6%). Agriculture, forestry, fishing and hunting, and mining provide employment for 0.4% of the county's workers in 2006.

According to the Bureau of Labor Statistics quarterly survey,⁶¹ the only fishing establishments in Charles County were in seafood product preparation and packaging. Between 2001 and 2003 the number of establishments was not disclosed, and between 2004 and 2006 there was one establishment in the county. Data on numbers of employees and wages were not disclosed for the years 2001 to 2006.

4.1.3.5.6 Income

The median household income in 1999 in Charles County was \$62,199, and the median family income was \$67,602. At that time 12.7% of households and 9.1% of families had incomes under \$25,000. Per capita income in the county in 2000 was \$24,285. Median earnings for male full-time, year-round workers were \$43,371 and median earnings for female full-time, year-round workers were \$34,231 in 2000. In 2006 the median household income in the previous year was \$80,179 and the median family income was \$84,670 in 2006 inflation-adjusted dollars. At that time 10.9% of households and 6.7% of families had incomes under \$25,000. Per capita

⁶¹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

income was \$33,849 in 2006. Median earnings for male full-time, year-round workers were \$54,445 and median earnings for female full-time, year-round workers were \$44,516.

In 2000, 3.7% of families had incomes below the poverty level in 1999 in Charles County. Families with a female householder, no husband present, had a substantially higher rate of families in poverty with 13.5% of these families having incomes below the poverty level. In 2006, poverty had increased in Charles County, with 4.5% of families having income below the poverty level in the previous 12 months; 15.9% of families with a female householder, no husband present, had incomes below the poverty level.

4.1.3.5.7 Housing

In 2000, there were 43,903 housing units in the county, of which 94.9% were occupied. Of the occupied units, 78.2% were owner occupied and 21.8% were renter occupied. The vacancy rate was 5.1%. Assuming that vacation and seasonal units were vacant during the census taking, 0.9% of all housing units are for seasonal, recreational or occasional use. In 2006, there were 51,410 housing units, of which 94.7% were occupied. At that time 79.2% of the occupied units were owner occupied and 20.8% were renter occupied. The vacancy rate was 5.3%. The median value of an owner occupied unit in 2000 was \$153,000, which had increased to \$379,300 in 2006; the median rent in 2000 was \$858, which increased to \$1133 in 2006.

In 2000 the housing stock was predominantly single unit detached (71.1%) and single unit attached (17.9%) structures. In 2006, single unit detached housing became even more dominant in the county with 73% of the units being single unit detached structures, and next most dominant are the single unit attached structures (12.2%). Houses in excess of 30 years old in 2000 comprised 24.4% of the housing stock in the county.

4.1.3.6 Harford County

Harford County is the northernmost of the counties on the western shore of Chesapeake Bay. The county does not have isolated areas in terms of islands or other areas limited by access. It is situated to the west of the Susquehanna River at the river's confluence with the bay. The county is part of the Baltimore-Towson Metropolitan Statistical Area within the Washington-Baltimore-Northern Virginia Combined Statistical Area. The northern portion of the county is largely agricultural in nature for its land use, as can be determined by the lack of trees, contour plowing patterns, and lack of compact development of towns and cities in aerial photography such as Google Earth. The southern part of the county is substantially more developed with roads, cities, and the area of the Aberdeen Proving Ground military base. Major employers in the county include the Aberdeen Proving Ground, the county's government and schools, government contractors related to military and other governmental functions, health care, manufacturing and distribution for snack foods, drug stores, a cosmetic store and a high end department store.⁶²

The municipalities within the county include Aberdeen, Bel Air, and Havre de Grace. Bel Air is the county seat. Nearby large cities include Baltimore, approximately 30 miles from the county seat, Washington, DC, approximately 65 miles from the county seat, Philadelphia, PA, approximately 70 miles from the county seat.

⁶² <http://www.harfordbusiness.org/demographics.cfm#EmployerStats>.

4.1.3.6.1 Location

Harford County is the most northerly of the western shore counties. It is situated to the north and west of the confluence of the Susquehanna River and Chesapeake Bay. The county's northern border is the state line with Pennsylvania, with Lancaster County on the PA side of the border. To the east, across the Susquehanna River, is Cecil County. To the south and east is Chesapeake Bay, and in addition to Cecil County across the bay is Kent County. To the west is Baltimore County.

4.1.3.6.2 Transportation

The major highway in the county is Interstate 95, which links most of the east coast cities. In addition, US Highways 1 and 40 roughly parallel Interstate 95, providing additional access between Baltimore County and Cecil County. State Highways 23, 146, and 138 provide circulation within the county. Rail transportation is available in the county for both freight and passenger service on MARC and Amtrak. There are three general aviation airports in the county, including Fallston and Harford County airports and a seaplane base at Havre de Grace. The nearest commercial airports are Baltimore Washington International (approximately 30 miles away) and Philadelphia (approximately 78 miles away).

4.1.3.6.3 Demographics

The total population of Harford County numbered 218,590 in 2000. The population had slightly more females (51%) than males (49%). The median age of the county's population was 36.2 years. In 2006, the population had increased to 241,402 people, with a slight increase in the female (51.1%) to male (48.9%) population. The median age of the county's population in 2006 had increased to 37.2 years.

The ethnic composition of the county in 2000 for the population which self-identified as a single race (98.5%) was primarily white people (86.8%), with 9.3% of the population black or African American people, and 1.5% Asian people. Less than 1% of the population self-identified as American Indian, Alaska native, native Hawaiian or other Pacific islander, or as another race. Hispanic or Latino people comprised 1.9% of the county's population. In 2006, the county had become more diverse, with the population composition of 83.2% white people, 12% black or African American people, and 1.8% Asian people. The remaining groups stayed at less than 1% of the population for each racial category. Hispanic or Latino people comprised 2.4% of the population in 2006.

In 2000, 96.6% of the county's population was native born Americans. For the 3.4% of the population that was foreign born, the most common regions of birth included Europe (41.3%), Asia (32.7%), and Latin America (16.4%). In 2006, 94.7% of the county's population was native born Americans. The sample sizes were too small for regions of birth for census publication. In 2000, the most common ancestries reported by residents of the county included German (26.5%), Irish, (18%), and "other ancestries" (17.4%).

The average household size was 2.72 persons and the average family size was 3.14 persons in 2000. For people 15 years of age and over, 64.8% of males and 59.9% of females were married in 2000; in 2006, 59.6% of males and 56% of females were married. In 2006, the

average household size was 2.64 persons and the average family size was 3.11 persons. Single parent households with children under 18 years of age comprised 10.2% of families in 2000, and 10.3% of families in 2006. Single person households comprised 19.8% of households in 2000 and 22.9% of households in 2006. Nonfamily households comprised 4.1% of households in 2000 and 27.5% of households in 2006.

In 2000, 15.8% of the population of Harford County five years of age and over had a disability. The group with the highest rates of reporting a disability (39.6%) was the cohort 65 years of age and over. In 2006, 12.1% of the county's population 5 years of age and over had a disability, and for the age 65 and over cohort, 36% were estimated as having a disability.

4.1.3.6.4 Education

The population of Harford County is well educated, with higher rates of college degree holders than the national rates of 24.4% in 2000 and 27% in 2006. For the population 25 years of age, 86.7% had a high school graduate or higher level of education and 27.3% had a bachelor's degree or higher level of education in 2000; in 2006, 90.5% had a high school graduate or higher level of education, and 29.5% had a bachelor's degree or higher level of education. Graduate and professional degree holders comprised 9.4% of the population 25 years of age and over in 2000, and 11.8% in 2006.

4.1.3.6.5 Employment

In 2000, there were 164,126 people in the county 16 years of age and over, of which 71.3% were in the labor force and 2.1% were unemployed. In 2006, there were 188,278 people 16 years of age and over, with 71.9% in the labor force and 2.4% were unemployed. Of females 16 years of age and over, 64.2% were in the labor force and 61.7% were employed in 2000; in 2006, 67% of females age 16 and over were in the labor force and 64% were employed.

The most frequently reported occupations for workers residing in the county included management, professional and related occupations (38%), sales and office occupations (27.4%), and service occupations (13%) in 2000. Farming fishing and forestry was reported by 0.1% of county workers in 2000. The distribution of workers by class was 76.6% private wage and salary workers, 18.8% government workers, 4.4% self-employed workers in own not incorporated business, and 0.2% unpaid family workers in 2000. In 2006, the most frequently reported occupations for workers in the county included management, professional and related occupations (41.7%), sales and office occupations (26.4%), and service occupations (13%). Farming, fishing and forestry occupations were reported by 0.1% of county workers in 2006. By class of worker, the distribution in the county 77.6% were private wage and salary workers, 18.1% were government workers, 4% were self-employed in own not incorporated business, and 0.1% were unpaid family workers.

The industries in which workers residing in the county were most frequently employed included educational, health and social services (19.8%), retail trade 12.6%, and professional, scientific, management, administrative, and waste management services (9.2%) in 2000. Agriculture, forestry, fishing and hunting and mining employed 0.5% of the county's workers in 2000. In 2006, the industries in which Harford County workers were most frequently employed included educational services, and health care, and social assistance (19.6%), retail trade

(13.8%), and professional, scientific, and management, and administrative and waste management services (10.8%).

According to the Bureau of Labor Statistics quarterly survey,⁶³ no fishing establishments were located in Harford County between 2001 and 2006. There may be fishing employment for self-employed workers or those employed on vessels but not participating in unemployment insurance, which would not come under this survey.

4.1.3.6.4 Income

In 1999, the median household income for the county was \$57,234 and the median family income was \$63,868. In 1999, 15.7% of households and 9.9% of families had income under \$25,000. Per capita income in 2000 was \$24,232. Median earnings for male full-time, year round workers were \$43,612, and median earnings for female full-time, year round workers were \$30,741 in 2000. In 2006, the median household income was \$69,549 and the median family income was \$81,495 in 2006 inflation-adjusted dollars. In 2006, 11% of households and 6% of families had income under \$25,000. Per capita income was \$30,946 in 2006. Median earnings for male full-time, year round workers were \$56,359 and \$40,827 for female full-time, year round workers in 2006.

In 1999, 3.6% of families had income below the poverty level and 16.8% of families with a female householder, no husband present, had income below the poverty level. In 2005, 2.6% of families and 13.7% of families with a female householder, no husband present, had income below the poverty level.

4.1.3.6.5 Housing

In 2000, there were 83,146 housing units in Harford County, of which 95.8% were occupied. For the occupied units, 78% were owner occupied and 22% were renter occupied. The vacancy rate was 4.2%. Assuming that all vacation and seasonal housing units were vacant during census taking, 0.4% of the county's housing units were for seasonal, recreational, or occasional use. In 2006, the number of housing units in the county had increased to 90,285, of which 95.4% were occupied. Of the occupied units in 2006, 81.9% were owner occupied and 18.1% were renter occupied, showing an increase in rates of home ownership. The vacancy rate was 4.6% in 2006. The median value of an owner occupied unit in 2000 was \$149,800, which increased to \$285,300 in 2006. The median rent for a unit in 2000 was \$648, which increased to \$840 in 2006.

The housing stock in the county was predominantly single unit detached (61.6%), and single unit attached (18.2%) in 2000. In 2006, the housing stock was similar, with 61.7% of the stock single unit detached structures, and 17.8% single unit attached. Housing units in excess of 30 years old in 2000 comprised 32.5% of the county's housing stock.

⁶³ <http://data.bls.gov/PDO/outside.jsp?survey=en>.

4.1.3.7 St. Mary's County

St. Mary's County is a peninsular area on the southern portion of the western shore of Chesapeake Bay. The Potomac River to the southwest and the Patuxent River to the northeast surround it. The county connects to the mainland along its northern boundary with Charles County. The county is mainly rural in its central section with some urbanized area on the northern border and substantial urbanization on the east central portion of the county near the Patuxent Naval Air Station.⁶⁴ Major employers in the county include the air base and related defense contractors which employ on the order of 25,000 people,⁶⁵ and the county's schools, hospital, county government, a college, two grocery stores, two big box discount department stores, an oil company, a veteran's home, a big box home improvement store, and school providing training for merchant mariners.⁶⁶

There is one area on the west side of the county that is somewhat isolated, but has bridge connection to the mainland of the county, Saint George/Jimmy Island. The islands are connected, and are inhabited. The islands project out into the area at the confluence of the Potomac River and Chesapeake Bay, and with a single bridge may be at some risks in the instance of storms.

There is only one municipality in St. Mary's County, Leonardtown, which is also the county seat. The nearest large cities are Washington, DC, approximately 50 miles away and Baltimore, approximately 80 miles away.

4.1.3.7.1 Location

St. Mary's County is the most southerly county on the western shore of Chesapeake Bay, confluence of the Potomac River and the Patuxent Rivers with Chesapeake Bay. The county's western boundary is the Potomac River, and across the river are Northumberland and Westmoreland Counties, VA. To the east of the county is Chesapeake Bay, and across the bay are Somerset and Dorchester Counties. To the northeast is Calvert County, across the Patuxent River. To the north, the connection to the mainland is via Charles County.

4.1.3.7.2 Transportation

The major highways in the county include State Highways 5 and 235. State Highways 4, 244, 249, and 238 provide circulation within the county. Rail service is not available in the county. General aviation services are available in the county, at St. Mary's County Regional Airport near the center of the county. The nearest commercial airports are Dulles Airport, approximately 80 miles away, Reagan National Airport, approximately 50 miles away, and Baltimore Washington International Airport, approximately 80 miles away.

4.1.3.7.3 Demographics

The population of the county was 86,211 people in 2000. The population was evenly distributed between males (50.5%) and females (49.5%). The median age of the population of St. Mary's county was 34.2 years in 2000. In 2006, the total population of the county was 98,854 people. Males (49.7%) and females (50.3%) were estimated to be evenly distributed in the

⁶⁴ http://www.msa.md.gov/msa/govpub/e/033000/033711/pdf/stma_ua.pdf

⁶⁵ <http://www.co.saint-marys.md.us/decd/documents/Document27-economicoverview3.pdf.pdf>

⁶⁶ <http://www.co.saint-marys.md.us/decd/documents/Document27-economicoverview3.pdf.pdf>

population. The median age of the county's population had increased slightly to 34.4 years in 2006.

The ethnic composition of the county in 2000 for those people who self-identified a single race (89.3%) was 81.6% white people, 13.9% black or African American people, 1.8% Asian people, 0.6% "some other race," 0.3% American Indian and Alaska native, 0.1% native Hawaiian and other Pacific islander. Hispanic or Latino people comprised 2% of the county's population in 2000. In 2006, the ethnic composition of the county was slightly more diverse for those people self-identifying a single race (97.9%), with 80.9% of the population self-identifying as white, 13.9% as black or African American, 2.1% as Asian, 0.5% some other race, 0.5% American Indian and Alaska native, and 0% native Hawaiian and other Pacific Islander by the survey estimates. Hispanic and Latino people had increased to 2.4% of the county's population in 2006.

In 2000, 97.2% of the population in the county was native born Americans. For the 2.8% of the population that was foreign born, the most common regions of birth included Asia (47.9%), Europe (25.8%), and Latin America (16.9%). In 2006, 95.4% of the county's population was native born Americans. The Census Bureau did not share regions of birth because the case size was deemed too small for 2006. The most common ancestries for residents of the county in 2000 included "other ancestries" (23%), German (16.2%), and English (14.2%).

In 2000, the average household size was 2.72 persons, and the average family size was 3.17 persons. In 2006, the average household size was 2.65 persons and the average family size was 3.06 persons. For the population 15 years of age and over, 59% of males and 56.6% of females were married in 2000, and 54.9% of males and 55.5% females were married in 2006. Single parent families with children under 18 years of age comprised 12.2% of families in 2000 and 14.1% of families in 2006. Single person households comprised 21.1% of households in 2000 and 21.6% of households in 2006. Nonfamily households comprised 5.4% of households in 2000 and 21.5% of households in 2006.

In 2000, 15.3% of the county's population five years of age and over had a disability. The segment of the population that has the highest reports of disability (37.5%) is the cohort 65 years of age and over. In 2006, 12.2% of the county's population five years of age and over had a disability; for the age cohort 65 years and over, 40.6% had a disability.

4.1.3.7.4 Education

For the population of the county 25 years of age and over, 85.3% had a high school graduate or higher level of education and 22.6% had a bachelor's degree or higher level in 2000; 86.5% had a high school graduate or higher level of education, and 24.4% had a bachelor's degree or higher in 2006. Graduate or professional degrees were held by 8.2% of the population 25 years of age and older in 2000, and by 9.5% of the population in the cohort in 2006.

4.1.3.7.5 Employment

In 2000, there were 64,673 people in the county 16 years of age and over, of which 71.2% were in the labor force and 3.1% were unemployed. For females in the 16 and over age cohort, 63.9% were in the labor force and 60.1% were employed in 2000. In 2006, it was estimated that 77,153 people were 16 years of age and over in St Mary's county of which 70.3%

were in the labor force and 3.3% were unemployed. For females in the 16 years of age and over cohort, 62.7% were in the labor force and 58.2% were employed.

The most common occupations for workers residing in the county included management, professional, and related occupations (39.1%), sales and office occupations (23.5%), and construction, extraction and maintenance occupations (14.3%) in 2000. At that time, farming, fishing and forestry occupations comprised 0.7% of those reported for the county. By class of worker, the composition of the county's residents was 64.8% private wage and salary workers, 28.8% government workers, 6% self-employed in own not incorporated business and 0.3% unpaid family workers in 2000. In 2006, the most common occupations for county residents included management, professional and related occupations (40.2%), sales and office occupations (22%), and service occupations (15.9%). Farming fishing and forestry occupations comprised 0.1% of those reported in 2006. By class of worker, the composition of county residents in 2006 was 61.6% private wage and salary workers, 31.8% government workers, 6.4% self-employed workers in own not incorporated business, and 0.1% unpaid family workers.

The industries in which St. Mary's workers were employed in 2000 most frequently included educational, health, and social services (17.2%), public administration (16.4%), and construction (12.7%). Agriculture, forestry, fishing and hunting, and mining employed 1.1% of the county's workers in 2000. In 2006, the industries employing the highest percentages of the county's workers included public administration (18.9%), professional, scientific, and management, and administrative and waste management services (18%), and educational services, health care, and social assistance (15.9%). Agriculture, forestry, fishing and hunting, and mining employed 2.2% of the county's workers in 2006.

In St. Mary's County the Bureau of Labor Statistics quarterly survey⁶⁷ recognized establishments in shellfish fishing and seafood processing between 2001 and 2006. At peak there were three shellfish fishing establishments and an undisclosed number of seafood product preparation and packaging establishments from 2001 to 2003. The maximum number of employees reported occurred in 2001 with five employees, declining to four in 2002 and 2003. After 2003, data on employee numbers was no longer disclosed. The maximum annual wages for the employees of shellfish fishing establishment was reported for 2003 at \$21048, but the maximum total wages were paid in 2001 at \$79 thousand.

4.1.3.7.6 Income

In 1999 the median household income was \$57,706 and the median family income was \$61,397. In 2006, the median household income had increased to \$71,158 and the median family income had increased to \$78,838 in 2006 inflation-adjusted dollars. In 1999, 18.1% of households and 12.3% of families had income under \$25,000. In 2006, 14.1% of households and 9.4% of families had income under \$25,000. The per capita income for the county was \$22,662 in 2000 and increased to \$31,194 in 2006. Median earnings for male full-time, year round workers were \$41,745, and for female full-time, year round workers median earnings were \$30,103 in 2000. In 2006, median earnings had increased to \$54,157 for male full-time, year round workers and \$41,018 for female full-time, year round workers.

⁶⁷ <http://data.bls.gov/PDO/outside.jsp?survey=en>

In 1999, 5.2% of families in the county had incomes below the poverty level. Families with a female householder, no husband present, had a reporting rate of 19.4% with income below the poverty level. In 2005, 5.2% of families had income below the poverty level, stable from 2000; unfortunately, families with a female householder, no husband present, were in greater difficulties than in 2000, with 23.3% estimated to have income below the poverty level.

4.1.3.7.7 Housing

In 2000 there were 34,081 housing units in the county, of which 89.9% were occupied. For the occupied units, 71.8% were owner occupied, and 28.2% were renter occupied. The vacancy rate was 10.1%, somewhat higher than the national rate of 9.1%. Assuming that all vacation and seasonal units were vacant during census taking, 4.3% of units in the county were for seasonal, recreational or occasional use. In 2006, there were 40,150 units in St. Mary's County of which 90.5% were occupied. For the occupied units, 71.9% were owner occupied and 28.1% were renter occupied. The vacancy rate was 9.5%, now less than the national rate of 11.6%. The median value of owner occupied units in 2000 was \$150,000 that increased to \$322,000 in 2006. The median rent for units in the county was \$719 in 2000 that increased to \$896 in 2006.

Housing stock in the county was predominantly single unit detached structures (72.4%), mobile homes (7.8%), and single unit attached structures (6.3%) in 2000. In 2006, the housing stock was composed predominantly of single unit detached structures (74.5%), but construction of multi-unit structures containing five to nine units increased these types of structures to a secondary (5.8%) ranking. Mobile homes and single unit attached units followed at 5.2% each of the housing stock in 2006. Housing units in excess of 30 years old in 2000 comprised 29.9% of the housing stock.

4.2 Virginia Coastal Counties

All Virginia coastal counties are considered affected by menhaden's ecosystem services since water quality is one of the potential effects. Virginia has a somewhat unique setting for county and local government in which Independent Cities are considered county equivalents; thus cities such as Newport News, Norfolk, Portsmouth, Virginia Beach and Williamsburg are included in the counties listing.⁶⁸

The following county descriptions will be divided into the Eastern Shore Counties and those on the western shore of Chesapeake Bay. The counties are described in alphabetical order after this definition.

4.2.1 EASTERN SHORE

4.2.1.1 Accomack County

Accomack is the northerly of the two Virginia Eastern Shore Counties. It is isolated from the rest of Virginia, except for Northampton County, by Chesapeake Bay. As part of the Delmarva Peninsula which is known for agriculture and fishing as predominant economic activities, Accomack follows suit, but has additional employment in tourism associated with Assateague National Seashore and space and military activities at Wallops Island. Major employers in the county include Eastern Shore Seafood, a clam processor, two chicken processors, NASA Wallops Island, and the U. S. Navy AEGIS Center.⁶⁹

Tangier Island, a well-known location because of its remnant Shakespearian pronunciations due to its isolation within Chesapeake Bay, is part of Accomack County. Its isolation, while part of its retention of Shakespearian pronunciation has also made the community vulnerable. A recent article tells that the ferry from the Eastern Shore may not be available for at least part of summer 2008.⁷⁰ In addition, Wikipedia⁷¹ describes the isolation of the island in its article, the island's reliance on a single doctor's services, and its dependency on fishing and tourism as its economic bases. Review of ABC TV's "World News",⁷² which awarded the doctor its Person of the Week title on January 19, 2007, notes that the doctor arrives via helicopter once per week, and travels via golf cart once on the island. The Wikipedia article also notes that in the recent past two storms have flooded much of the island, and that homes have been abandoned or were in the process of being raised to lessen flood damage.

4.2.1.1.1 Location

Accomack County is located on the eastern shore of Virginia between the Atlantic Ocean and Chesapeake Bay. It is bounded on the north by the Virginia-Maryland state lines and on the south by Northampton County. The county seat is Accomack.

⁶⁸ These coastal counties include the following: Accomack, Essex, Gloucester,, Hampton, Isle of Wight, James City, King and Queen, King George, Lancaster, Mathews, Middlesex, Newport News, Norfolk, Northampton, Northumberland, Portsmouth, Poquoson, Prince William, Richmond, Stafford, Suffolk, Surry, Virginia Beach, Westmoreland, Williamsburg, and York.

⁶⁹ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/JointCommunity14.pdf>.

⁷⁰ http://www.wvec.com/traffic/news/stories/wvec_top_030108_tangier_ferry.11d23545.html

⁷¹ http://en.wikipedia.org/wiki/Tangier_Island

⁷² <http://abcnews.go.com/WNT/PersonOfWeek/story?id=2808883>

The nearest sizable city is Salisbury, MD (approximately 50 mi from the center of the county), while the nearest large cities are Washington, DC (approx. 170 mi) and Norfolk, VA (roughly 80 mi). For the larger cities connections via bridge-tunnels are important because there is no direct connection by land to Norfolk or a long trip around the north end of the Delmarva Peninsula for Washington.

4.2.1.1.2 Transportation

Transportation is facilitated with the US. Highway 13. It runs north to south along the Delmarva Peninsula. Three airport overlay districts are found in the county including a southerly airport near Melfa and a northerly airport area at Wallops Island that is associated with the NASA property and a small airstrip on Tangier Island. A rail line also serves Accomack County.

4.2.1.1.3 Demography

In 2000, the US Bureau of Census found that the total population of Accomack County was 38,305. Slightly more women than men reside in the county, with 51.5% of the population being female and 48.5% male. The median age of the county's population was 39.4 years.

Ethnic characteristics for the county include a majority white population for those who self-identified as one race (63.4 %), with black or African-American people making up 31.6%; Hispanics or Latinos of any race comprised 5.4% of the population. The remaining racial groups comprised somewhat over 4% of the population, of which the most prevalent was "some other race" (3.6%).

Nearly 96% of the population was born native born in the US. Of the 4.2% of foreign born, 83.4% were born in Latin America, 7.2% were born in Europe and 6.9% were born in Asia. The most prevalent ancestries reported for the total population include other ancestries (32.1%), United States or American (14.9%), and English (13.7%).

The average household size for the county was 2.45 people and the average family size was 2.96 people in 2000. Somewhat over half of both the males (58.1%) and females (50.8%) over the age of 15 are married. Single parent families with children under 18 make up 14.7% of families in the county. Of the 15,270 households in the county, 27.7% are single person households and non-family households comprise 1.4%.

Accomack County's population has a higher rate of disability than the national average, with 21.4% reporting disabilities compared to the national average of 19.3%. Slightly over 40% of the population over age 65 has a disability.

4.2.1.1.4 Education

Nearly 67.9% of the population over age 25 has a high school diploma or higher, and 13.5% have bachelor's degrees or higher levels of educational attainment. People with advanced degrees including graduate and professional degrees comprise 5.4 % of the population over age 25.

4.2.1.1.5 Employment

Of the 30,048 residents of the county over the age of 16, 53.9% are in the labor force. Of those in the labor force in 2000, 4.3% were unemployed. Over half of the women over the age of 16 of the county are participants in the labor force, and 49.5% were actively employed.

The major occupations of county residents include management, professional and related occupations (24.2%), sales and office occupations (22.1%) and production, transportation, and material moving occupations (20%). The least reported occupations were those in farming, fishing and forestry occupations at 5.9%. Nearly 72% of workers were private wage and salary workers, 18.2% were government workers, 9.6% were self-employed workers in own not incorporated business, and 0.3 were unpaid family workers.

Of local industries, the most commonly occurring in the county were manufacturing (17.7%), educational, health and social services (16.2%), and retail trade (11.8%). Agriculture, forestry, fishing and hunting and mining (6.3%) were more common than those of wholesale trade, transportation and warehousing and utilities, finance and insurance, and information.

According to the Bureau of Labor Statistics quarterly survey data,⁷³ fishing employment is reasonably concentrated in Accomack County with 10% of the fishing establishments of the state in recent years, only exceeded by Northumberland County and equaled by Lancaster and Gloucester Counties. The maximum number of establishments between 2001 and 2006 occurred in 2001 with 15; 12 in processing, three in shellfish fishing and an undisclosed number in finfish fishing. More recently the numbers of establishments have declined to eight processors, two shell fishing establishments and one finfish-fishing establishment. At peak (in 2001), seafood processing employed 285 people with total wages of nearly \$5 million. In 2006, processing employed 109 people with total wages of approximately \$2.5 million. In 2001 and 2002 shell fishing establishments employed five and four people respectively at \$69 thousand and \$61 thousand total wages; subsequent data was not disclosed.

4.2.1.1.6 Income

The median household income for Accomack County in 1999 was \$30,250 whereas median family income was 34,821 at that time. Nearly 41.5 % of the county's households had incomes under 25,000 in 1999, while 32.8% of families in the county had incomes in the same range. Per capita income for the county was 16,309. The median earnings for male full-time, year-round workers were \$27,078 compared to \$19,590 for women full-time, year-round workers.

Poverty status in 1999 was reported for 13% of all families in Accomack County, while for female-headed households without a husband present, 32.6% were found to be below the poverty level.

4.2.1.1.7 Housing

In 2000, there were 19550 total housing units in the county, dominated by single, detached units (70.2%) and mobile homes (23.1%). Housing units in excess of 30 years old made

⁷³ <http://data.bls.gov/PDO/outside.jsp?survey=en>

up 48.4% of those in the county. Of the total housing, 78.3% were occupied, with 75.1% of the occupied units being occupied by owners, and 24.9% occupied by renters. For single-family occupied units, the median value in 2000 was \$79,300. The median rent for units in Accomack County in 2000 was \$466.

4.2.1.2 Northampton County

Northampton County has the unfortunate distinction of being recognized as an area of persistent poverty by the USDA Economic Research Service (Cook and Meisner 1994). It is the only county with this recognition within the study area. The Economic Research Service document suggests that persistent poverty is “directly attributable to the composition and characteristics of the population”, but that the role of local economies in the persistence of poverty is not as clear cut. It does appear that poverty counties are most likely to be counties dependent on transfer payments and counties with higher percentages of the populations having mental or physical disabilities, which are consistent factors for Northampton County.

Northampton County, as a distal point on the Delmarva Peninsula, has disadvantages in accessing other areas because of geography. Although the Bridge- Tunnel exists, the fees are sufficiently high that they inhibit development of homes for the Virginia Beach-Newport News metropolitan area when there is still sufficient property available in those areas. Northampton County’s major employers include a concrete company, a tile manufacturer, a health care provider and Chesapeake Bay Bridge Tunnel Authority.⁷⁴

Islands on the east side of the county have largely been abandoned and are owned by the Nature Conservancy or are part of wildlife refuges. The mobile nature of the barrier islands was recognized and the homes on them abandoned.

4.2.1.2.1 Location

Northampton County is located on the southern tip of Virginia’s Eastern Shore, which comprises the southern section of the Delmarva Peninsula. It is bounded on the north by Accomack County, and is otherwise surrounded by water with the Atlantic Ocean on the east and northeast sides and Chesapeake Bay on the south and west. The county seat is Eastville.

Access to the county is available from the Norfolk/Virginia Beach area by Chesapeake Bay Bridge-Tunnel a 20-mile long engineering feature that in some locations is only two lanes wide. While the tunnel provides access to the larger communities it has a fee on its use of \$12.00 in one direction. Return trips within 24 hours have a lesser fee of \$5.00.

4.2.1.2.2 Transportation

The major highway through Northampton County is US 13. One airport, Campbell Field, a small grass runway general aviation airport is located in Weirwood, VA.⁷⁵ Northampton County has a rail line and a rail barge system exists for connections to the Hampton Roads area.

⁷⁴ http://virginiascan.yesvirginia.org/Data_Center/Community_Profiles/EasternShore.aspx

⁷⁵ <http://www.campbellfieldairport.com>

4.2.1.2.3 Demography

In 2000, the US Bureau of Census population for Northampton County was 13,093 people. Slightly more women than men lived in the county (53.2% compared to 46.8%). The median age of the county's population was 42.4 years.

Ethnic characteristics for the county included a reasonably diverse racial mix in the community with people self identifying as a single race with white comprising 53.3% of the population, black or African American 43%, Asian 3.6%, and some other race 2.4%. Latino or Hispanic people made up 3.5% of the county's population.

Native-born US citizens comprised 96.6% of the population. For the 3.4% of the population who were reported as foreign born, nearly 70% were born in Latin America, 19.7% were born in Europe, approximately 7% were born in North America and the remaining foreign born residents were from Asia. The most commonly reported ancestries for the total population of Northampton County were "other ancestries" (38.3%), English (12.9%) and United States or American (10.7%).

The average household size for the county in 2000 was 2.9 people, while the average family size was 2.94 people. A higher proportion of the males (55.4%) in the county were married than females (48.3%) for the population 15 years of age and over. Single parent families with children under 18 made up 14.2% of families in the county. Of the 5,319 households in the county 29.5% were single-person households, and 3.6% were nonfamily households.

People with disabilities were found to exist at a higher rate (25.8%) than US at large (19.3%). Of the population over 65 years of age, 45.4 % reported having a disability.

4.2.1.2.4 Education

Of the population over 25 years of age, 67.4% had high school graduate or higher level of educational attainment, 15.7% had levels listed as bachelor's degree or higher, and 5.2% had graduate or professional degrees.

4.2.1.2.5 Employment

For the 10,412 people over the age of 16 who resided in Northampton County in 2000, 53.6% reported that they were in the labor force. Of the people over 16, 3.7% were unemployed. Nearly half the women of the county (48.6%) were in the labor force and 44.8% were employed.

The most commonly reported occupations for county residents included management, professional, and related occupations (27.1%), service occupations (20%), and sales and office occupations (19.9 %). Farming, fishing and forestry comprised 6.6 of residents' reported occupations. Of the employed population, private wage or salary workers comprised 69.5%, 20% as government workers, 9.8% as self-employed in own not incorporated business and 0.7% as unpaid family workers.

For industries in the county, the most commonly reported to in the 2000 census included manufacturing (12.2%), retail trade (9.6%), and arts, entertainment, recreation, accommodation and food services (8%). Agriculture, forestry, fishing and hunting, and mining made up 7.9%.

According to the Bureau of Labor Statistics,⁷⁶ there have been establishments in finfish fishing and seafood product preparation and packaging in Northampton County between 2001 and 2006. For the first three years data were not disclosed on the number of finfish fishing establishments, but between 2004 and 2006 one has been reported with no data disclosed on number of employees or wages. In 2001 there were four seafood processors in the county, employing eight people with total wages of \$168 thousand. In the subsequent year the number of establishments declined to three at which level they have remained until 2006. The number of employees in seafood processing increased to a maximum of 11 reported in 2002, declining to 10 in the subsequent year and reported again as 10 in 2006, with total wages in seafood product preparation and packaging of \$573 thousand.

4.2.1.2.6 Income

The median household income in 1999 for Northampton County was \$28,276 and the median family income for the same year was \$35,034. Households with incomes lower than \$25,000 comprised 45.3%, and families with incomes under \$25,000 comprised 34.9%. Per capita income was \$16,591. Median income for male full-time, year-round workers was \$26,842 whereas the median income for female full-time, year-round workers was \$21,839.

The Economic Research Service of USDA considers Northampton County as a non-metro, non-specialized county dependent upon transfers, and a county of persistent poverty (Cook and Meisner 1994). The U.S. Bureau of Census in 1999 reported that 15.8% of families as in Poverty status, while it was 39.1% for families with a female householder, no husband present.

4.2.1.2.7 Housing

Of the 6,547 housing units in the county, 81% were occupied. Of the occupied units, 68.7% were owner occupied and 31.3 were renter occupied. For the single family units that were occupied, the median value was \$78,700. The median rent for units in the county in 2000 was \$382.

The housing stock in the county consists predominantly of single unit detached houses (78.1%) and mobile homes (13.6%). Homes in excess of 30 years old comprised 60.2% of the county's housing stock and structures over 60 comprised 28.6%.

⁷⁶ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2 WESTERN CHESAPEAKE BAY COUNTIES

4.2.2.1 Essex County

Essex County is the most northerly of the Middle Peninsula counties, at the mainland edge of the peninsula. The county is rural in nature, and is outside the Richmond Metropolitan Area, which includes adjoining Caroline and King and Queen Counties. The county has no isolated areas in terms of islands that are inhabited.

Major employers include a concrete company, a manufacturer of automobile brakes, a plastic molding company, the local hospital, and a big box store.⁷⁷ Although predominantly rural, Tappahannock, which is situated at the junction of Routes 17 and 360, serves as a regional trade center with several shopping centers and restaurants.

4.2.2.1.1 Location

Essex County is in the northern area of the western shore of Virginia of Chesapeake Bay. Its land area is bounded on the northeast by the Rappahannock River, on the south by Middlesex County, on the southwest by King and Queen County and on the northwest by Caroline County. The county seat is Tappahannock.

4.2.2.1.2 Transportation

The major highway in the county is US 17 that runs northwest-southeast, paralleling the long axis of the county. US 360 runs through the county approximately perpendicular to US 17 and intersects US 17 in Tappahannock, nearly half way along the north-south axis of the county, but to the east side of the county. There is one airport in the county, which is in transition. The old Tappahannock airport will be converted to an industrial park and a new airport is being constructed between Miller's Tavern and Bray's Fork, about 5 miles from the current airport. The airport is due to open in fall of 2007. Essex County has no rail service.

4.2.2.1.3 Demography

In 2000, the population of Essex County totaled 9,989 people, of which slightly more were female (52.6%) than male (47.4%). The median age of the county's population was 40.3 years.

The ethnic composition of the county consist of 98.76% of the population self-identifying as a single race, and of those 58% were white, 39% were black or African-American, 5.5% were some other race, and 3.6% were Asian. Hispanic or Latino people made up 1.6% of the county's population.

A high percentage (98.6%) of the population of Essex County in 2000 was native born Americans. Of those not born in the United States, 49.3% were born in Asia, 27.9% were born in Europe, and 12.1% were born in Africa. Reported ancestries for the residents of the county were most commonly "other ancestries" (36.1%), United States or American (14.5%), and English (13.8%).

⁷⁷ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51057.pdf>

The average household size in Essex County in 2000 was 2.46 people, and the average family size was 2.95 people. Slightly more males (59.2%) than females (52.5%) in the county over the age of 15 were married. Single parent families with children under 18 made up 11% of families in the county. Of the 3,981 households in the county 25.8% were single person households and 4.6% were nonfamily households.

For people over 5 years of age, 22.4% reported having a disability. People over the age of 65 reported the highest incidence of disability (41%).

4.2.2.1.4 Education

For the 7,052 people in the county over 25 years of age, 73.5% of the population had a high school graduate or higher, 17.4% had Bachelor's degrees or higher, and 5.4% had graduate or professional degree levels of educational attainment.

4.2.2.1.5 Employment

For the population over the age of 16, 63% were in the labor force. Of those in the civilian labor force 3.2% were unemployed in 2000. Women over the age of 16 participated in the labor force at a rate of 59.2%, and 2.3 % were unemployed.

The most frequently reported occupations for county residents in 2000 were management, professional and related occupations (27.5%), sales and office occupations (25.1%) and production, transportation and material moving occupations (19.4%). Farming, fishing and forestry occupations were reported for 1.1% of the population. By class of worker, 72.6% were private wage and salary workers, 19.9% were government workers, 7.3% were self-employed workers in own not incorporated business, and 0.1% were unpaid family workers.

Industries in the county were most often reported as educational, health and social services (19.7%), manufacturing (14.7%), retail trade (11.7%) and construction (11%). Agriculture, forestry, fishing, hunting and mining made up 2.3%.

The Bureau of Labor Statistics⁷⁸ recognizes limited employment in fisheries in Essex County between 2001 and 2006. From 2001 to 2003 the number of seafood processors was not disclosed, and a single processor was reported for 2004 through 2006. For the period from 2001 through 2006 data were not disclosed with regard to number of employees or wages. Apparently, the Bureau of Labor Statistics found no finfish fishing or shellfish fishing establishments in the county because no data were available. There may have been fishery participants, but they may not have participated in unemployment insurance, which was the baseline upon which the Bureau of Labor Statistics based its survey.

4.2.2.1.6 Income

Median household income for Essex County in 1999 was \$37,395, while median family income at that time was \$43,588. Households with incomes under \$25,000 comprised 31.9%, and families with a similar income comprised 22.8%. Per capita income was \$17,994. Median

⁷⁸ <http://data.bls.gov/PDO/outside.jsp?survey=en>

income for male full-time, year-round workers was \$29,736, and for women full-time year-round workers the median income as \$22,253.

Poverty status in 1999 was reported for 7.7% of families, while for families with a female householder, no husband present 25% were found to be in poverty.

4.2.2.1.7 Housing

In 2000 there were 4,926 housing units in the county; of these, 81.1% were occupied. For the occupied units, 77.3% were owner occupied and 22.7% were renter occupied. The vacancy rate for Essex County's housing units was 19.9%. Of these vacant units, 67.7% were units for seasonal, recreational or occasional use. The median value for owner occupied single family housing units in the county in 2000 was \$98,700 and the median rent was \$539.

The housing stock of the county consisted mainly of single-family, detached units (76.1%) and mobile homes (15.5%). Housing units in excess of 30 years old comprised 42.4% of the county's housing stock.

4.2.2.2 Gloucester County

Gloucester County is a bedroom community for the Hampton Roads area predominantly, although it is almost split between being a bedroom community in its southern portion and being more rural in nature in its northern areas. A long-term connection has existed between the county and Hampton Roads, with a ferry in the past providing service for Gloucester County residents to access jobs at the Newport News shipyard among other locations. The Virginia Institute of Marine Science is now in the location formally occupied by the ferry terminal. In 1952, the Coleman Bridge opened connecting Yorktown and Gloucester Point, replacing the ferry. In 1995 the bridge was reconstructed (due in part to damage to the bridge), with recent trips across the bridge numbering approximately one million per month.⁷⁹ The county is considered part of the Virginia Beach-Norfolk-Newport News Metropolitan Area.

Major employers in the county include a peanut processor, two institutes of higher education, an electrical utility, two health care providers (a hospital and a nursing home), a newspaper, a telecommunications firm and a laser cartridge recycling firm.⁸⁰

4.2.2.2.1 Location

Gloucester County is located on the south distal tip of the middle peninsula of Virginia. It is bounded by the York River on the south and southwest, Chesapeake Bay on the east, Mathews and Middlesex Counties on the northeast and north respectively and King and Queen County on the northwest. The county seat is unincorporated Gloucester Courthouse. There are no incorporated towns within Gloucester County. Connections to Newport News and Hampton, roughly 15 miles away are available via the Coleman Bridge, a draw bridge which opens nearly daily.

⁷⁹ http://virginiadot.org/travel/hro-tunnel-default.asp#the_bridges

⁸⁰ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51073.pdf>

4.2.2.2.2 Transportation

The major highway in Gloucester County is U.S. Highway 17. State Highway 3 branches off from U.S. Highway 17 in the area of Gloucester Courthouse providing linkage to Mathew County. At the north end of the county, near Glenss, State Highway 33 links Gloucester County to King and Queen County and further toward Interstate 64. Gloucester County does not have rail lines or an airport within its boundaries.

4.2.2.2.3 Demography

In 2000, the U. S. Bureau of Census found that Gloucester County had a total population of 34,780. The population was nearly evenly distributed between males (49.1%) and females (50.9%). The median age of county residents was 38.0 years.

The ethnic composition of the county consisted of 97.6% of the population self-identifying as a single race, of which 75.1% were white, 12.3% were black or African-American, 5.5% “some other race,” and 3.6% were Asian. Hispanic or Latino people comprised 1.6% of the county’s population. Nearly all of Gloucester County’s population (98.1%) is native born American. For the limited number of people who identified themselves as foreign born, the regions of birth most commonly stated were Europe (47.2%), Asia (34.9%), and Latin America (14.4%). Most commonly reported ancestries included “other ancestries” (19.6%), English (17.4%), United States or American (16%) and German (13.3%).

The average household size was 2.62 people, and the average family size was 3.02 people. The county has a fairly high rate of marriage; for males 15 years of age and over 63.6% were married and for females in the same age cohort, 61.5% were married. Single parent families comprised 9.6% of all families in the county. Slightly over 20% of the households in the county were single person households, and nonfamily households comprised 4.3 percent of households in the county.

Among the population five years of age and over, 18.6% reported having a disability. The highest rate of reported disability is among those 65 years of age and over who reported that 40.7% had a disability.

4.2.2.2.4 Education

Gloucester County’s population has a slightly higher percentage of people with high school or higher levels of educational attainment (81.7% for the county compared to the national rate of 80.4%). Those with bachelor’s degrees or higher made up 17.6% of the county’s population (less than the national rate of 24.4%) and 6.9% had graduate or professional degrees.

4.2.2.2.5 Employment

For those residents of the county 16 years of age and over, 66.8% were in the labor force. Of those in the labor force, 2.6% were unemployed. Women over the age of 16 had 59.3% participating in the labor force, and 56.5% were employed.

Occupations reported for county residents 16 years of age and over were most frequently listed as management, professional and related occupations (31.3%), sales and office occupations

(23.6%), and construction, extraction, and maintenance occupations (15.9%). Farming, fishing, and forestry occupations made up 1.5% of those reported. Private wage and salary workers constituted 70.2% while government workers made up 22.8%, self employed workers in own not incorporated business comprised 6.6%, and unpaid family workers made up 0.3% of workers in the county in 2000.

For industries, the most commonly reported were educational, health and social services (20.8%), retail trade (11.6%), and construction (11.4%). Agriculture, forestry fishing and hunting, and mining comprised 2.3% of those reported.

Gloucester County has a reasonably high concentration of fishing establishments with 10% of the Commonwealth's combined finfish fishing, shellfish fishing and seafood product preparation and packaging establishments according to the Bureau of Labor Statistics.⁸¹ Of the 11 establishments in the county in 2006, four each were reported as finfish fishing and seafood product preparation and packaging, and three were reported as shellfish fishing. No data were disclosed on numbers of employees or wages in finfish fishing or shellfish fishing, but for seafood processing a maximum number of 63 were employed in 2004 and 2005 declining to 57 in 2006 with total wages of a high of \$841 thousand in 2005 and \$830 in 2006.

4.2.2.2.6 Income

Gloucester County resident's median household income for 1999 was \$45,421, and for families in the same time period, the median income was \$51,426. Households with income under \$25,000 comprised 22.9% of those in the county, while families with income under \$25,000 comprised 16.5%. The county's per capita income was \$19,990. The median income for male full-time, year-round workers was \$35,838 and the median income for female full-time, year-round workers was \$24,325.

Poverty status was reported to affect 6.8% of families in Gloucester County, and was observed to be at a rate of 26% among families with a female householder, no husband present.

4.2.2.2.7 Housing

In 2000 there were 14,494 housing units in Gloucester County of which 90.6% were occupied. Of the occupied housing units in the county, 81.4% were owner-occupied (substantially higher than the national average of 66.2%), and 18.6% were renter-occupied. The vacancy rate for Gloucester's housing units was 9.4%. Of the vacant units, 39.2% were reported to be for seasonal, recreational or occasional use. The median value of occupied single family houses in the county was \$111,600, and the median rent for occupied units in the county was \$527.

The housing stock in the county is predominantly composed of single unit detached homes (75.9%) and mobile homes (15.1%). Units in excess of 30 years old comprised 29.5% of the county's housing stock.

⁸¹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2.3 Hampton

Hampton is an independent city in the Hampton Roads area that has no isolated areas. Independent cities in Virginia are considered to be county equivalents. The city is largely urbanized with limited agriculture. Hampton is part of the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area (MSA). Hampton has three loci of fish processing, one in the downtown area with a fish house, a crab processor, a university extension office and a gear provider, one on Sunset Creek with a fish house and scallop facility, and one in Phoebus with a restaurant and docks for a scallop company.

Major employers include the military and military contractors, telecommunications, telemarketing, a hospital, and two institutions of higher education. The city promotes its high tech base and highly educated population, with its motto “from the sea to the sky” alluding to the presence of Langley field and Langley’s NASA connections. Overall, commuters come into the city but the number of net in-commuters is a small proportion of the over 34,000 persons who live and work in the city.⁸²

4.2.2.3.1 Location

Hampton is located on the peninsula between the York and James Rivers. The city is bounded on the east by Chesapeake Bay, on the south by the junction between the James River and Chesapeake Bay, on the west by the City of Newport News and to the north by York County. Adjacent cities include Newport News, which shares a border with Hampton, and Norfolk, which is accessed by the Hampton Roads Bridge -Tunnel.

4.2.2.3.2 Transportation

Hampton connects to other communities via Interstate Highways 64 and 664. In addition, rail lines serve the city for freight and passenger service. Amtrak runs from Hampton to Richmond and beyond with trips twice daily. The city does not have an airport within its boundaries, but Patrick Henry Field in adjoining Newport News and Norfolk International Airport provide air service for the area. In addition Langley Field, a military and NASA installation have runways at the northeast edge of Hampton.

4.2.2.3.2 Demographics

The population of the City of Hampton in 2000 totaled 146,437 and was evenly distributed between males and females (49.6% versus 50.9% respectively). According to recent information from the 2006 American Community Survey of the U.S. Bureau of Census estimates that the city’s population has declined slightly to 145,017 and that there is a very slight increase in percentage of females (50.7%) to males (49.3%). The median age for Hampton’s population in 2000 was 34 years, and in 2006 it was 35.4 years.

The ethnic composition of Hampton in 2000 was quite evenly mixed between whites (49.5%) and blacks or African-Americans (44.7%) for those self-identifying as a single race. Those reporting “some other race” comprised 5.5% of Hampton’s population and Asian people made up 3.6%. Hispanic or Latino people comprised 2.8% of the population. Similar results were

⁸² <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51650.pdf>

found for 2006, with a decrease in people reporting some other race (1.4%), but increases in those reporting Asian (4.4%), and Hispanic (3.4%) ethnicities. A preponderance of the population reported being native born Americans (96.1%). Of the nearly 4% of the population who reported being foreign born in 2000, the most common region of birth was Asia (37.3%), Europe (27.2%), and Latin America (23.7%). The most frequently reported ancestries for residents of the city were “other ancestries” (48.9%), German (9%), English (7.8%), United States or American (7.2%), and Irish (7.1%).

The average household size for Hampton in 2000 was 2.49 people, and the average family size at that time was 3.02 people. Average household size increased very slightly to 2.59 persons, and average family sized to 3.2 persons in 2006. For the population 15 years of age and over in the city in 2000, 55.7% of males and 47.3% of females were married. In 2006, this rate had declined to 48.7% for males and 41.9% for females. In 2000, single parent households with children under 18 years of age made up 1.8% of families in the city. At that time 26.5% of households were single person households, and 6.3% of households were nonfamily households.

The disability status of people in the city five years of age and over was reported at 19.5% in 2000. In 2006 there was a decline to 14.3% of people 5 years of age and over reporting having a disability. Disabilities were found to be reported at the highest rate among those in the population age 65 and over (45.6%) in 2000.

4.2.2.3.2 Education

People in Hampton 25 years of age and over in 2000 had higher than the national rate of high school graduation or completion of higher levels of education (85.5% for Hampton compared to 80.4% nationally). Those with advanced educations of bachelor’s degree or higher (21.8%) fell below the national average (24.4%). Residents having graduate or professional degrees comprised 8.3% of the city’s population. In the 2006 survey, the high school graduates or higher comprised 87.1% of the population while those with bachelor’s degrees or higher declined to 19.5%.

4.2.2.3.3 Employment

For the people of Hampton 16 years of age and over, 62.4% were in the labor force in 2000. At that time, 3.7% of those 16 years of age and over were unemployed. For females in 2000, over half (59.5%) were in the labor force and 53.3% were employed. In 2006, participation in the labor force increased to 68.9%.

The most frequently listed occupations for residents of Hampton in 2000 included management, professional and related occupations (32.1%), sales and office occupations (27.8%), and service occupations (15.1%). Farming, fishing and forestry occupations comprised 0.3% of those reported. Private wage and salary workers comprised 73.4% of workers, government workers comprised 22.8%, self-employed workers in own unincorporated business constituted 3.7% and unpaid family workers comprised 0.1% of the workers by class.

Industries within the city in 2000 were most frequently reported as educational, health and social services (20.4%), manufacturing (15.5%), and retail trade (13%). Agriculture, forestry, fishing and hunting and mining comprised 0.3% of those reported.

Hampton is less concentrated in fisheries establishments than nearby Gloucester County, which had six establishments in 2006.⁸³ Of the six establishments, three were seafood product preparation and packaging, two were shellfish fishing and one was finfish fishing. No data was disclosed on numbers of employees for any of the types of establishments or wages, and no data were available for finfish fishing from 2001 to 2005 or shellfish fishing 2001 or 2002.

4.2.2.3.4 Income

The median household income for residents of Hampton in 1999 was \$39,532 whereas for families at that time the median income was \$46,110. In 2006, the median household income had increased to \$46,636 in 2006 inflation-adjusted dollars and median family income was \$57,037. Per capita income for Hampton in 1999 was \$19,774. Median earnings for male full-time, year-round workers were \$31,666 in 2000, while for full-time, female, year-round workers median earnings were \$24,578.

Poverty status in 2000 was found to be the situation for 8.8% of families overall. For families with a female householder, no husband present, poverty status was found to be the case for 25.9%. In 2006 the rate of families found to be below the poverty level declined slightly to 7.1%.

4.2.2.3.5 Housing

In 2000, there were 57,311 housing units in the city of which 94.0% were occupied. The proportion of owner-occupied housing units (58.6%) was somewhat less than the national average (66.2%) and the proportion of renter occupied units was somewhat higher (41.4% versus the national rate of 33.8%). The vacancy rate of housing units in the city in 2000 was 6%. In 2006 some construction in the city was apparent with an additional 2,276 estimated in the community. The occupancy rate was down slightly to 91.7%, but a slightly higher proportion of homes were owner-occupied (59.9%). For the vacant housing units in 2000, 11% were reported to be for seasonal, recreational, or occasional use. The median value of single detached unit occupied in 2000 was \$91,100 and that value rose to \$165,300 in 2006. Median rent in 2000 was \$603, which in 2006 increased to \$806.

The housing stock in the city in 2000 was composed of single unit detached units as a high proportion (64.1%), but multiple units comprised a higher proportion (26.9%) than that of nearby rural areas. Mobile homes compose only a small proportion (1.8%) of the city's housing stock. Housing units in excess of 30 years old in 2000 made up 52.6% of the city's housing.

4.2.2.4 Isle of Wight County

Isle of Wight County is a predominantly rural county with three areas of development, near Smithfield, Windsor, and Lees Mill. The Lees Mill area is a small scale suburb of the small independent City of Franklin, which adjoins the county. Despite its rural character, Isle of Wight, by virtue of daily economic interactions, is considered part of the Virginia Beach-Norfolk-Newport News Metropolitan Area. Isle of Wight has no islands as isolated areas.

⁸³Bureau of Labor Statistics; <http://data.bls.gov/PDO/outside.jsp?survey=en>

Major employers in the county include a construction machinery company, two meat processors (one of which also does packing), and a lumber and particleboard company. The two meat processors have in excess of 1,500 employees each, as does the lumber and particleboard firm that implies a reliance on manufacturing for the county of roughly 30,000 people.⁸⁴

4.2.2.4.1 Location

Isle of Wight County is situated on the south side of the James River. It shares borders with Suffolk County to the southeast, the City of Franklin to the south, and Surry County to the northwest. Across the James River, and linked via the James River Bridge, is Newport News to the northeast, and to the east approximately 15 miles is Norfolk and Portsmouth which are linked by highways with bridges. The county seat is Isle of Wight.

4.2.2.4.2 Transportation

U.S Highway 17 links the north side of the county to Newport News, Suffolk and Portsmouth. The southern section of the county is linked to Suffolk via U. S. Highway 58 and U.S. Highway 460. A rail line serves the county, running from Petersburg to Suffolk. A small airport is located in the adjoining city of Franklin for general aviation and additional air service is available though Norfolk International Airport which is roughly 20 miles away.

4.2.2.4.3 Demographics

In 2000, the population of Isle of Wight County totaled 29,728 according to the U.S. Bureau of Census. The population was evenly distributed between males (48.9%) and females (51.1%). The median age for county residents in 2000 was 38.9 years.

Isle of Wight County's ethnographic make up is less diverse than neighboring cities, with a higher predominance of people who self-identified as white (71.1%), and fewer people who identified as black or African American (27.1%). A low percentage of people identified themselves as Asian (0.3 %), American Indian or Alaska Native (0.3%), or some other race (0.3%). Hispanic or Latino people comprised 0.9% of the population. Nearly all the residents of the county (98.9%) were native born US citizens. Of the foreign born population, 39.7% listed their region of birth as Europe, 25.7% were born in Asia, and 6.1% were born in Latin America. The most frequently reported ancestries for county residents included "other ancestries" (28.9%), United States or American 1(3.7%), and English (13.1%).

The average household size for Isle of Wight County in 2000 was 2.61 people, and the average family size was 2.99 people. A slightly higher than national level, 56.7% for males and 52.1% for females over the age of 15, was reported for the county at 63.6% for males and 59.5% for females in the age cohort. Single parent families comprised 11.3% of all families in the county. Single person households encompassed 20% of the county's households, and nonfamily households comprised 2.6%.

⁸⁴ <http://virginiacan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51093.pdf>

For the population of the county five years of age and over, 20% reported having a disability. The reporting of a disability occurred at a higher rate (45.4%) among residents of the county 65 years of age and over.

4.2.2.4.4 Education

For residents of the county 25 years of age and over, 76.2% had high school diploma or higher levels and 17.5% had bachelor's degree or higher levels of attainment.

In 2000, 5.2% of Isle of Wight's population had graduate or professional degrees.

4.2.2.4.5 Employment

For the 14,851 county residents 16 years of age and over in 2000, 63.9% participated in the labor force. At that time, 2.6% of the population in the appropriate age cohort was unemployed. Females 16 years of age and over participated in the labor force at a rate of 56.5%, and 54% were employed.

The residents of Isle of Wight most commonly reported their occupations as management, professional and related (31.3%), sales and office occupations (12.1%), and production, transportation, and material moving occupations (18.9%). Farming, fishing and forestry occupations were listed by 0.9% of the county's population. Just over 77% of workers were private wage and salary workers, 16.2% were government workers, 6.1% were self-employed in own, not incorporated business, and 0.3% were unpaid family workers.

Most common industries in the county in 2000 were manufacturing (25.4%), educational, health, and social service (16.3%), and retail trade (9.6%). Agriculture, forestry, fishing and hunting, and mining comprised 2.8 % of the industry for the county.

The Bureau of Labor Statistics quarterly survey⁸⁵ does not recognize any fishing establishments (finfish fishing, shellfish fishing, or seafood product preparation and packaging) in Isle of Wight between 2001 and 2006. There may have been some fishing occurring by self employed individuals or others not participating in unemployment insurance upon which the Bureau of Labor Statistics survey is based.

4.2.2.4.6 Income

The median household income in 1999 for the county was \$45,387, and at that time median household income was \$52,597. Households earning less than \$25,000 comprised 26.5% of the county's households, and families with a similar income made up 18.5%. Per capita income for Isle of Wight County was \$20,235. Median earnings for male full-time, year-round workers were \$37,853 in 1999, and those of female full-time, year round workers were \$22,990.

In 2000, 6.6% of families in the county were below the poverty level. Families with a female householder, no husband present, were more likely to be below the poverty line with a reported 25% in that situation.

⁸⁵ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2.4.7 Housing

There were 12,066 housing units in the county in 2000, of which 93.8% were occupied. Of those occupied units, 80.8% were owner-occupied and 19.2% were renter-occupied. The median value of owner-occupied single detached housing units was \$129,300. The median rent for units in the county was \$502.

The county's housing stock was comprised dominantly of single unit detached homes (74.1%), and mobile homes (17.7%). Units in excess of 30 year of age composed 32.4% of units in the county.

4.2.2.5 James City County

James City County is a mix of rural and urbanized/urbanizing areas. The areas near the City of Williamsburg are either urbanized or urbanizing whereas portions of the county nearer the York River are more rural in character. James City County is the home of Jamestown, which is situated on Jamestown Island. The island is the only semi-isolated occupied land of the county, which is connected via bridge, and is predominantly owned by State and Federal landholders. James City County is part of the Virginia Beach-Norfolk-Newport News Metropolitan Area.

Major employers in the county include a beer manufacturer, manufacturers of glass and aluminum containers, a candle making company, a manufacturer of medical trays, a large amusement park, resort management, timeshares, and warehousing and distribution for a big box store.

4.2.2.5.1 Location

James City County is located just west of the City of Williamsburg. It is the location of the first permanent settlement of the English in the New World, Jamestown. The county spans the peninsula, from the James River in the south to the York River on the north. The county is bounded on the northwest by New Kent County; on the southeast by York County, Williamsburg, and Newport News; on the south by the James River, across which is Surry County, and on the southwest by the Chickahominy River and Charles City County. The nearest major cities are Newport News, which adjoins the city, Hampton, which is roughly 40 miles from the center of the county, and Richmond, which is approximately 50 miles from the center of the county.

4.2.2.5.2 Transportation

The major transportation route in James City County is Interstate 64, which provides access to Richmond to the northwest and the Hampton Roads metropolitan area to the southeast. State Highway 31 links the county via the Jamestown-Scotland Ferry to Surry County, and U. S. 60 connects the county to New Kent and Richmond, generally paralleling Interstate 64. In addition, State Highway 199, which in some locations is a limited access highway, provides a bypass of the City of Williamsburg. Amtrak service is available from Williamsburg or Richmond and a rail line runs from Richmond to Hampton Roads,. General aviation is provided by the Williamsburg-Jamestown airport, which is privately owned. Public air service is available through the Richmond airport, which is approximately 50 miles away or the Williamsburg-Newport New Airport approximately 25 miles from the center of the county.

4.2.2.5.3 Demographics

In 2000, the U.S. Bureau of Census found that the population of James City County totaled 48,102 people. The population was fairly equally distributed between males (49.1%) and females (51.6%). The median age of the county's residents was 40.8 years.

In terms of ethnic characteristics, James City County's diversity is lower than that of the adjacent Hampton Roads cities, with 98.6% of the population self-identifying as a single race. Of those reporting a single race 82% of the population self-identifying as white, 14.4% as black or African-American, 1.5% Asian, and 1.4% "some other race." Hispanic and Latino people comprised 1.7% of the population. A high percentage (95.9%) of the population consisted of native-born Americans. For the slightly over 4% of the populations that was born outside of the United States, the most frequently listed regions of birth included Europe (38.7%), Asia (29.7%) and Latin America (17.3%). Ancestries of county residents most frequently reported included "other ancestries" (24.2%), English (18.7%), German (15.7%) and Irish (13.7%).

The average household size for the county in 2000 was 2.47, persons and the average family size was 2.86 persons. For the segment of the population 15 years and over in age, 66.3% of males and 60.4% of women were married. Single parent families with children under 18 years of age compose 9.5% of families in the county. Single person households comprise 21% and nonfamily households comprise 4.8% of total county households.

People with disabilities made up 16.2% of county's population five years of age and over. Although people 65 years of age and over had the highest rate of reporting disabilities (34.4%), the rate of reporting of disabilities for this age cohort was lower than that of nearby counties.

4.2.2.5.4 Education

In general, the population of James City County is well educated. For the population 25 years of age and over in 2000, 89.3% had high school diploma or higher, and 41.5% had bachelor's degree or higher levels of educational attainment. A substantial percentage (16.7%) had graduate or professional degrees.

4.2.2.5.5 Economics

For those residents of the county 16 years of age and over in 2000, 60.5% were in the labor force. At that time 2.1% were unemployed. Females in this age cohort participated in the labor force at a rate of 53.9%, and 51.4% employed.

The most commonly cited occupations for county residents included management, professional and related occupations (41.1%), sales and office occupations (25.3%) and service occupations (15.7%). Farming, fishing and forestry occupations comprised 0.2% of those reported. Private wage and salary workers comprised 70.7%, government workers 22.6%, self-employed with own not incorporated business 6.4%, and unpaid family workers comprised 0.3% of workers in the county.

The industries in which residents participated most commonly were educational, health and social services (21.4%), arts, entertainment, recreation, accommodation, and food services (15.5%), retail trade (11.3%) and manufacturing (10%). Agriculture, forestry, fishing and hunting, and mining made up 0.4% of reported industries.

James City County had no fishing establishments (finfish fishing, shellfish fishing, or seafood product preparation and packaging) between 2001 and 2006 according to the Bureau of Labor Statistics quarterly survey.⁸⁶ There may have been some fishing activity by those not participating in unemployment insurance upon which the survey is based.

4.2.2.5.6 Income

In 1999, the median household income for James City County was \$55,594 and the median family income was \$66,171. Households with income under \$25,000 comprised 18.3%, and households with the same income comprised 11.4%. Per capita income for the county in 1999 was \$29,256. A substantial disparity between earnings of male full-time, year-round workers (\$43,339) and female full-time, year-round workers (\$27,016) was reported by the U.S. Bureau of Census.

In 1999, 4.1% of families in the county were found to be below the poverty level. For those families with a female householder, no husband present, the rate increased to 17.7%.

4.2.2.5.7 Housing

In 2000 there were 20,772 housing units in James City County; 91.5% of those units were occupied. Of the occupied units in the county, 77% were owner-occupied and 23% were renter-occupied. The vacancy rate was 8.5% of which 20.8% of the vacant homes were for seasonal, recreational or occasional use. The median value of occupied single unit homes was \$167,300, and the median rent in the county was \$703.

The housing stock of James City County consists of single unit detached homes (66.9%), single unit attached homes (12.2%), and mobile home (6.8%) for the most frequently reported classes. Housing units in excess of 30 year old make up a small portion (15.3%) of the county's housing stock.

4.2.2.6 King George County

King George County, situated on the south shore of the Potomac River, is mainly rural in character with development focused around the Dahlgren area. The County is not part of a metropolitan area, but adjoins counties that a part of the Richmond and the Washington-Baltimore-Northern Virginia metropolitan areas. There are no isolated occupied islands in King George County.

Major employers in the county include the military, a concrete company, two computer programming companies, a nursing home, and a trucking company.⁸⁷ Other than the military, none of these companies employs in excess of 300 people.

⁸⁶ <http://data.bls.gov/PDQ/outside.jsp?survey=en>

⁸⁷ <http://virginiacan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51099.pdf>

4.2.2.6.1 Location

King George County is located on the proximal end of the Northern Neck, along the Potomac River. The county is adjacent to Westmoreland County (to the southeast), Essex and Caroline Counties to the south, and Stafford County to the West. Across the Potomac River from King George County is Charles County, Maryland. The nearest city of substantial size is Fredericksburg, approximately 12 miles west of the county line. Washington, DC is approximately 60 miles away.

4.2.2.6.2 Transportation

The major highways in the county are U.S. 301 which connects via the Potomac River toll bridge to Maryland to the northeast and Richmond and beyond to the west southwest and State Highway 3 which runs from Culpeper and Fredericksburg to the tip of the Northern Neck at Reedville and toward Mathews and Gloucester Counties on the Middle Peninsula. While the county is not served by a rail line, rail service including Amtrak is available at Fredericksburg. The county does not have an airport for general or public use, but Dahlgren Station, a military installation, is shown to have air service on the Virginia Department of Transportation (VDOT) map.⁸⁸

4.2.2.6.3 Demography

In 2000, the total population of King George County was 16,803 according to the U.S. Bureau of Census. The population was evenly split between men (50.2%) and women (49.8%). The median age of residents of the county was 35.1 years.

The ethnic characteristics for the county's population was a dominantly white population (77.7%), with 18.8% of the population self-identifying as black or African-American and 1% of the population self-identifying as Asian for those members of the population identifying a single race. Hispanic and Latino people comprised 1.8% of the population. Nearly all the population (98.7%) was native-born Americans. For the limited population of foreign-born people, the most commonly reported regions of birth included Europe (40.4%), Asia (29.8%) and Latin America (22.2%). The most frequently reported ancestry for the residents of the county included "other ancestries" (27.1%), German (14.3%), English (13.2%), Irish (11.7%), and United States or America (10.1%).

The average household size for the county was 2.7 people, and the average family size was 3.12 people. For the population 15 years of age and over, 58.8% of males and 57.8% of females were married. Single parent families with children under 18 years of age made up 10.9% of families in the county. Single person households comprised 20.4% and nonfamily households comprised 4.8% of all households in the county.

People with disabilities comprised 18.1% of the population over the age of 5 years. Senior citizens 65 years of age and over had the highest rate (46.8%) of reporting having a disability.

⁸⁸ <http://www.virginiadot.org/travel/Resources/ct-vamap3.pdf>

4.2.2.6.4 Education

Of the population 25 years of age and over in the county 80.4% had a high school graduate or higher and 23.6% had a bachelor's degree or higher level of educational attainment, rates roughly commensurate with the nation as a whole. Graduate and professional degrees were held by 8.1% of the population in that age cohort.

4.2.2.6.5 Employment

In 2000, 69.1% of the county's population 16 years of age and over was in the labor force, and 2.7% were unemployed. Females sixteen years of age and over participated in the labor force at a rate of 59%, and 54.3% were employed.

The most frequently reported occupations of county residents were management, professional, and related occupations (38%), sales and office occupations (24.3%), and production, transportation, and material moving occupations (13.1%). Farming, fishing and forestry occupations comprised 0.9% of those reported. By class of worker, the breakdown for the county consisted of 63.4% private wage and salary workers, 30.7% government workers, 5.7% self-employed in own not incorporated business, and 0.2% unpaid family workers.

Industries most reported included public administration (21.3%), educational, health, and social services (11.7%) and retail trade (11.7%). Agriculture, forestry, fishing and hunting and mining was reported by 2% of the population.

King George County had no fishing establishments in finfish fishing, shellfish fishing or seafood product preparation and packaging according to the Bureau of Labor Statistics⁸⁹ between 2001 and 2006. There may have been some fishing activity in the county that was missed undertaken by people who were self-employed or otherwise not participating in unemployment insurance, which was the basis of the Bureau of Labor Statistics survey.

4.2.2.6.6 Income

The median household income in 1999 was \$49,882, and the median family income at that time was \$55,160. Households with incomes under \$25,000 comprised 19.2% of households in the county and families with similar incomes comprised 14.3% of families. Per capita income for the county in 1999 was \$21,562. Male full-time, year-round workers had a median earning of \$38,600 and female full-time, year-round workers had a median earning of \$26,350.

Poverty status was found for 4.4% of families in the county in 1999. A higher percentage of families with female householder, no husband present (16.5%) were found to have incomes below the poverty level.

4.2.2.6.7 Housing

In 2000, there were 6,820 housing units in King George County, of which 89.3% were occupied. For the occupied units, 71.8% were owner-occupied, and 28.2% were renter-occupied. The vacancy rate for units in the county was 9%, and of the vacant units 36.5% were for

⁸⁹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

seasonal, recreational or occasional use. The median value of owner occupied single detached units was \$123,200 and the median rent was \$622.

The housing stock in the county was comprised mainly of single unit detached homes (73.9%) and mobile homes (12.7%). Roughly one third of the county's housing is 30 years of age or over.

4.2.2.7 Lancaster County

Lancaster County is a mainly rural county situated at the end of the Northern Neck. Development in the county is focused centrally around the town of Kilmarnock and in the southern part of the county near the area of Irvington. Fleets Island (Windmill Point) is slightly isolated, but connected by roadway and bridges to the remainder of the county. The county is not part of a metropolitan area.

Major employers in the county include two banks, two health care providers (one hospital and one nursing home), a resort, a newspaper publisher, and a seafood processor.⁹⁰ Kilmarnock serves as a local regional services and goods center, with shopping centers and restaurants. Nearly half of the employment in the county in the third quarter of 2007 was within the services sector.⁹¹

4.2.2.7.1 Location

Lancaster County is situated at the south side of the distal end of the Northern Neck. It is bounded on the north by Northumberland County, on the east by Chesapeake Bay, on the south by the Rappahannock River and Middlesex County, and on the west by Richmond County. The county seat is Lancaster. The nearest sizable city is Fredericksburg which is approximately 75 miles to the northwest, and the nearest large cities are Newport News (also 75 miles) and Washington, DC (120 miles).

4.2.2.7.2 Transportation

The major highway in the county is State Highway 3, which has four lanes for much of its length. The Rappahannock River Bridge links the county to southern areas. There is no rail service to the county. The nearest airport is at Tappahannock, approximately 30 miles away, and connection to international flights is available in Washington, DC approximately 120 miles away or Norfolk approximately 85 miles away.

4.2.2.7.3 Demographics

The population of Lancaster County in 2000 was found by the US Census Bureau to total 11,567. A slightly higher percentage of the population was female (53.5%) than male (46.5%). The median age of the county's population was 49.8 years.

The ethnic composition of the county was 69.9% white, 28.9% black or African-American, and less than 1% of other races for those self-identifying as a single race. Hispanic or

⁹⁰ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51103.pdf>

⁹¹ p2, <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51103.pdf>

Latino people made up 0.6% of the county's population. A high proportion (98.3%) of the population was native-born Americans. For the small group of people born outside the United States, 60.2% were born in Europe, 25.4% were born in Asia, and 11.4% were born in Northern America. The most frequently reported ancestries for county residents included "other ancestries" (26.2%), English (17.9%), and United States or American (12.9%).

The average household size was 2.23 persons and the average family size was 2.71 persons. More males over the age of 15 (68.9%) were married than females of the same age group (58.9%). Single parent families comprised 9.7 % of all families in the county. Single person households made up 28% and nonfamily households made up 2.1% of all households.

People with disabilities comprised 21.6% of the population 5 years of age and over. The most affected population is the age cohort 65 years of age and over for which 33.3% of the cohort reported a disability.

4.2.2.7.4 Education

For the population 25 years of age and over, 74.4% had high school graduate or higher levels and 24.5% had bachelor's degree or higher levels of educational attainment. Graduate or professional degrees were held by 9.2% of the population 25 years of age and over.

4.2.2.7.5 Employment

For the population 16 years of age and over in 2000, 48.7% were in the labor force. For females in the 16 years of age and over cohort, 43.4% participated in the labor force and 40.3% were employed.

The most frequently cited occupations for the county included management, professional and related occupations (27.6%), sales and office occupations (25.1%), and service occupations (20.6%). Farming, fishing and forestry occupations comprised 1.9% of those in the county. Private wage and salary workers comprised 71.9%, government workers 15.4, self-employed workers in own not incorporated business 12.5%, and unpaid family workers 0.2% of workers in the county.

Industries in which county residents most frequently participated included educational, health, and social services (21.9%), retail trade (12.7%), and construction (9.7%). Agriculture, forestry, fishing and hunting, and mining were participated in by 3% of the population.

Lancaster County has a concentration of fishing establishments with nine establishments in 2006 and 11 in 2005 according to the Bureau of Labor Statistics.⁹² At the peak reported, 2004, there were a total of 13 fishing establishments, with four in finfish fishing, one in shellfish fishing, and eight in seafood product preparation and packaging. In 2005, the number of seafood processors declined to six, and in 2006 both finfish fishing declined (to three) and the sole shellfish fishing establishment no longer appeared in the reporting. The maximum number of employees in seafood product preparation and packaging was 136 in 2002 and 2003 and the maximum total wages for the employees was over \$1.7 million in both years. In 2006 seafood product preparation and packaging employed 79 people with total wages of nearly \$1.2 million.

⁹² <http://data.bls.gov/PDO/outside.jsp?survey=en>

Finfish fishing had maximum employment of 17 people in 2006 with total wages of \$429 thousand.

4.2.2.7.6 Income

The median household income in 1999 for the county was \$33,239 and the median family income at that time was \$42,957. Households with incomes under \$25,000 made up 36.2% of the households in the county, and families with incomes under \$25,000 comprised 26.6% of families in the county. Per capita income for the county in 1999 was \$24,663. Mean earnings for male full-time, year round workers was \$30,592, and mean earnings for female full-time, year round workers was \$23,039.

Poverty status was assessed for 9.9% of families in the county. Families with female householders, no husband present, were three times more likely to be in poverty (31.2%).

4.2.2.7.7 Housing

In 2000 there were 6,498 housing units in the county; of these, 77% were occupied. For the occupied units in the county, 83% were owner-occupied and 17% were renter-occupied. The vacancy rate was 23%. Of the vacant houses, 70% were reported to be for seasonal, recreational or occasional use. The median value of occupied single unit homes was \$131,600 and median rent in the county was \$508.

Housing stock in Lancaster County is predominantly single unit detached structures (85.8%) and mobile homes (8.9%). Structures in excess of 30 years old made up 44.5% of the county's stock.

4.2.2.8 Mathews County

Mathews County is a rural county at the tip of the Middle Peninsula. In its own web page, the county describes itself as having “remained relatively undeveloped, retaining the slow-paced, friendly charm of a country community.” In addition, “Mathews County still does not have any traffic signal lights. However, there are lights placed at either end of the swing span bridge to Gwynn's Island that could be considered traffic lights by some”.⁹³ Gwynn's Island is not isolated from the mainland – it is connected via the swing span bridge, and it is the only inhabited island in the county. The spit from the southeast end of Gwynn's Island had separated from the island between the 1982 date of the U. S. Geological Survey's (USGS) topographical map and the 1992 aerial photography available at USGS as DOQ imagery.⁹⁴ The county is considered within the Virginia Beach-Norfolk-Newport News metropolitan area.

Major employers in the county include an embroidery company, a maker of ropes and slings and similar textile materials, a seafood company, and a boat repair. None of the establishments employ in excess of 100 people. A high proportion of commuters in the county

⁹³ <http://www.co.mathews.va.us/>

⁹⁴ <http://terraserver-usa.com/usgsentry.aspx?T=1&S=13&Z=18&X=242&Y=2593&W=3>

are “out-commuters” working outside the county, with 54.2% of commuters leaving the county daily.⁹⁵

4.2.2.8.1 Location

Mathews County is at the northern extremity of the Middle Peninsula. It is adjoined by Gloucester County to the south and Middlesex County to the west. To the north is the Rappahannock River, to the east is Chesapeake Bay and to the south is Mobjack Bay. The county seat is unincorporated Mathews Courthouse. In general, Mathews County is rural and takes pride in its pastoral serenity. The nearest Cities are Hampton and Newport News, which are roughly 45 miles away.

4.2.2.8.2 Transportation

Mathews County connects to Gloucester County via State Highway 14. State Highway 3 connects Mathews and Lancaster County with access to the remainder of the Northern Neck. Mathews County has neither airport nor rail service. The nearest airport is the Williamsburg-Newport News Airport approximately 45 miles away.

4.2.2.8.3 Demographics

In 2000, the U.S Census Bureau found the population of Mathews County to total 9,207 people. The population was evenly split between males (48.2%) and females (51.8%). The median age of the county’s population was 46.2 years.

In terms of ethnic composition, the county is predominantly white (87.3%), with 11.3% of the population self-identifying as black or African-American, and very low (less than 1%) self-identifying in the other races or multiple races. Hispanic or Latino people made up 0.8% of the population. Nearly 98% of the population reported native born American status. Of the limited population of foreign born people the most frequently reported regions of birth were Europe (83.8%), Northern America (7.1%), and Latin America (6.6%). The most often reported ancestries for residents of the county included United States or American (21.3%), other ancestries (16.3%), and English (16%).

The average household size was 2.32 persons and the average family size was 2.75 persons in 2000. Married men over the age of 15 slightly outnumbered married women (66.2% versus 61.1%) of the same age group. Single parent families with children under 18 years of age comprised 6.5% of all families in the county. Single person households made up 24.8% of the county’s households, and nonfamily households comprised 3.4%.

People 5 years of age and over with disabilities comprised 18.1% of the population. The age cohort with the highest percentage of reported disabilities was those people aged 65 and over (42.1%).

⁹⁵ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51115.pdf>

4.2.2.8.4 Education

For the population 25 years of age and over, 80.8% had high school graduate or higher levels and 19.2% had bachelor's degree or higher levels of educational attainment. Graduate and professional degrees were held by 8.2% of the county's population 25 years of age and over.

4.2.2.8.5 Employment

For those county residents 16 years of age and over, 56% were in the labor force, and 1.8% was unemployed. Females 16 years of age and over participated in the labor force at a rate of 52.1%, and 50.3% were employed.

The most frequently reported occupations for county residents in the employed in the labor force included management, professional, and related occupations (27.3%), sales and office occupations (22.9%), and service occupations (17.1%). Farming, fishing, and forestry occupations comprised 1.6% of those reported. Private wage and salary workers comprised 70.2%, government workers comprised 19.4%, and 10.5% were self-employed workers in own not incorporated business. There were no unpaid family workers found in the county.

The industries in which county residents most frequently participated included educational, health and social services (20.4% of employed workers), manufacturing (12.8%), and retail trade (11.7%). Agriculture, forestry, fishing and hunting, and mining provide employment for 1.9% of the workers in the county.

Mathews County has employment in fishing establishments in all three categories recognized by the Bureau of Labor Statistics,⁹⁶ finfish fishing, shellfish fishing and seafood product preparation and packaging between 2001 and 2006. Numbers of establishments were disclosed only for 2004-2006, and were reported as three in finfish fishing, one in shellfish fishing, and two in seafood product preparation and packaging. No data were disclosed regarding numbers of employees or wages for 2001 -2006.

4.2.2.8.6 Income

The median household income for Mathews County in 1999 was \$43,222 and the contemporaneous median family income was \$50,653. Households with incomes under \$25,000 comprised 26.8% of all households in the county, and families with similar incomes comprised 16.4% of all families. The per capita income for the county was \$23,610. Median earnings for male full-time, year round workers were \$36,394 and median earnings for female full-time, year-round workers were \$23,434.

In 1999 4.3% of families were found to have incomes below the poverty level. More severely affected were families with female householder, no husband present of whom 11.1% were found to have income below the poverty level.

⁹⁶ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2.8.7 Housing

In 2000, there were 5,333 housing units in the county of which 73.3% were occupied. Owner-occupied units made up 84.7% of the occupied units, and renter-occupied units made up 15.3%. Over a quarter of the units of the county were vacant. Nearly three quarters of the vacant units (72.8%) were for seasonal, recreational or occasional use. The median value of owner occupied single detached units was \$118,000 and the median rent for renter occupied units was \$506.

The county's housing stock consists largely of single unit, detached structures (86.6%) and mobile homes (10%). Structures in excess of 30 year of age comprised 52% of the county's housing stock.

4.2.2.9 Middlesex County

Middlesex County is a predominantly rural county with development focused mainly in the areas of Urbanna, Saluda, Locklies, and Deltaville. There is one island in the county that is not connected to the mainland via bridge, Parrott Island, but review of the aerial photography from USGS shows that it appears to be uninhabited.⁹⁷

Major employers in the county include two seafood companies, a wood chip and saw dust company, a metal fabricator, a courier, a boat engine rebuilding company, and a bottled gas company. None of the employers hire more than 100 people.⁹⁸

4.2.2.9.1 Location

Middlesex County is located along the north side of the Middle Peninsula, with its long axis paralleling the Rappahannock River. Sharing the county's northwest boundary is Essex County. To the south and west are Mathews, Gloucester and King and Queen Counties from east to west. Access to Lancaster and Richmond Counties, across the Rappahannock River is available by bridges in Tappahannock and Mathews County. The county seat is Saluda.

4.2.2.9.2 Transportation

The major highway in the county is U.S. Highway 17, which runs generally along the center of the county from southeast to northwest in the northern half of the county. From U.S. Highway 17 south, the major highways are state highways 3 and 33. State Highway 3 connects through to Lancaster County via the Rappahannock River Bridge, and State Highway 33 connects down to the southeastern tip of the county at Deltaville and Stingray Point. The USGS map shows three airfields in Middlesex County, one in the area of Topping (Hummel Field, a single runway airport owned by the county), one at Rosegill Farm, and one at Camp Nimcock. From the USGS aerial photos, it appears that both the Camp Nimcock and Rosegill Farm airstrips are grass-surfaced.⁹⁹ There is no rail service in the county.

⁹⁷ <http://terraserver-usa.com/image.aspx?T=1&S=10&Z=18&X=1874&Y=20808&W=3>

⁹⁸ <http://virginiacan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51119.pdf>

⁹⁹ <http://terraserver-usa.com/image.aspx?T=1&S=14&Z=18&X=113&Y=1301&W=3>

4.2.2.9.3 Demographics

The population of Middlesex County in 2000 totaled 9,932 people according to the U.S. Census Bureau. The population was evenly split between males (48.1%) and females (51.9%). The median age of county residents was 46.8 years.

The ethnic composition of the county is predominantly white (78.5%) with a small proportion of black or African-American (20.1%) and a miniscule proportion of Asian (0.1%), and other residents for those self-identifying a single race. Hispanic or Latino people made up a small proportion of the population (0.6%). Native born American citizens comprised 97.9% of the population. For the restricted number of foreign born residents of the county, the regions of birth most commonly cited included Europe (62.5%), Asia (19.7%) and Latin America (13.5%). The most frequently reported ancestries for county residents included other ancestries (23.2%), English (18.8%), and United States or American (13.4%).

The average household size in 2000 in Middlesex County was 2.27 people, and the average family size was slightly larger at 2.73 people. Of the Males in the county 15 years of age and over 63.5% were married, whereas for females of the same age cohort, 57.1% were married. Single parent families with children under 18 years of age comprised 9.4% of all families in the county. One-person households made up 26% of the total households in the county, and nonfamily households comprised 4.9%.

Disability status was assigned for people 5 years of age and over with a disability which made up 23.1% of the population. The cohort of people reporting a disability at the highest rate was the population 65 years of age and over (43.6%).

4.2.2.9.4 Education

The population of Middlesex County had a slightly lower level of educational attainment than the nation at large. High school graduates or higher levels of educational attainment were possessed by 73.7% of county residents as compared to 80.4% for the nation as a whole, and 18.9% held bachelor's degrees or higher levels compared to 24.4% for the nation. Graduate and professional degrees were held by 6.3% of the county's residents.

4.2.2.9.5 Employment

Of the 8,216 people in the county 16 years of age and over, 54.2% were in the labor force, and 2.1% were unemployed. Females participated in the labor force at a moderate rate (46.8%), with 44.8% employed.

The most commonly reported occupations for county residents included management, professional, and related occupations (30.1%), sales and office occupations (23.3%), and construction, extraction, and maintenance occupations (15.4%). Farming, fishing and forestry occupations comprised 2.1% of those reported. Nearly 70% of workers in the county were private wage or salary workers, 21.6% were government workers, 11.1% were self-employed workers in own not incorporated business, and 0.4% were unpaid family workers.

The county's residents participated most frequently in the following industries, educational, health and social services (20.9%), construction (11.7%), and retail trade (11.5%). Agriculture, forestry, fishing and hunting, and mining employed 2.9% of the local residents.

Middlesex County had fin fishing and seafood processing establishments between 2001 and 2006 according to the Bureau of Labor Statistics quarterly survey.¹⁰⁰ Numbers of establishments were not disclosed for either category in 2001 and 2002. In 2003 and 2004 there were four seafood processors, which declined to three in 2005 and 2006. For the only year in which data is disclosed, 2003, there were 69 employees in seafood product preparation and packaging (seafood processing), with total wages over \$1 million. In shellfish fishing, two establishments were reported in 2004, declining to one in 2005 and 2006; no data were disclosed on numbers of employees or wages for this sector.

4.2.2.9.6 Income

The median income for households in Middlesex County in 1999 was \$36,875 and the median family income for the county at that time was \$43,440. Households with income less than \$25,000 comprised 30.1% of all households in the county, while families with similar income comprised 22.9% of families. Per capita income for the county was \$22,708. Median earnings for male full-time, year-round workers in the county were \$30,842, and median earnings for female full-time, year-round workers were substantially lower at \$23,659.

Poverty status was assessed for 9.7% of families in 1999. Families with a female householder, no husband present, were found to have incomes below the poverty level at a rate of 29.6%.

4.2.2.9.7 Housing

In 2000, there were 6,362 housing units in the county, of which 66.9% were occupied. For the occupied units, 83.1% were owner-occupied, and 16.9% were renter-occupied. Of the vacant housing units, 84.5% were reported to be for seasonal, recreational or occasional use. The median value of occupied single unit structures was \$124,300, and the median rent for units in the county was \$544.

Housing stock is mainly comprised of single unit, detached structures (80.1%), and mobile homes (15%). Structures over 30 years old made up 41.6% of those in the county.

4.2.2.10 City of Newport News

The City of Newport News is situated on the southern peninsula on the western shore of Chesapeake Bay. The southern portion of the City is highly developed with a more open character with single-family homes in the northern portion in general, although the western segment of the northern area contains a military base and an industrial park. A large city park is located in northern Newport News. Newport News' small boat harbor in the southeast portion of the city is a locus of commercial fishing activity with shrimp, scallop, fish, and crab being offloaded or processed. Substantial fish processing also occurs in the northern portion of the city

¹⁰⁰ <http://data.bls.gov/PDO/outside.jsp?survey=en>

in one of the industrial parks, with fish imported from Iceland. Islands in the city appear to be associated with the military base and appear to be unpopulated. The city is part of the Virginia Beach-Norfolk-Newport News metropolitan area.

Major employers in the city include a copier and laser printer firm, a newspaper, a seafood processor, a rubber products manufacturer, a dairy processor, two ship building and repairs (one of which employs in excess of 10,000 people), a paper box printing company, an automobile component company, a distribution center for the military, two health care providers, a plumbing services company, an industrial equipment services company, a soft drink bottler, a catalog sales and distribution company, a research laboratory, and customer service and courier branches for a major delivery service. Commuters in the area are highly mobile, but overall, the net for Newport News is toward commuters who come into the city to work on a daily basis.¹⁰¹

4.2.2.10.1 Location

Newport News is situated on the south side of the tip of the area known as “The Peninsula” to Hampton Roads residents, which is located between the James and York Rivers. Newport News’s boundaries abut the City of Hampton and York County to the east, and James City County on the north. The west side of the city is bounded by the James River, and across the river is Isle of Wight County, and the Cities of Suffolk, Portsmouth, and Norfolk from northwest to southeast respectively.

4.2.2.10.2 Transportation

The City of Newport News is well served for transportation. It serves as a freight hub for one of the busiest harbors in the nation, and trailers are freighted in, and then transshipped via trucks for delivery up and down the east coast. Multi-modal transport in the area has a long history with the early rail service from the C&O railroad leading to a need for a shipyard to provide vessels to send coal to more distant areas, both of which began shortly after the Civil War under the auspices of Collis Potter Huntington.¹⁰² The major highways in Newport News include Interstate 64 and Interstate 664, U.S. Highways 17, 258, and 60. Rail service continues in the city, and Amtrak service is available in the city. Air service is available within the city at the Newport News-Williamsburg International Airport, with regular commercial service.

4.2.2.10.3 Demographics

According to the U.S. Bureau of Census, the total population of the city was 180,150 people in 2000. The population was estimated to have declined to 178,281 people in a more recent American Community Survey in 2006. Males and females were fairly evenly distributed with 48.4 % of the population as males and 51.6% females in 2000. In 2006, the proportion had shifted to slightly more females (52.6%) than males (47.4%). The median age of the population in 2000 was 32 years, and in 2006 it was 33.5 years.

The city is reasonably ethnically diverse, with 53.8% of the population self-identifying as a single race as white, 39.1% as black or African-American, and 2.3% as Asian in 2000, while in 2006 the population was estimated to be 50.6% white, 41.3% black or African-American, 2.6% Asian for those who self-identified a single race. Hispanic and Latino people comprised 4.2% of

¹⁰¹ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51700.pdf>

¹⁰² <http://www.nngov.com/library/nnhistory>

the population in 2000, and 4.4% in 2006. Native born Americans comprised 95.2% of Newport News's population in 2000, in 2006 the native born American population declined slightly to 94.2%. For the nearly 5% of the population that was foreign born in 2000, the most commonly reported regions of birth included Asia (41.8%), Europe (30%) and Latin America (21.3%). The most frequently listed ancestries reported in 2000 included other ancestries (46.7%), German (9.6%), and English (8.3%).

The average household size in 2000 was 2.5 persons, and the average family size at that time was 3.04 persons; in 2006 both the average household size and the average family size had declined slightly (2.35 and 2.97, respectively). Married males 15 years of age and over comprised 52.6% of all males in the city, and married females 15 years of age and over comprised 46.7% of females in the city in 2000; in 2006, both had declined slightly to 50.2% of males being married and 45% of females being married. Single parent families with children comprised 20.6% of families in the city. Single person households comprised 26.9% of households in the city and nonfamily households comprised 6% of the city's households.

People 5 years of age and over reporting a disability comprised 19.1% of the city's population in 2000, and in 2006 those reporting disabilities declined to 15.5%. The age cohort most frequently reporting having a disability (43.1%) was the segment of the population 65 years of age and over; in 2006 41.0% of the same age cohort reported possessing a disability.

4.2.2.10.3 Education

In 2000, the Census Bureau found that 84.5% of Newport News's population 25 years of age and over had a high school or higher level and 19.9% had a bachelor's degree or higher level of educational attainment. Contemporaneously, 6.5% of the city's population had a graduate or professional degree. In 2006 those with high school and higher levels of educational attainment had increased to 87.8% of the population in the 25 years of age and over cohort and those with bachelor's degree or higher level of education had increased to 23.3%. In 2000, those with graduate and professional degrees had increased to 8.4%.

4.2.2.10.4 Employment

In 2000, 68.3% of the city's population 16 years of age and over participated in the labor force and 3.45% were unemployed. Simultaneously, 61.8% of females participated in the labor force and 56.2% were employed.

The most commonly reported occupations in the city were management, professional, and related occupations (30.5%), sales and office occupations (17.6%), and service occupations (17.6%). Farming, fishing, and forestry occupations comprised 0.3% of those reported. Private wage and salary workers composed 74.7%, government workers made up 21%, self-employed workers with own not incorporated business made up 4.2%, and unpaid family workers made up 0.2% of city workers.

The industries in which city residents participated most frequently were educational, health, and social services (19.3%), manufacturing (15.3%), and retail trade (12.8%). Agriculture, forestry, fishing and hunting, and mining employed 0.3% of the city's workers.

According to the Bureau of Labor Statistics quarterly survey,¹⁰³ Newport News had one finfish fishing establishment, between three and four shellfish fishing establishments and two seafood product preparation and packaging establishments reported between 2004 and 2006. The maximum number reported was a total of seven (one finfish fishing, four shellfish fishing, and two seafood product preparation and packaging establishments) in 2005. The number of employees disclosed was four in shellfish fishing in 2005 and 2006, with maximum total wages of \$289 thousand in 2006.

4.2.2.10.5 Income

The median household income for the city in 1999 was \$36,597, and the median family income at that time was \$42,520. In the 2006 survey, the median household income had increased to \$44,226 and the median family income had increased to \$53,631. Households with incomes less than \$25,000 comprised 32.1% of households in the city in 1999, whereas families with a similar income at that time comprised 25.7% of families. In the 2006 survey, fewer households (26.7%) had incomes under \$25,000 (in 2006 inflation adjusted dollars) and families with incomes under \$25,000 decreased to 18.8%. The per capita income in 2000 was \$17,843 and in 2006 the per capita income for the city had increased to \$22,257. Median income for male full-time year-round workers in 1999 was \$31,275, and for female full-time, year-round workers the median income was \$22,310. Although both male and female full-time, year-round workers saw an increase in median income, disparately men saw a greater increase to \$42,810 whereas women's median income increased to \$28,978 in the 2006 survey.

Poverty status (income below the poverty level) was found for 11.3% of families in 1999, and families with a female householder, no husband present, were found to be in poverty at a higher rate (32.9%). According to the 2006 data, 9.2% of families had incomes below the poverty level in the previous 12 months, and 24.1% of families with a female householder, no husband present, were found to have been in poverty.

4.2.2.10.5 Housing

In 2000, there were 74,117 housing units in Newport News and 94% were occupied. Of the occupied units, 52.4% were owner occupied in 2000, and 47.6% were renter occupied. Vacant units comprised 6% of all units in the city. Of the vacant units in 2000, 6.1% of units were for seasonal, recreational, or occasional use. In 2006, there were an additional 3,806 units, totaling 77,923 units within the city, of which 93.3% were occupied. The proportion of owner occupied units and renter occupied units was virtually the same as in 2000. The median value of single unit, detached structures in 2000 was \$96,400 and in 2006 the median value had increased to \$173,900. Median rent in Newport News in 2000 was \$559, and in 2006 the median rent had increased to \$752.

The housing stock of the city in 2000 broke down to 50.7% of the units being single unit, detached structure, with the largest proportion of the remaining units being multiunit structures. Units in excess of 30 years of age comprised 43.2% of the city's housing stock.

¹⁰³ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2.11 City of Norfolk

Norfolk is a community with long affiliation with the military. Within city limits are two major bases, Naval Station Norfolk, the largest military base in the world, and Little Creek Amphibious Base. The Norfolk Naval Shipyard is also within city limits. Norfolk is highly developed with substantial housing, industry and commercial uses of land within city limits. There are no occupied isolated islands within the City of Norfolk. The city is within the Virginia Beach-Norfolk-Newport News metropolitan area.

Major employers within the city of Norfolk include a book publisher, a newspaper, a ship building and repair company, a bank, two health care providers, one media and information services company and two institutions of higher education. The population is quite mobile with a high number of commuters into and out of the city, with a net of commuters into the city for employment each day.¹⁰⁴

4.2.2.11.1 Location

The City of Norfolk is located on the south side of the James River. It shares boundaries with the cities of Suffolk to the west, Portsmouth and Chesapeake to the south, and Virginia Beach to the east. Immediately north of the city is the waterway known as Hampton Roads, with the confluence of the James and York Rivers and Chesapeake Bay. Across the James River from Norfolk are the cities of Newport News and Hampton. The area is served by bridge-tunnels, including the Hampton Roads, the Monitor-Merrimack and the Midtown Bridge Tunnels, which were designed to permit both highway and marine transport.

4.2.2.11.2 Transportation

The City of Norfolk has substantial highway linkage to the adjoining communities and the other major cities in the U. S. Interstate Highways serving the city include Interstates 64, 264, and 564. Links to North Carolina are via State Highways 168 and 17, and connections east-west to Virginia Beach and Emporia are via State Highway 58. The city has rail service, and a new light rail line is scheduled for construction between Norfolk and Virginia Beach. The city is the home of the Norfolk International terminal for freight service, with transshipment of a large portion of goods distributed along the east coast. Norfolk International Airport provides commercial air service for the surrounding regions. In addition to the commercial airport, there are military facilities for aircraft at the Naval Station.

4.2.2.11.3 Demographics

The population of the city totaled 234,403 people in 2000 according to the U. S. Bureau of Census. In 2006 the American Community Survey data showed the city's population was estimated at 229,112, a decline of 2.26%. In both the 2000 and 2006 the U.S. Census Bureau found that the population was generally evenly split with 51.1% males and 48.9% females. The median age of Norfolk's population was 29.6 years in 2000, and 29.5 years in 2006.

The ethnic composition of Norfolk in 2000 by self-identified single race was 48.4% white, 44.1% black or African-American, and 2.8% Asian people, and 2.5% of the population

¹⁰⁴ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51710.pdf>

self-identified two or more races. In 2006, the city's racial mix was similar, with slightly higher proportions of black or African American people (44.8%) and Asian people (3.1%). Hispanic and Latino people made up 3.8% of the city's population in 2000, and rose to 4.4% of the population in 2006. In 2000 95% of the city's population was comprised of native-born Americans; for the 5% of the population that was foreign born, the most frequently reported regions of birth included Asia (50.5%), Latin America (23.6%), and Europe (17.8%). The most commonly reported ancestries for Norfolk's population in 2000 was "other ancestries" (49.5%), English (6.9%) and United States or American (5.2%).

The average household size for the city in 2000 was 2.45 persons, and the average family size concurrently was 3.07. In 2006 the average household size was 2.36 persons, and the average family size was 3.01 persons. In 2000, 41.7% of males 15 years of age and over were married and 39.6% of females in the same age cohort were married, by 2006 the percentage of married males had increased just less than 2% to 43.6% and the percentage of married females was virtually unchanged at 39.6%. Single parent households with children present in 2000 comprised 23.2% of all families in the city. Single person households made up 30.2% of all households in the city and nonfamily households comprised 9.17% of the city's households.

People with disabilities made up 23.2% of the city's population in 2000 5 years of age and over, a higher proportion than the national comparison of 19.3% of the population 5 years of age and over reporting a disability. The age cohort most likely to report having a disability was the cohort 65 years of age and over (46.9%). In 2006 the level of people 5 years of age and over who reported a disability declined to 15.3%.

4.2.2.11.4 Education

The residents of Norfolk in 2000 tended to be somewhat less educated than the nation. In Norfolk 78.4% of the population 25 years of age and over had high school graduate or higher levels of educational attainment, and 19.6% had bachelor's degrees or higher. The national levels of educational attainment at that time disclosed 80.4% having high school graduate or higher levels and 24.4% had bachelor's degree or higher level. In 2006 the city's population still fell somewhat behind the national in terms of education with 83.2% of the city compared to 84.1% of the national population having high school or higher levels of educational attainment, and 23.3% of the city's population having bachelor's degrees or higher while the national rate was 27%. In 2000, 7.7% of the city's population 25 years of age and over had graduate or professional degrees, and in 2006, 8.86% held graduate or professional degrees.

4.2.2.11.5 Employment

Of the population 16 year of age and over, 67.1% of the city's residents participated in the labor force in 2000 and 4.7% were unemployed. The armed forces employed 14.8% of the city's residents. Of females 16 years of age and over, 58.4% were in the labor force and 48.6% were employed in 2000. In 2006, 69.1% of the total population 16 years of age and over was in the labor force, and 4.16% were unemployed; of females in the same age cohort, 62.6% were in the labor force and 54.9% were employed.

The most frequently reported occupations for residents of the city included management, professional and related occupations (29.1%), sales and office occupations (27.7%), and service

occupations (19.1%) in 2000. Farming, fishing, and forestry occupations made up 0.2% of those reported in the city. Private wage and salary workers composed 75.3%, government workers comprised 20.6%, self-employed workers in own not incorporated business comprised 3.9%, and unpaid family workers 0.2% of the city's workers.

Of the industries in which city workers participated, the most commonly identified included education, health and social services (20.7%), retail trade (12.9%), and arts, entertainment, recreation, accommodation, and food services (10.7%). Agriculture, forestry, fishing and hunting, and mining provided employment for 0.2% of the city's working population.

Norfolk has somewhat limited employment in fishing according to the Bureau of Labor Statistics,¹⁰⁵ with two establishments in seafood product preparation and processing reported for 2004-2006, and numbers not disclosed between 2001-2003. Numbers of employees and wages were not disclosed.

4.2.2.11.6 Income

In 1999 the median household income for Norfolk was \$31,815 and the median family income was \$36,891. Per capita income in Norfolk in 2000 was \$17,372. In 2006 the median household income in Norfolk rose to \$40,230 and the median family income had increased to \$44,127. Per capita income in 2006 increased to \$21,886. In 1999, 38.8% of Norfolk's households and 32.3% of families had income under \$25,000. In the 2006 survey 29.5% of households and 24.4% of Norfolk's families had equivalent income. Median earnings for male full-time, year-round workers in the city in 1999 were \$25,848 and median earnings for female full-time year-round workers were \$21,907. In 2006 median earnings had increased for both male and female workers, but male full-time, year-round workers' median earnings were \$35,047 while the median income for female full-time, year-round workers only increased to \$28,780.

In 2000 15.5% of families in the city had incomes below the poverty level. Families with a female householder, no husband present, were more likely to be in poverty with 37.1% of these families having incomes below the poverty level. In 2006, 14.2% of all families in the city had income below the poverty level in the previous 12 months, and 32.3% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.11.7 Housing

In 2000 there were 94,416 housing units in the city, of which 91.3% were occupied. Of occupied units in 2000, 45.5% were owner occupied, and 54.5% were renter occupied. In 2006 there were 97,226 units in the city, of which 89.3% were occupied. Home ownership rates had increased slightly with 47.6% of units being owner-occupied in 2006. Of the 8.7% of units that were vacant in 2000, 5.8% were for seasonal, recreational or occasional use. The median value of owner-occupied units in 2000 was \$88,400 and the median rent was \$538. In 2006, the median value of owner-occupied units in Norfolk increased to \$185,100 and median rent increased to \$752.

¹⁰⁵ <http://data.bls.gov/PDO/outside.jsp?survey=en>

In 2000 the housing stock of the city was comprised roughly of half single unit, detached structures (47.9%) and half (51.1%) single unit attached or multi-unit structures. Structures in excess of 30 years old comprised 68.3% of the city's housing stock.

4.2.2.12 Northumberland County

Northumberland County is a rural county with no incorporated towns. It is fairly remote, being situated on the tip of the Northern Neck. Development is sparse, with villages in Reedville, Heathsville, Burgess, Callao, Edwardsville, Lewisetta, Lottsburg, Ophelia, Walmsley, and Wicomico Church. Of these, Heathsville is probably the largest. Fishing and agriculture are very important to Northumberland County with all of its major employers being fish companies, and much its land area being either forested or in agricultural use. There are no inhabited isolated islands in the county, although the county provides ferry service to Accomack County's Tangier Island and to St. Mary's County, MD, Smith Island. The county is not part of any metropolitan area.

Major employers in the county include an oyster company, a seafood company that handles mainly crab, and fish oil and fish meal processing firm. Of these the fish oil and fish-meal processor is the largest with estimated employment of between 100 and 299 people. Overall the county exports commuters to Richmond and Lancaster county for employment, with nearly half (45.8%) of the county residents departing the county for employment elsewhere.

4.2.2.12.1 Location

Northumberland County is located on the north side of the tip of the Northern Neck of Virginia, on the south side of the Potomac River. Counties with adjoining borders include Lancaster County to the south, Richmond County to the southwest, and Westmoreland County to the west and northwest. The state lines for Virginia and Maryland are found in the Potomac River near the Virginia Shore, and St. Mary's County, MD is the adjoining Maryland jurisdiction. The nearest city of substantial size is Fredericksburg, which is approximately 70 miles from the center of the county, and the nearest large cities are Newport News, VA, roughly 90 miles away or Washington, DC, which is approximately 110 miles distant.

4.2.2.12.2 Transportation

The major highway through the county is U. S. Highway 360 that runs roughly east-west through the county. Connections to the south to Lancaster County are via State Highways 200 and 201. VDOT shows that there are no general aviation, commercial or military airports in the county. An airport on the Northern Neck has been proposed, but is not constructed.¹⁰⁶ The nearest airport is in Tappahannock, nearly 40 miles away. There is a landing field for the spotter airplanes supporting the menhaden fleet in Reedville, however. There are no rail lines serving the county.

¹⁰⁶<http://www.doav.state.va.us/Downloads/Studies/VATSP%20Update/VATSP%20Update%20Executive%20Summary.pdf>

4.2.2.12.3 Demographics

In 2000 the U.S. Census Bureau found that the population of the county totaled 12,259 people. There was slightly greater proportion of females (52.3%) than males (47.7%). The median age of county residents was 50.1 years.

The ethnic composition in the county was somewhat diverse with 72.2% white, and 26.6% black or African American. Hispanic or Latino people made up 09% of the county's population. A very high proportion of the population (98.4%) was native born Americans. Of the 1.6% of the population that was foreign born, the most frequently reported areas of birth were Europe (50%), Asia (20.1%), and Northern America (18%). The most frequently reported ancestries for county residents included "other ancestries" (27.9%), English (15.8%), and United States or American (15.2%).

In 2000, the average household size for Northumberland County was 2.24 persons, and the average family size was 2.7 persons. Males 15 years of age and over were more likely to be married (70.1%) than females of the same age cohort (60.9%). Single parent families with children under 18 years of age comprised 7% of all families in the county. Single person households comprised 27.6% of households and nonfamily households comprised 3.4% of households in the county.

People with a disability made up 23.7% of the population 5 years of age and over. The age cohort reporting the highest percentage of people with a disability (39.4%) were residents 65 years of age and over.

4.2.2.12.4 Education

Of the population 25 years of age and over, 75.9% of the county's population had a high school graduate or higher, and 21.7% had a bachelor's degree or higher level of education. Graduate or professional degrees had been acquired by 9% of the county's population 25 years of age and over.

4.2.2.12.5 Employment

In 2000, 49.8% of Northumberland County's population 16 years of age and over participated in the labor force, of which 2% of that cohort was unemployed. At that time, 45.5% of females 16 years of age and over participated in the labor force and of women in that cohort were 44.5% employed.

The most commonly reported occupations in the county included management, professional and related occupations (30%), sales and office occupations (23.3%) and service occupations (16.4%). Farming, fishing, and forestry occupations were reported by 3.8% of the county's workers. By class of worker, 67.3% of the county's workers were private wage and salary workers, 19.3% were government workers, 12.8% were self-employed workers in own not incorporated business, and 0.6% were unpaid family workers.

The industries employing workers residing in the county at the highest rates were education, health and social services (20.8%), manufacturing (10%), and construction (9.7%). A high proportion of county workers compared to most coastal counties (5.9%) participated in agriculture, forestry, fishing and hunting, and mining industries.

Northumberland County has the highest concentration of fishing establishments on Chesapeake Bay with 17 establishments according to the Bureau of Labor Statistics quarterly survey.¹⁰⁷ Between 2001 and 2003, data were not disclosed on the number of establishments in any fishery sector, but from 2004 -2005 there were four (increasing to five in 2006) finfish fishing establishments, two shellfish fishing establishments, and 10 seafood product preparation and packaging establishments. No data were disclosed on employees or wages.

4.2.2.12.6 Income

The median household income for Northumberland County in 1999 was \$38,129 and the median family income at that time was \$49,047. Households earning less than \$25,000 in 1999 comprised 32.7% of households, and families with similar earnings comprised 19.2% of families. Median earnings reported in the 2000 decennial census for male, full-time, year-round workers were \$30,151, and median earnings for female, full-time, year-round workers were \$24,116.

In 1999, 8.1% of the county's families had incomes below the poverty level. Families with a female householder, no husband present, were more likely (34.8%) to have incomes below the poverty level.

4.2.2.12.7 Housing

In 2000 there were 8,057 housing units in Northumberland County, of which 67.9% were occupied. Of the occupied units, 87.4% were owner occupied, and 12.9% were renter occupied. Of the 32.1% of units in the county vacant in 2000, 72.5% were reported to be for seasonal, recreational or occasional use. The median value of owner occupied units was \$129,100 in 2000, and the median rent was \$478.

Housing stock in the county in 2000 was composed primarily of single unit, detached structures (85.7%) and mobile homes (11.7%). Housing units in excess of 30 years old comprised 45.1% of the county's housing stock.

4.2.2.13 City of Poquoson

The City of Poquoson is a small city in the Virginia Beach-Norfolk-Newport News metropolitan area. It is locally known for crab fishing, and has a seafood festival each autumn. The city in more recent times has become a bedroom community for the larger cities of Hampton Roads, including Hampton, which it adjoins. The city shares legal services with York County, such as police and jail. Although there are marshy islands off the east side of the city, none appear occupied, and it appears that they are part of the Plum Tree National Wildlife Refuge.

Major employers in Poquoson include the city, a supermarket, the school system, and a water treatment facility. Attesting to its bedroom community status nearly twice as many

¹⁰⁷ <http://data.bls.gov/PDO/outside.jsp?survey=en>

commuters leave the city for employment as stay within the community and come into the community for employment; of the departing commuters, over 40% of commuters depart to Hampton for employment and another 37% go to Newport News.¹⁰⁸

4.2.2.13.1 Location

The City of Poquoson is situated along the south side of the York River. It shares boundaries with York County to the northwest and Hampton to the south. The city is situated to the north side of the tip of the Peninsula, and is surrounded to the north by the York River and to the East by Chesapeake Bay.

4.2.2.13.2 Transportation

The City of Poquoson is slightly out of the way in Hampton Roads, and is not served by interstate highways. Linkage to York County and Hampton is via State Highways 171 and 172. The city has no airports, but air service is available at the nearby Newport New-Williamsburg International Airport (approximately 5 miles away). Adjacent to the city is the NASA Langley installation, a military airfield. The city has no rail service, but rail service is available in Newport News, and Hampton, roughly 5 to 10 miles away, including Amtrak passenger service.

4.2.2.13.3 Demographics

The population of Poquoson totaled 11,566 people in 2000 according to the U. S. Bureau of Census. The population was evenly split between males (50.1%) and females (49.9%). The median age of city residents was 39.5 years.

The ethnic composition of the city for those who self-identified a single race is nearly entirely white (96.3%), with small percentages of Asian (1.6%) and black or African-American (0.7%), and other races. Hispanic or Latino people comprised 1.1% of the city's population. Native born Americans comprised 97.1% of the city's population. For the 2.9% of the city's foreign born residents the most commonly reported regions of birth included Asia (45.3%), Europe (32.6%), and Latin America (15%). The most commonly reported ancestries for residents of the city included English (24.1%), German (14.2%), and "other ancestries" (13.2%).

The average household size in 2000 for the city was 2.75 persons, and the average family size was 3.08 at that time. In 2000, 68.4% of males 15 years of age and over were married, and 67.2% of females in that age cohort were married. Single parent families with children under 18 years of age comprised 8.3% of all families in the city. Single person households comprised 15.7% of the households in the city, and nonfamily households comprised 2.9% of all city households.

People with disabilities made up 14.6% of the population 5 years of age and over. People age 65 and over were the most likely to report having a disability (41.5%).

¹⁰⁸ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51735.pdf>

4.2.2.13.4 Education

The population of Poquoson 25 years of age and over has higher levels of educational attainment than that of nearby areas and that of the nation as a whole. In 2000, 88.5% had high school graduate or higher level of education and 31.6% had bachelor's degree or higher levels, compared to the national breakdown of 80.4% having high school graduate or higher levels and 31.6% having bachelor's degree or higher levels. For the City of Poquoson's residents 25 years of age and over, 13.9% had graduate or professional degrees.

4.2.2.13.5 Employment

In 2000, 66.8% of the population 16 years of age and over participated in the labor force, and 2.1% was unemployed. At that time, 59 % of females in that age cohort participated in the labor force and 57.5% were employed.

The most commonly reported occupations of city residents included management, professional, and related occupations (44.1%), sales and office occupations (20.8%), and service occupations (13.5%). Farming, fishing and forestry occupations comprised 1.5% of those reported for employed city residents. For workers in the city, 67.7% were private wage and salary workers, 25.3% government workers, 6.4% self-employed workers in own not incorporated business, and 0.6% unpaid family workers.

The industries in which city residents most frequently were employed in 2000 included educational, health, and social services (20.3%), public administration (12%), and manufacturing (11.3%). Agriculture, forestry, fishing and hunting, and mining employed 1.3% of the city's workers.

Between 2001 and 2006, the City of Poquoson potentially had establishments in all aspects of fishing according to the Bureau of Labor Statistics quarterly survey.¹⁰⁹ It is difficult to be certain, however, because the number of seafood product preparation and packaging establishments was not disclosed for 2001 and 2002, and no data was available for the remainder of the period. There was one establishment each in finfish fishing and shellfish fishing reported for 2005 and 2006, with a shellfish fishing establishment also reported for 2004. No data were disclosed on numbers of employees or wages.

4.2.2.13.6 Income

Median household income in 1999 for the city was \$60,920, and median family income at that time was \$65,460. Per capita income in 1999 was \$25,336. Households with income less than \$25,000 comprised 14.2% of city households, and families with equivalent incomes comprised 9.1% of families in the city.

The median earnings for male full-time, year-round workers were \$45,284 in 1999, while for female full-time, year-round workers were \$28,310.

¹⁰⁹ <http://data.bls.gov/PDQ/outside.jsp?survey=en>

In 1999, 3% of families in the city had income levels below the poverty level. At that time 14.8% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.13.7 Housing

In 2000, there were 4300 housing units in the city of which 96.9% were occupied. Of the occupied units, 84.1% were owner occupied, and 15.9% were renter occupied. The vacancy rate was 3.1%. Of the vacant units, 17.2% were reported to be for seasonal, recreational or occasional use. The median value of owner occupied units was \$153,400, and the median rent in the city was \$697.

The city's housing stock was predominantly composed of single unit, detached structures (83.2%), and mobile homes (5.4%). Housing units in excess of 30 years old comprised 36.6% of the city's housing stock.

4.2.2.14 City of Portsmouth

The City of Portsmouth is one of the Hampton Roads cities within the Virginia Beach-Norfolk-Newport News metropolitan statistical area. It is a historic port city and is home to the Norfolk Naval Shipyard and the Portsmouth Naval Medical Center. Portsmouth, like adjoining Norfolk, is substantially developed with a mix of residential, commercial, and industrial uses with the highest levels of industrialization and urbanization along the Elizabeth River. No isolated occupied islands are found in Portsmouth.

Major employers in the City of Portsmouth include a ship repair, a processed meat producer, a sheet metal products manufacturer, a shipping terminal operator, three health care providers, and two military/Federal government installations. Commuters in the city are a net increase by day with the net of in-commuters coming from adjacent cities to work in Portsmouth.¹¹⁰

4.2.2.14.1 Location

The City of Portsmouth is located just west of the city of Norfolk, along the James River. It is across the James River from Newport News, and shares boundaries with the Cities of Suffolk, Chesapeake, and Norfolk from west to east.

4.2.2.14.2 Transportation

Interstate Highways 64 and 264, and State Highway 164 link the City of Portsmouth to other communities in the area, which is also a limited access highway. The Midtown Tunnel on U. S. Highway 58 provides access across the Elizabeth River to Norfolk. Two rail lines serve the city. While there is no air service within the city, Norfolk International Airport, approximately 12 miles distant, provides commercial service.

4.2.2.14.3 Demography

The population of the City of Portsmouth in 2000 totaled 100,565 people according to the U.S. Bureau of Census. In 2006, the population had increased to 101,377 people according to the

¹¹⁰ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51740.pdf>

estimates of the American Community Survey. In 2000 the proportion of males to females was 48.3% to 51.7%, but in 2006 the balance had shifted slightly to 49% males and 51% females. The median age of residents in the city in 2000 was 34.5 years, and in 2006 had increased to 35 years.

The ethnic composition of the city in 2000 for those reporting a single race was 45.8% white, 50.6% black or African-American, and less than 1% each American Indian and Alaska native, Asian, native Hawaiian or other Pacific Islander, or some other race. In 2006 of the population that self-identified a single race the composition was 42.9% white, 51.9% black or African American, 1.5% some other race, and 1.4% Asian with the remaining racial groups comprising less than 1% each. In 2000, 1.7% of the city's population was Hispanic or Latino, and in 2006 that segment of the population had increased to 2.3%. Native born Americans comprised 98.4% of the city's population in 2000. For the limited foreign born population, the most commonly reported regions of birth included Asia (35.9%), Latin America (29.2%), and Europe (26.1%). The most frequently reported ancestries in the city in 2000 included "other ancestries" (49%), English (8%), and United States or American (7.1%).

The average household size in 2000 for Portsmouth was 2.51 persons and the average family size at that time was 3.05 persons. In 2006, the average household size was estimated to be 2.45 persons and the average family size was estimated to be 3.02 persons. Married males 15 years of age and over comprised 48% of the male population in 2000 while synchronously 42.2% of females in that age cohort were married. In 2006 the percentage of males 15 years of age and over who were married decreased to 44.4% of all males in that cohort in the city while the marriage rate for females 15 years of age and over had increased to 42.5%. Single parent families with children under 18 years of age in the city comprised 21.2% of families in the city. Single person households comprised 27.5% of all households in the city and nonfamily households comprised 5.8% of households within the city.

People with disabilities made up a higher proportion (25.3%) of the city's population 5 years of age and over than that of the nation (19.3%) in 2000. The age cohort most frequently reporting having a disability in 2000 (51.1%) was the segment of the population 65 years of age and over. In 2006, people with disabilities made up 18.5% of the population 5 years of age and over compared to 15.1% for the nation.

4.2.2.14.4 Education

Of the population of the city 25 years of age and over, 75.2% had high school graduate or higher levels and 13.8% had bachelor's degree or higher level of educational attainment. These rates were lower than those of the nation (80.4% having high school graduate or higher levels, and 24.4% having bachelor's degree or higher levels of education) in 2000. Graduate or professional degrees were held by 4.7% of the city's population. In 2006, 77.9% of the city's population 25 years of age and over had a high school graduate or higher level of education and 19.6% had a bachelor's degree or higher level of education. The nation as a whole had risen to 84.1% of the age cohort possessing high school graduate or level and 27.0% having bachelor's degree or higher levels of education.

4.2.2.14.5 Employment

In 2000, 62.1% of the city's population 16 years of age and over participated in the labor force and 4.3% were unemployed. For females in the same age cohort in 2000, 56.2% participated in the labor force and 50.3% were employed. In 2006, 65.3% of the city's population 16 years of age and over participated in the labor force, and 55.3% were employed. In 2006, 57.6% of females 16 years of age and over were in the labor force and 53.1% were employed.

The major occupations which were reported by workers in the city in 2000 included sales and office occupations (27.8%), management, professional and related occupations (27.7%), and service occupations (16.7%). Farming, fishing and forestry occupations were reported by 0.2% of workers residing in the city. Private wage and salary workers comprised 69.3% of workers in the city; government workers comprised 26.4%, self-employed workers in own not incorporated business 4.2%, and unpaid family workers 0.1% of all workers in the city in 2000.

In 2000, the most frequently reported industries, which employed workers residing in the city, included educational, health, and social services (20.7%), retail trade (11.9%), construction (8.1%). Agriculture, forestry, fishing, hunting, and mining provide employment for 0.4% of the city's workers.

According to the Bureau of Labor of Statistics quarterly survey,¹¹¹ fishing employment is not a major source of employment in the City of Portsmouth. In 2001 and 2002 there were possibly establishments in finfish fishing, but numbers of establishments were not disclosed and no data was available for any years on shellfish fishing or seafood product preparation and packaging. Individuals may have worked in fishing activities in the city but may have been self employed or otherwise not have paid into unemployment insurance upon which the survey was based.

4.2.2.14.6 Income

Median household income in 1999 was \$33,742, and median family income for Portsmouth was \$39,577. Per capita income in 1999 was \$16,507. In 2006, median household income for the city rose to \$41,670 and median family income increased to \$48,890. Per capita income for the city rose to \$20,506. In 1999, households with income under \$25,000 comprised 35.8% of households in the city and families with equivalent incomes comprised 28.6% of families in the city at that time. In 2006, 27.5% of households in the city had incomes less than \$25,000 in the previous 12 months and 19.7% of families in the city had incomes less than \$25,000. Median earnings for male full-time, year-round workers were \$30,122 and median earnings for female full-time, year-round workers were \$23,375 in 2000. In 2006, median earnings for male full-time, year-round workers increased to \$33,421 and median earnings for female full-time, year-round workers increased to \$30,531.

In 1999, 13.3% of families in the city had income below the poverty level, and 31.2% of families with a female householder, no husband present, had income below the poverty level. In 2006, 10 % of all families in the city had income below the poverty level, and 28.9% of families with female householder, no husband present, had income below the poverty level.

¹¹¹ <http://data.bls.gov/PDQ/outside.jsp?survey=en>

4.2.2.14.7 Housing

In 2000, there were 41,605 housing units in the City of Portsmouth; 91.7% of the housing units were occupied. In 2000, 58.6% of units were owner occupied, and 41.4% were renter occupied. The vacancy rate was 8.3%. Of the vacant units, 4.5% were for seasonal recreational or occasional use. In 2006, 42,668 units were estimated to be present in city, with 91.3% estimated to be occupied but the American Community Survey. Owner and renter occupancy proportions were virtually unchanged between 2000 and 2006. In 2000 the median value of occupied single, detached units was \$81,300 and median rent was \$540. In 2006, the median value of occupied single, detached units was \$158,000 and the median rent was \$776.

In 2006, the city's housing stock was comprised of approximately two thirds (62.7%) single unit, detached structures, and the remaining one third (36.8%) single unit attached or multi-unit structures. Structures in excess of 30 years old composed 65.9% of units in the city's housing stock.

4.2.2.15 Prince William County

Prince William County is within the Washington-Baltimore metropolitan area. Within the county are five incorporated areas, Dumfries, Haymarket, Manassas, Occoquan, and Quantico. The county is promoting itself for biotechnology, information technology, and other technological services for the military and government contracting in addition to private industry.¹¹² Overall, though, Prince William County's communities are suburbs of the Washington metropolitan area with commuting into businesses nearer and within the central city.¹¹³ There are no inhabited isolated islands in Prince William County.

Major employers in the county include a maker of rocket motors, a construction material company, an aerospace electronics systems company, a custom deck and sunroom company, a semiconductor company, two food distribution companies, an air transport company, two telecommunications companies, a defense contractor, a private school, an institution of higher education, two health care companies, an electric utility and a land development firm.¹¹⁴

4.2.2.15.1 Location

Prince William County is located in northern Virginia on the west side of the Potomac River. The county shares boundaries with Fairfax County on the north east, Loudon County on the north, Fauquier County on the northwest and west, and Stafford County on the south. Across the Potomac River is Charles County, MD.

¹¹² <http://www.pwcecondev.org/default.asp?section=15&subsection=108&sidebar=off>

¹¹³ p 3, <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/JointCommunity10.pdf>

¹¹⁴ pp 4 & 5, <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/JointCommunity10.pdf>

4.2.2.15.2 Transportation

The county is served by two Interstate Highways, Interstate 95 on the east side of the county and Interstate 66 on the west side of the county. Between the two interstates are several major state highways, including State Highway 234, the Prince William Parkway, and other primary roads. The county does not have an airport, but the adjoining Quantico Marine Reservation is listed as having a military airfield, the county participates in the Stafford Regional Airport Authority, which owns and operates the airport in adjoining Stafford County¹¹⁵ and, finally Dulles International Airport with commercial service is in adjoining Loudon County and Fairfax County. Two rail lines serve the county, including passenger service.

4.2.2.15.3 Demographics

In 2000, the county's population totaled 280,813 according to the U.S. Bureau of Census. The county was evenly distributed between males (49.9%) and females (50.1%).

In 2006, the county's population was estimated to be 357,503, and the distribution of males and females approximately the same, with 50.1% males and 49.9% females. The high growth rate of the population has precedent in the last 50 years, with the population more than doubling between 1950 and 1960 and again between 1960 and 1970.¹¹⁶ The more typical rates for 1980 to the present are annualized at roughly 3 to 3.5%, which the past 6 years outstrips at 4.5%. The median age of residents of the county in 2000 was 31.9 years and in 2006 was 32.8 years.

The ethnic composition of the county in 2000 for residents reporting a single race was predominantly a white population (68.9%) with 18.8% of the population being black or African-American, 4.3% "some other race," and 3.8% Asian. In 2006, the population had become more diverse, with a decrease in the white population to 59.7%, and an increase in "some other race" to 10.9% and Asian people to 7.5%. Hispanic or Latino people comprised 9.7% of the population in 2000, and had increased to 19.1% of the population in 2006. In 2000, 88.5% of the county's population was native born Americans, but in 2006, 78.1% reported being native born. For the foreign born the most commonly reported regions of birth in 2000 included Latin America (46.6%), Asia (28.7%) and Europe (13.8%), while in 2006 the most commonly reported regions of birth included Latin America (53.9%), Asia (30.1%), and Africa (9.7%). The most frequently reported ancestries in 2000 included "other ancestries" (37%), German (15.1%), and Irish (12.8%).

The average household size in 2000 for the county was 2.94 persons, and the average family size was 3.32 persons; these values were virtually the same (2.92 persons per household and 3.29 persons per family) in 2006. Of the population 15 years of age and over 61.1% of males and 59.7% of females in the county were married in 2000. In 2006, 57.6% of males 15 years of age and over were married, and 56.5% of females in the same age cohort were married. Single parent families with children under 18 years of age comprised 12.4% of families in the county in 2000. In 2006, single parent families with children under 18 years of age had increased to 15.5% of the population. Single person households comprised 17% of households, and nonfamily households comprised 5.4% of all households in the county in 2000. In 2006, single person

¹¹⁵ <http://www.staffordairport.com/info.htm>

¹¹⁶ <http://www.pwcgov.org-001823.pdf>

households had increased slightly to 17.7% of households and nonfamily households had increased to 23.3% of households in the county.

People with disabilities comprised 12.7% of the county's population 5 years of age and over in 2000. For those people with disabilities, the highest rate of reporting having a disability occurred for the people 65 years of age and over (38.8%) in 2000. In 2006, 8% of the county's population reported having a disability, and 31.5% people 65 years of age and over reported having a disability.

4.2.2.15.4 Education

The population of the county 25 years of age and over is well educated, with above the national rates of high school graduates and bachelor's degree and higher level of education holders. In 2000, 88.8% of the county's population 25 years of age and over had high school graduate or higher level and 31.5% had bachelor's degree or higher levels of education compared to the national rates of 80.4% having high school graduate or higher levels and 24.4% having bachelor's degree or higher level. In 2000, 11.2% of the population 25 years of age and over had graduate or professional degrees. In 2006, the educational levels of the county's population remained high, but showed some decline for high school graduates with 87.6% of the population 25 years of age and over having high school graduate or higher levels and 36.7% having bachelor's degrees or higher. In 2006, 14% of the population in this age cohort had graduate or professional degrees.

4.2.2.15.5 Employment

In 2000, 77.1% of the county's population 16 years of age and over participated in the labor force and 2.2% of that age cohort were unemployed. At that time, 69.9% of the county's female population participated in the labor force, and 66.6% were employed. In 2006, 76.6% of the county's population 16 years of age and over participated in the labor force, and 2.8% of the age cohort were unemployed. In 2006, 67.4% of the female population 16 years of age and over participated in the labor force, and 63.9 % were employed.

For those employed residing in the county, the most commonly reported occupations in 2000 included management, professional, and related occupations (41.1%), sales and office occupations (27.8%), and service occupations (13.5%). Farming, fishing and forestry occupations were reported by 0.1% of the county's workers. Private wage and salary workers comprised 71.6% of the county's workers, government workers comprised 23.9%, self-employed workers in own not incorporated business made up 4.3%, and unpaid family workers 0.2%. In 2006, the same three occupational categories were most commonly reported. Farming, fishing, and forestry occupations in 2006 comprised 0.2% of the occupations reported.

The county's resident worker were most frequently employed in the following industries in 2000, educational, health and social services (15.5%), professional, scientific, management, administrative and waste management services (15.3%), and public administration (13.2%). Agriculture, forestry, fishing, hunting, and mining provide employment for 0.3% of the county's resident workers in 2000. In 2006, the most commonly reported industries included professional, scientific, and management and administrative and waste management services (20%), educational services, health care, and social services (16.4%), and public administration (11.5%).

In 2006, agriculture, forestry, fishing and hunting, and mining industries employed 0.2% of the county's resident workers.

Prince William County, according to the Bureau of Labor Statistics,¹¹⁷ has no establishments or employment in fisheries in finfish fishing, shellfish fishing, or seafood product preparation and packaging. There may have been individuals who worked in fishing who were self employed or who otherwise were not participating in unemployment insurance upon which the survey was based.

4.2.2.15.6 Income

In 1999, the median household income for Prince William County was \$65,960, and at that time the median family income was \$71,622. Households with incomes under \$25,000 comprised 10% of the county's households, and families with equivalent incomes comprised 7.9% of the county's families in 1999. Per capita income for the county in 1999 was \$25,641. In 2005, the median household income for the county was \$80,783 and the median family income was \$86,995. Households with income under \$25,000 in 2006 inflation adjusted dollars comprised 6.7% of the county's households, and families with equivalent incomes comprised 5.8% of the county's families. Per capita income in 2005 was \$33,319. Median earnings for male full-time, year-round workers in 2000 were \$45,595 and median earnings for female full-time, year-round workers were \$34,286. In 2006, median earnings for male full-time, year-round workers had increased to \$55,921 and median earnings for female full-time, year-round workers had increased to \$43,534.

In 2000, 3.3% of the county's families had incomes below the poverty level, and in 2006, 3.7% of all families in the county had income below the poverty level in the previous 12 months. In 2000, 12.3% of families with a female householder, no husband present, had incomes below the poverty level, while in 2006, 14% of families with a female householder, no husband present were found to be in poverty in the previous year.

4.2.2.15.7 Housing

In 2000, there were 98,052 housing units in the county, of which 96.4% were occupied. For those occupied units, 71.7% were owner occupied and 28.3% were renter occupied. The vacancy rate was 3.6%. Of the vacant units in 2000, 6.4% were reported to be for seasonal, recreational or occasional use. At that time the median value of owner occupied units was \$149,600 and the median rent was \$862. In 2006, the number of housing units in the county had increased to 130,862, of which 93.5% were occupied. At that time, 73.8% of units were owner occupied and 26.2% were renter occupied. The median value for owner occupied units had roughly tripled to \$441,400 and the median rent had increased to \$935.

The majority of the housing stock in the county in 2000 was single unit structures, with single unit, detached structures comprising 53.9% and single unit, attached structures comprising 26.8% of the stock. In 2006, a similar composition was reported with 57% of the structures identified as single unit detached and 23.6% identified as single unit attached structures. Housing units in excess of 30 years old in the county comprised 20.6% of the stock.

¹¹⁷ <http://data.bls.gov/PDO/outside.jsp?survey=en>

4.2.2.16 Richmond County

Richmond County is a rural county located on the Northern Neck of Virginia. County lands are mainly agricultural or forested, with sparse development. The major town is the county seat of Warsaw, which is the most highly developed area of the county. The county is not part of any metropolitan area. No occupied isolated islands are found in the county.

Richmond County's major employers include two lumber companies, an electric cooperative, a telecommunications company and a health care center. The county holds annual festivals celebrating local arts and crafts and the county's agricultural heritage

Despite the rural nature of the county, and the reasonably small size of the major employers, none of which employ in excess of 300 people, there is a net inflow of commuters.¹¹⁸

4.2.2.16.1 Location

Richmond County is located on the south side of the Northern Neck adjacent to the more mainland portion of the state. The county is situated on the north side of the Rappahannock River. The county shares boundaries with Essex County on the southwest, Westmoreland County on the north and west, Northumberland County on the northeast, and Lancaster County on the southeast. The nearest city of substantial size is Fredericksburg, approximately 55 miles northwest, and the nearest large city is Richmond, approximately 55 miles southwest.

4.2.2.16.2 Transportation

The major highways in the county are State Highways 3 and 360 that serve the Northern Neck and connect to State Highway 17 in adjoining Essex County. There is no airport in the county, but an airport is situated in adjacent Essex County, just outside Tappahannock. Commercial airline service may be obtained in via the Richmond Airport in the City of Richmond, approximately 50 miles away or in Washington, DC approximately 100 miles north. No rail line is found in the county, but a rail line is available in Caroline County, approximately 35 miles west.

4.2.2.16.3 Demography

The population of Richmond County totaled 8,809 people in 2000. There were slightly more males (56.1%) than females (43.9%) in the county at that time. The median age of the population was 40.3 years.

The ethnic composition of the county is, by race, approximately two thirds white and one third black or African American. Although there are a few people of other races, none of the groups exceeds 1% of the population. Hispanic or Latino people comprised 2.1% of the population. In 2000, 98.1% of the population of the county was native born Americans. For the 1.9% of the population that was foreign born, the most commonly reported regions of birth included Latin America (53.3%), Europe (26.7%), and Asia (15.2%). The most frequently reported ancestries for county residents included "other ancestries" (21%), United States or American (20.1%), and English (9.2%).

¹¹⁸ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51159.pdf>

The average household size for Richmond County was 2.4 persons and the average family size was 2.93 persons. Of the population 15 years of age and over, 65.7% of males were married and 51.1% of females were married in 2000. Single parent families with children under 18 comprised 12.6% of the families in the county. Single person households made up 28.1% of the county's households, and nonfamily households comprised 2.9% of households.

Of the population 5 years of age and over, 22.4% had a disability. The highest incidence of reporting a disability occurred among the population 65 years of age and over (46.1%).

4.2.2.16.4 Education

The population of Richmond County had substantially lower than the national levels of educational attainment. In 2000, 60% of the county's population 25 years of age and over had a high school graduate level of education compared to the national population's 80.4% with high school graduate level. The county also had a lower percentage (9.9%) of bachelor's degree of higher level of education compared to the national level (24.4%). At that time, 2.4% of the population had graduate or professional degrees.

4.2.2.16.5 Employment

Of the population 16 years of age and over residing in the county, 45.8% participated in the labor force and 2.3% were unemployed. For females 16 years of age and over, 51.4% were in the labor force and 48.7% were employed.

The most commonly reported occupations for county residents included sales and office occupations (29.1%), management, professional and related occupations (23.1%), and service occupations (16.1%). Farming, fishing and forestry occupations were reported by 2.9% of the county's residents. By class of worker, the county's working population was predominantly private wage and salary workers (69.5%), with 21.6% government workers, 8.7% self-employed in own not incorporated business, and 0.2% unpaid family workers.

The industries, which were the most common employers of worker residing in the county included educational, health, and social services (17.2%), retail trade (13.8%), and construction (9%). Agriculture, forestry, fishing and hunting, and mining provide employment for 4.6% of the county's resident workers.

According to the Bureau of Labor Statistics quarterly survey,¹¹⁹ Richmond County had employment in seafood product preparation and packaging between 2001 and 2005, with a single establishment reported in 2004 and 2005. No data were disclosed for 2001 -2003, and no data were disclosed regarding employees and wages.

4.2.2.16.6 Income

The median household income in 1999 in the county was \$33,026 and the median family income at that time was \$42,143. Households with incomes under \$25,000 comprised 37.7% of the county's households, and families with equivalent incomes comprised 27.5% of the county's families. Per capita income was \$16,675. Median earnings for male full-time, year-round

¹¹⁹ <http://data.bls.gov/PDQ/outside.jsp?survey=en>

workers in 1999 were \$30,722 and median earnings for female full-time, year-round workers were \$21,807.

In 1999, 11.9% of the county's families were found to have incomes below the poverty level. Families with a female householder, no husband present, were almost three times more likely to be in poverty with 32.8% of those families having income below the poverty level.

4.2.2.16.7 Housing

In 2000, there were 3,512 housing units in the county, of which 83.6% were occupied. For those occupied units 77.4% were owner occupied and 22.6% were renter occupied. The vacancy rate was 16.4%. Of the vacant units, 50% were for seasonal, recreational or occasional use. The median value of owner occupied units was \$86,700 and the median rent for units in the county was \$457.

The housing stock in the county is predominantly composed of single, detached units (79.6%), and mobile homes (12.8%). Structures in excess of 30 years old comprised 48.2% of the county's housing stock.

4.2.2.17 Stafford County

Stafford County is a metropolitan county within the Washington-Baltimore metropolitan area. The county appears to be mainly a suburb of the Washington area, with over half its commuters leaving the county toward areas nearer the central city of Washington, DC.¹²⁰ Most concentrated development appears to be focused in the south of the county nearest Fredericksburg, and on the north end of the county near the Quantico Marine Base.¹²¹ There are no isolated inhabited islands in the county.

Major employers in the county include a manufacturer of printed circuit boards, research and development, Federal government and military, insurance, computer software, and grocery distribution companies. The largest single employer in the county is the Quantico Marine Corps base. The county appears to be mainly a suburb of the Washington area, with over half its commuters leaving the county.¹²²

4.2.2.17.1 Location

Stafford County is located between the Rappahannock and Potomac Rivers on the mainland area of Virginia. It is approximately half way between Richmond and Washington, DC. The county shares boundaries with Prince William County to the north, Fauquier and Culpeper Counties to the west, Spotsylvania and Caroline Counties and the City of Fredericksburg to the south, and King George County to the east. Across the Potomac River to the east is Charles County, MD.

¹²⁰ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51179.pdf>

¹²¹ http://www.co.stafford.va.us/Departments/Planning_&_Zoning/Maps_Available/asset_upload_file810_9954.pdf

¹²² <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51179.pdf>

4.2.2.17.2 Transportation

Interstate 95 is the major highway that serves the county, running generally north-south, and linking the county to Fredericksburg, which adjoins the city to the south and further to Richmond, and to the north to Washington, DC. State Highway 17 provides access to the west toward Warrenton, and State Highway 3 provides access easterly to the Northern Neck. The county has a general aviation airport,¹²³ but major service is through Washington at Dulles or Regan National, about 25 miles away. A rail line serves the county and passenger service via Amtrak is also available.

4.2.2.17.3 Demographics

In 2000, the population of Stafford County totaled 92,446 people. The population was evenly split between males (50.3%) and females (49.7%) at that time. The median age of the county's population in 2000 was 33.1 years. In 2006, the county's population had increased to 120,170 and the proportions of males (50.4%) and females (49.6%) were similar to the information from 2000. The median age had increased slightly in 2006 to 33.6 years.

The ethnic composition of the county in 2000 by race was predominantly white (82%), with 12.1% of the population self-identifying as black, 1.6% self-identifying as Asian, and 1.2% self-identifying "some other race." In addition, 2.5% of the population self-identified as two or more races. Hispanic and Latino people comprised 3.6% of the county's population in 2000. In 2006, racial diversity in the county had increased, with 73.6% of the county self-identifying as white, 16.9% self-identifying as black or African-American, 2.5% self-identifying as Asian, and 3.4% self-identifying as "some other race." Hispanic and Latino people made up 7.6% of the county's residents in 2006. In 2000, 96% of the county's population was native born Americans. The most frequently reported regions of birth for the 4% of the population that was foreign born in 2000 were Asia (38.5%), Europe (28%), and Latin America (22.7%). In 2006, the foreign born population had increased to 8% of the county's population, but regions of birth were not presented in the American Community Survey data. The most frequently reported ancestries in 2000 included "other ancestries" (25.2%), German (16.3%), and Irish (14.9%).

In 2000, the average household size was 3.01 persons, and the average family size in the county was 3.32 persons. In 2006, the average household size had decreased slightly to 2.97 persons, and the average family size had increased slightly to 3.36 persons. In 2000, 63.6% of males 15 years of age and over in the county were married and 64.2% of females in the same age cohort were married. In 2006, 57.2% of males 15 years of age and over in the county were married and 55.8% of females 15 years of age and over were married. Single parent families with children under 18 made up 9.9% of families in the county in 2000, and in 2006 single parent families with children under 18 made up 9.5 % of families. Single person households comprised 13.9% of households in the county in 2000 and nonfamily households comprised 4.8% of households in the county. In 2006, single person households comprised 18% of households in the county and nonfamily households comprised 21.8% of households in the county.

In 2000, 12.6% of the population 5 years of age and over had a disability. The population 65 years of age and over most frequently reported having a disability (42.2%). In 2006, 9.1% of

¹²³ <http://www.staffordairport.com/info.htm>

the county's population had a disability, and 31.1% of the population 65 years of age and over had a disability.

4.2.2.17.4 Education

In 2000, 88.6% of the county's population 25 years of age and over had high school graduate or higher level of education and 29.6% had bachelor's degree or higher level of education. This rate was somewhat higher than the national rates (80.4% of the national population having high school or higher levels of education and 24.4% of the national population possessing bachelor's degree or higher level of education). At that time 10.8% of the county's population 25 years of age and over had graduate or professional degrees. In 2006, 91.4% of the county's population 25 years of age and over had high school or higher levels of education, and 34.1% had bachelor's degree or higher levels of education. Again, this is somewhat higher than the national rates of 84.1% of having high school or higher level of education and 27% of the national population 25 years of age and over having bachelor's degree and higher levels of education. In 2006, 13% of the population of the county had graduate or professional degrees.

4.2.2.17.5 Employment

In 2000, of the 50,424 people 16 years of age and over in the county, 76% participated in the labor force and 2.1% were unemployed. At that time 67.6% of females 16 years of age and over were in the labor force and 64.3% were employed. In 2006, 72.1% of the county's population 16 years of age and over participated in the labor force, and 3.5% were unemployed. In 2006, 65.6% of females 16 years of age and over in the county were in the labor force, and 61.5% were employed.

The most frequently reported occupations for working county residents in 2000 included management, professional, and related occupations (41.1%), sales and office occupations (25.7%), and service occupations (13.3%). Farming, fishing and forestry occupations were reported by 0.1% of the employed county residents. In 2000, 67.6% of the county's workers were private wage and salary workers, 27.7% were government workers, 4.5% were self-employed workers in their own not incorporated business, and 0.2% were unpaid family workers. In 2006, the management, professional and related occupations were reported by 40.3%, sales and office occupations were reported by 27.0% and service occupations were reported by 12.8% of the county's workers. Farming, fishing and forestry occupations were reported by .006% of the county's workers.

In 2000, the most commonly reported industries in which employed county residents worked included educational, health, and social services (16.8%), public administration (15.5%), and professional, scientific, management, administrative and waste management services (11.8%). Agriculture, forestry, fishing and hunting, and mining employed 0.3% of the county's workers in 2000. In 2006, the industries employing the greatest number of the county's workers included public administration (17.8%), professional, scientific, and management, and administrative and waste management services (15.8%) and educational services, health care and social assistance (14.7%). Agriculture, forestry, fishing and hunting and mining employed 0.06% of the county's workers.

Stafford County, according to the Bureau of Labor Statistics quarterly survey,¹²⁴ had no employment or establishments in finfish fishing, shellfish fishing, or seafood product preparation and packaging between 2001 and 2006. There may have been individuals working in fishing who were self employed or who otherwise did not contribute to unemployment insurance upon which the Bureau of Labor Statistics survey is based.

4.2.2.17.6 Income

The median household income in the county in 1999 was \$66,809 and the median family income was \$71,575. In 2006, the median household income had increased to \$85,014 and the median family income had increased to \$93,625. Households with income under \$25,000 in 1999 comprised 10.4% of the county's households, and families with similar income comprised 7% of the county's families at that time. In 2006, 8.6% of the households in the county had income less than \$25,000 (in 2006 inflation-adjusted dollars), and 4.5% of families had equivalent income at that time. Median earnings for male full-time, year-round workers in 2000 were \$47,080 and median earnings for female full-time, year-round workers were \$31,469. In 2006, median earnings increased to \$62,199 for male full-time, year-round workers, and \$41,905 for female full-time, year-round workers. Per capita income in 1999 was \$24,764, and in 2006, per capita income for the county had increased to \$31,860 (in 2006 inflation-adjusted dollars).

In 1999, the county had a low incidence of families in poverty. At that time, 2.4% of the county's families had income below the poverty level. Unfortunately the rate was still higher for families with a female householder, no husband present, at 11.9%. In 2006, 2.7% of all families in the county had income below the poverty level in the previous 12 months, and 8.3% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.17.7 Housing

In 2000 there were 31,405 housing units in the county, of which 96.1% were occupied. Of those occupied units, 80.6% were owner occupied and 19.4% were renter occupied. The vacancy rate was 3.9%, and of the vacant units, 14.1% were for seasonal, recreational or occasional use. In 2006, the number of housing units increased to 41,791, and 95% were occupied; at that time 76.3% were owner occupied and 23.7% were renter occupied. The median value of owner occupied units in 2000 was \$156,400 and the median rent at that time was \$842; in 2006 the median value of owner occupied units increased to \$396,800 and the median rent had increased to \$1183.

The housing stock in the county in 2000 was mainly composed of single unit detached (76.2%) and single unit attached (11.3%) structures and mobile homes (4.6%). Between 2000 and 2006, there was construction of apartments, in the main in excess of 10 units in the structure. In 2006, 10 to 19 unit structures offered 3.6% of the housing stock. Structures in excess of 30 years old in 2000 comprised 16% of the county's housing stock at that time.

4.2.2.18 City of Suffolk

Suffolk is the westerly city on the south side of Hampton Roads, and is part of the Norfolk-Virginia Beach-Newport News metropolitan area. As an independent city, Suffolk is

¹²⁴ <http://data.bls.gov/PDO/outside.jsp?survey=en>

considered a county equivalent. Much of Suffolk is inland area with a short segment of the county on the James River, however, the Nansemond River penetrates into the county. Dumpling, Shackley and Wills Islands and another unnamed island are situated in the Nansemond River, none of which appear to be densely developed, although Dumpling Island had a pier and what appeared to be a structure in 1994.¹²⁵

According to the Virginia Economic Development Partnership, major employers in the city include food and beverage (tea and coffee) processing and distribution, shopping network distribution, health care, and federal government (military) services and the city is building on its technology infrastructure for modeling and simulation technologies.¹²⁶

4.2.2.18.1 Location

The City of Suffolk is on the south side of the James River and extending southward to the North Carolina border. The city's boundaries are shared with Isle of Wight and Southampton Counties on the west and the cities of Chesapeake and Portsmouth to the east. The City of Newport News is across the James River from Suffolk.

4.2.2.18.2 Transportation

Major highways in Suffolk include Interstate 664 which links to Newport News, Portsmouth, Chesapeake, and Virginia Beach, U. S. Highway 58 which links to the east toward Norfolk and westward toward Franklin and Emporia (and Interstate 95), U. S. Highway 13 which connects to the Eastern Shore, and U. S. Highway 17 which runs from the North Carolina to Fredericksburg and Warrenton. According to the Virginia Transportation Map¹²⁷ three rail lines serve the city. Two general aviation airports are also shown on the map, and commercial air service is available at Norfolk International Airport and Newport News-Williamsburg International Airport, both approximately 12 miles away.

4.2.2.18.3 Demographics

The population of the city in 2000 totaled 63,677 people. Females (52.2%) slightly outnumbered males (47.8%). The median age of Suffolk's population in 2000 was 36 years. In 2006, the city's population had increased to an estimated 81,071 people, and the distribution of females and males was similar (52.3% females, 47.7% males). The median age of the city's population had declined slightly to 35.3 years.

The ethnic composition of the city in 2000 was fairly diverse, and included 53.8% of the population self-identifying as white, 43.5% self-identifying as black or African American, 0.8% self-identifying as Asian, and 1.2% self-identified as two or more races. Hispanic and Latino people comprised 1.3% of the population in 2000. In 2006, the racial composition of the city had changed slightly with 54.8% of the population self-identifying as white, 40.5% self-identifying as black or African-American, 2.3% self-identifying as "some other race," and 1.3% self-identifying as Asian. Hispanic or Latino people in 2006 comprised 2.1% of the city's population. In 2000, 98.1% of the city's population consisted of native-born Americans. For

¹²⁵ <http://terraserver-usa.com/image.aspx?T=1&S=10&Z=18&X=1804&Y=20388&W=3>

¹²⁶ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51800.pdf>

¹²⁷ <http://www.vdot.virginia.gov/travel/Resources/ct-vamap10.pdf>

the nearly 2% of the population who were foreign born, the most frequently reported regions of birth included Europe (36.3%), Asia (36.3%) and Latin America (17.5%). In 2000, the most frequently cited ancestries for city residents included “other ancestries” (42.9%), United States or American (11.4%), and English (10.3%).

The average household size in Suffolk in 2000 was 2.69 people and the average family size was 3.09 people. In 2006, the average household and family size for the city had declined slightly to 2.63 persons and 3.01 persons respectively. In 2000, 59.5% of males 15 years of age and over were married and 51.3% of females in the same age cohort were married. In 2006, 59.5% of males 15 years of age and over were married, and 53.6% of females in the age cohort were married. Single parent families with children under 18 year of age comprised 15.9% of families in the city in 2000, and 13.6% of families in 2006. Single person households comprised 20.1% of the city’s households in 2000 and 18.6% of the city’s households in 2006. Nonfamily households comprised 3.7% of households in the city in 2000; by 2006, nonfamily households had increased to 18.6% of the city’s households.

In 2000, 23.1% of the city’s population 5 years of age and over had a disability, and the highest reporting of disability was in the age cohort 65 years of age and over for whom 48.5% reported having a disability. In 2006, 19.8% of the city’s population 5 years of age and over reported having a disability and 41.7% of the population 65 years of age and over reported having a disability.

4.2.2.18.4 Education

In 2000, 76.8% of the city’s population 25 years of age and over had a high school graduate or higher level of education, and 17.3% had a bachelor’s degree or higher level of education. These rates were somewhat lower than the national rates of 80.4% of the population having a high school graduate level or higher level of education and 24.4% having bachelor’s degree or higher level of education. In 2000, 5.6% of the city’s population 25 years of age and over had graduate or professional degrees. In 2006, 83.3% of the city’s population had a high school graduate or higher level of education, and 24.9% had a bachelor’s degree or higher level of education. This lagged behind the national rates in which 84.1% of the population had high school graduate or higher levels of education, and 27% of the population had bachelor’s degrees or higher levels of education. In 2006, 2.7% of the city’s population was estimated to have graduate or professional degrees.

4.2.2.18.5 Employment

In 2000, 63.6% of the city’s 30,345 people 16 years of age and over were in the labor force and 3% were unemployed. At that time, 56.2% of females 16 years of age and over were in the labor force and 52.8% of females 16 years of age and over were employed. In 2006, 69.3% of the city’s population 16 years of age and over was in the labor force and 2.8% were unemployed; 63.6% of females in the age cohort were in the labor force in 2006, and 59.8% were employed.

The most frequently reported occupations for residents of the city in 2000 included management, professional and related occupations (30.9%), sales and office occupations (25.3%) and production, transportation and material moving occupations (18.5%). Farming fishing and

forestry occupations were reported by 0.4 % of the city's workers. The most frequent class of worker reported was private wage and salary workers (72.9%), followed by government workers (22%), self-employed workers in own not incorporated business (4.6%) and unpaid family workers (0.4%). In 2006, the most frequently reported occupations were management, professional and related occupations (34.2%), sales and office occupations (25%), and service occupations (15.2%). Farming, fishing and forestry occupations comprised 1.7% of those reported in 2006. Private wage and salary workers became more common in the city, comprising 76.3% of the city's workers in 2006 with declines in government workers (20.5%), self-employed workers in own not incorporated business (3.18%) and no unpaid family workers.

The industries that most commonly employed the city's workers in 2000 included educational, health, and social services (19.7%), manufacturing (17.7%) and retail trade (11.5%). Agriculture, forestry, fishing and hunting, and mining employed 0.9% of the city's workers in 2000. In 2006, the most commonly reported industries for the city's employed workers included educational services, health care, and social assistance (21.2%), manufacturing (13.9%), and retail trade (12.1%). Agriculture, forestry, fishing and hunting and mining employed 0.5% of the city's workers in 2006.

Between 2001 and 2006, the City of Suffolk has had an increase in fishing employment according to the Bureau of Labor Statistics quarterly survey. In 2001 there were apparently no establishments in finfish fishing, shellfish fishing or seafood product preparation and packaging, then in 2002 and 2003, while data are not disclosed for shellfish fishing there at least is the non disclosed data notation for shellfish fishing in Suffolk. In 2004, one shellfish fishing establishment is reported, and a report for a single establishment continues to 2006. In 2005 and 2006 a single establishment is reported for seafood product preparation and processing. No data are disclosed on numbers of employees or wages.

4.2.2.18.6 Income

The median household income in the city in 1999 was \$41,994, and the median family income was \$47,342. In 2006, the median household income in the city had increased to \$60,703 and the median family income had increased to \$70,076 in 2006 inflation-adjusted dollars. Households with income less than \$25,000 in 2000 comprised 30.1% of the city's households, and families with similar income comprised 23.2% of the city's families. In 2006 households with income less than \$25,000 in the previous 12 months comprised 18.3 % of the city's households, and families with equivalent income comprised 13.5% of the city's families. Median earnings for male full-time, year-round workers in 2000 were \$35,852 and median earnings for female full-time, year-round workers were \$23,777. In 2006, median earnings for male full-time, year-round workers had increased to \$52,039, and median earnings for female full-time year-round workers had increased to \$34,568. Per capita income in 2000 was \$18,836. Per capita income increased to \$26,806 in 2006.

In 2000, 10.8% of families were reported to have income below the poverty level. Families with a female householder, no husband present were more likely to be in poverty, as displayed by 35.4% of these families having income below the poverty level. In 2006, 7.3% of all families were reported to have income below the poverty level, and 31.5% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.18.7 Housing

In 2000, there were 24,704 housing units in the City of Suffolk, of which 94.2% were occupied. Of the occupied units, 72.2% were owner occupied and 27.8% were renter occupied. The vacancy rate was 5.8% of all units. For those vacant units, 9% were for seasonal, recreational or occasional use. In 2006 the total number of housing units had increased to 31,575, of which 95.9% were occupied. Of the occupied units in 2006, 72.1% were owner occupied and 27.9% were renter occupied. The median value of owner occupied units in 2000 was \$107,300 and the median rent was \$506; in 2006 the median value of owner occupied units had risen to \$232,900 and the median rent had risen to \$775.

The housing stock in the city in 2000 was mainly composed of single unit detached structures (78.3%), and mobile homes (4.3%). The next most common type of units in 2000 was duplexes (4.9%). In 2006, single unit detached structures comprised 75% of the city's housing stock. Structures in excess of 30 years old comprised 40.5% of the city's housing stock.

4.2.2.19 Surry County

Surry County is a rural county in the Virginia-Norfolk-Newport News Metropolitan Area. It is located just to the west of Isle of Wight County and south of Charles City and James City Counties. The majority of the land uses in the county are forested and agricultural. Development is concentrated around the towns of Surry, Dendron, and Claremont. Another indicator of the rurality of the county is its celebration of its agricultural and forestry heritage, the annual "Pork, Peanut, and Pine Festival" which is held in July. There are no isolated occupied islands within the county.

Major employers in the county include a meat processor, a lumber company, a millwork company, an electric utility, and a construction firm. Overall the county's commuters have a net export to adjoining counties and Newport News.¹²⁸

4.2.2.19.1 Location

Surry County is located in Southeastern Virginia, along the south side of the James River. It is to the west of Isle of Wight County, and to the east of Prince George County. To the south of Surry County are Sussex and Southampton Counties, and to the north are Charles City and James City Counties and the City of Williamsburg. Within the county are the towns of Claremont, Dendron, and Surry. The town of Surry is the county seat.

4.2.2.19.2 Transportation

The major transportation routes in the county are State Highways 10, 40, and 31. State Highway 10 Connects from the Hopewell-Petersburg area (Interstate 95) toward Norfolk) and State Highway 40 connects southwesterly through Sussex County to Interstate 95 toward North Carolina. State Highway 31 connects Williamsburg and Interstate 64 via the Scotland Ferry (a free ferry) to the north, and Wakefield and U. S. Highway 58 to the south with connections into North Carolina. There is no airport or landing field in Surry County, but there is an airport in

¹²⁸ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51181.pdf>

Wakefield in adjoining Sussex County. The major commercial airports are in Norfolk or Richmond between 25 and 30 miles away and somewhat limited commercial service is available at the Newport News-Williamsburg Airport about 8 miles away. Rail service is not available in the county, but it is available in surrounding counties.

4.2.2.19.3 Demography

The population in the county in 2000 totaled 6,829 people. The population was generally evenly distributed between males (48.4%) and females (51.6%). The median age of the population was 39.4 years.

The ethnic composition of county's population that self-identified a single race was 46.9% white, 51.6% black or African-American, and less than 1% for other races. Hispanic or Latino people comprised 0.7% of the population. Nearly the entire population 99.5% was native born Americans. For the extremely limited population that reported foreign birth, 75.8% were born in Europe, 18.2% were born in Latin America and 6.1% were born in Asia. The most commonly reported ancestries for county residents included "other ancestries" (45.1%), United States or American (10%), and English (9.4%).

The average household size in 2000 for Surry County was 2.61 people and the average family size was 3.09 people. At that time, for the age cohort 15 years of age and over, 59.1% of males were married, and 53.6% of females were married. Single parent families with children under 18 years of age comprised 11.2% of all families. Single person households comprised 23.6% of households and nonfamily households comprised 3.2% of households in the county.

People with disabilities comprised 24.5% of the population years of age and over. The age cohort most frequently reporting having a disability was the group 65 years of age and over, of whom 51% reported having a disability.

4.2.2.19.4 Education

In 2000, 70.4% of the county's population 25 years of age and over had high school graduate and higher level of education and 12.8% of the age cohort had bachelor's degree or higher levels of education. At that time 3.6 % of the county's population 25 years of age and over held graduate or professional degrees.

4.2.2.19.5 Employment

According to the 2000 census, of the 5,289 people in the county 16 years of age and over, 63.8% were in the labor force and 3.4% of those in the age cohort were unemployed. At that time 58.1% of females in the age cohort were in the labor force and 55.4% were employed.

The most common occupations for employed residents of the county included management, professional and related occupations (22.2%), sales and office occupations (22.1%), and construction, extraction, and maintenance occupations (18.7%). Farming, fishing and forestry occupations comprised 1.8% of those reported. By class of worker, the county's workforce included private wage and salary workers (71.7%), government workers (21.8%),

self-employed workers in own not incorporated business (5.9%), and unpaid family workers (0.5%).

The most frequently reported industries for county workers included manufacturing (21.7%), educational, health, and social services (17.8%), and retail trade (9.4%). Agriculture, forestry, fishing and hunting, and mining employed 5% of the county's workers.

In recent years (2003-2006) had no employment in finfish fishing, shellfish fishing or seafood product preparation and packaging according to the Bureau of Labor Statistics.¹²⁹ There were an undisclosed number of finfish fishing establishments in 2001 and 2002, and numbers of employees and wages were also not disclosed. There may have been some individuals participating in fishing as self employed or in positions, which did not participate in unemployment insurance upon which the Bureau of Labor Statistics survey is based.

4.2.2.19.6 Income

The median household income in Surry County in 1999 was \$37,558 and the median family income was \$41,234. Households with income under \$25,000 comprised 31.9% of households in the county, and families with equivalent income comprised 25.3% of families in the county in 1999. Median earnings for male full-time, year-round workers were \$31,123 and median earnings for female full-time, year-round workers were \$21,143. The per capita income for Surry County was \$16,682.

In 1999, 9.7% of families in the county had incomes below the poverty level. At that time 30.4% of families with a female householder, no husband present had income below the poverty level.

4.2.2.19.7 Housing

In 2000, there were 3,294 housing units in the county of which 79.5% were occupied. For the occupied units, 77.2% were owner occupied, and 22.8% were renter occupied. The vacancy rate was 20.5%. Of the vacant units, 66% were reported to be for seasonal, recreational, or occasional use. The median value of owner occupied units in 2000 was \$88,100, and the median rent was \$402.

In 2000, the housing stock in the county was comprised predominantly of single unit detached structures (71.4%) and mobile homes (23.3%). Units in excess of 30 years old comprised 43.6% of the county's housing stock.

4.2.2.20 City of Virginia Beach

The City of Virginia Beach is the largest city in Virginia in terms of land area (310 miles) and the fastest growing city in the state. It is a focus of the Virginia Beach-Norfolk-Newport News metropolitan area. The city is a resort destination, with two major performing arts venues, 38 miles of shoreline, museums, two major locations for accessing fishing (Lynnhaven and Rudee Inlets) and numerous hotels. In addition there are military facilities and substantial business interests in the city including medical specialists associated with Sentara Virginia Beach

¹²⁹ <http://data.bls.gov/PDO/outside.jsp?survey=en>

General Hospital. Lynnhaven Mall, located in the city, is reputed to be the largest shopping mall between Washington DC and Atlanta, GA.¹³⁰

Major employers in the city include a manufacturer of rubber gaskets and seals, a company that makes voltage trays and power cables, a manufacturer of industrial pumps, a gas control gauge company, a coated abrasive company, a maker of gears, a polymer company, an electronic sensor company, a newspaper, a manufacturer of outdoor power tools, three defense contractors, an insurance company, a tax preparer, a health care company, a telecommunications company, an engineering/design/technical support company, and the customer service and processing center for a major rental car company. Although there are several companies with substantial employment in the city, the net flow of commuters is out of the city, with the vast majority of commuter destinations being Norfolk.¹³¹

4.2.2.20.1 Location

Virginia Beach is the southeasterly-most local entity in the Commonwealth of Virginia. Along its southern boundary is the state line of North Carolina, and along its eastern border is the Atlantic Ocean. To the north of the city is the mouth of Chesapeake Bay, and to the west are the cities of Norfolk and Chesapeake.

4.2.2.20.2 Transportation

Two Interstate Highways, 264 and 64 are within the city's boundaries. In addition, several state and U. S. Highways are within city limits, including U. S. 60 and 58, and State Highways 13, 165, 149, and 225. While there is not a public airport in the city, Oceana Naval Air Station is located in city limits. The public airport is situated in Norfolk, approximately one mile from the city's western boundary. Rail service between Norfolk and Virginia Beach exists for freight service and there is currently an ongoing political process for developing light rail connections between the two cities.

4.2.2.20.3 Demography

In 2000 the population of Virginia Beach totaled 425,527 people according to the U.S. Census Bureau. The population was evenly split between males (49.5%) and females (50.5%). The median age in 2000 was 32.7 years. In 2006, the population had increased to an estimated 435,619 people. The distribution of males (48.9%) and females (51.1%) had become a bit less even. The median age in 2006 increased to 35.5 years.

The ethnic composition of city residents in 2000 who self-identified a single race was predominantly white (71.44%), with 19% black or African American and 4.9% Asian people. In 2000, 4.2% of the population was comprised of Hispanic or Latino people. In 2006, the racial composition of the city was 70.2% people who self-identified as white, 19.5% people who self-identified as black or African American, 5.5% who self-identified as Asian, and 1.3% "some other race" for those who identified single race in excess of 1% of the population. In 2006, Hispanic or Latino people comprised 5.1% of the city's population. In 2000, 93.4% of the population was composed of native born Americans. For the 6.6% of the population that was

¹³⁰ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51810.pdf>

¹³¹ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51810.pdf>

foreign born, the most frequently reported regions of birth included Asia (53.7%), Europe (22.4%), and Latin America (16.7%). In 2006, 91.3% of the city's population was native born American. For the 8.7% of the city's population that was foreign born, 50% reported their region of birth as Asia, 22.7% reported their region of birth as Europe, and 21.3% reported their region of birth as Latin America. The most frequently cited ancestries in 2000 included "other ancestries" (33.9%), German (13.7%), and Irish (12.4%).

In 2000 the average household size for the city was 2.7 persons and the average family size was 3.14 persons. In 2006, the average household size was 2.62 persons and the average family size was 3.12 persons. In 2000, 58.5% of males 15 years of age and over were married, and 55.7% of females in the same age cohort were married. In 2006, 55.6% of males 15 years of age and over were married, and 52.5% of females in the same age cohort were married. Single parent families with children under 18 years of age comprised 13.9% of all families in 2000, and 13% of all families in 2006. Single person households comprised 20.3% of all households in the city in 2000 and 23.7% of all households in 2006; nonfamily households comprised 7.2% of all households in 2000 and 29.9% of all households in the city in 2006.

In 2000, 15.8% of the population over the age of 5 had a disability; the cohort most affected was the segment of the population 65 years of age and over, of whom 39.7% reported having a disability at that time. In 2006, 11.8% of the population 5 years of age and over reported having a disability, and for the segment of the population 65 years of age and over 32.8% reported having a disability.

4.2.2.20.4 Education

In 2000, 90.4% of the population 25 years of age and over had high school graduate or higher levels of education and 28.1% had bachelor's degrees or higher levels of education, substantially better than the national rates of 80.4% having high school graduate or higher levels of education and 24.4% having bachelor's degrees or higher levels of education. In 2000, 8.9% of the city's population had graduate or professional degrees. In 2006, 92% of the city's population had high school graduate or higher levels of education and 31.1% had bachelor's degree or higher levels of education. These remained higher than the national rates, which also improved to 84.1% for high school graduates or higher levels and 27% for bachelor's degree or higher levels of education for the national population.

4.2.2.20.5 Employment

In 2000, of the 321,282 people in the city 16 years of age and over, 72.9% were in the labor force, and 2.6% of the age cohort was unemployed. For females in the age cohort, 65.5% were in the labor force in 2000, and 60% were employed. In 2006, 72.8% of the population 16 years of age and over was in the labor force, and 2.6% were unemployed. For females 16 years of age and over in 2006, 66.1% were in the labor force and 62.3% were employed.

The most commonly reported occupations for employed workers in the city in 2000 included management, professional and related occupations (35.9%), sales and office occupations (30.1%), and service occupations (14.9%). Farming, fishing and forestry occupations were reported by 0.1% of workers. In 2006, the same three categories were the most commonly reported occupations, but the percentages had changed slightly, with management

professional and related occupations comprising 38.7% of the reported occupations, sales and office occupations comprising 27.2%, and service occupations comprising 15.6%. Farming, fishing and forestry occupations continued to comprise 0.1% of the reported occupations. The composition of workers in the city by class in 2000 consisted of mainly private wage and salary workers (75.2%), with lesser percentages of government workers (19.4%), self-employed workers in own not incorporated business (5.2%), and unpaid family workers (0.2%). In 2006, by class of worker, the composition of workers included 73% private wage and salary workers, 21.9% government workers, 4.9% self-employed workers in own not incorporated business, and 0.1% unpaid family workers.

The industries in which workers in the city most frequently were employed in 2000 included educational, health and social service (20.5%), retail trade (13.7%), and professional, scientific, management, administrative, and waste management services (10.9%). Agriculture, forestry, fishing and hunting, and mining employed 0.2% of the city's workers in 2000. In 2006, the industries which employed the most of the city's workers included educational services, health care, and social assistance (21.3%), professional, scientific, and management and administrative, and waste management services (11.9%), and retail trade (10.8%). Agriculture forestry, fishing and hunting, and mining provide employment to 0.5% of the city's resident population in 2006.

At the peak level of diversity between 2001 and 2006 in Virginia Beach, the Bureau of Labor Statistics,¹³² reported one establishment each in other marine fishing, shellfish fishing, and seafood product preparation and packaging and two establishments in finfish fishing (2005). Subsequently in 2006 it appears that the establishments in other marine fishing and seafood product preparation and packaging are no longer in business, but that an additional establishment has been added in shellfish fishing. No data were disclosed on numbers of employees or wages for the 2001-2006 time period.

4.2.2.20.6 Income

The median household income in 1999 for the City of Virginia Beach was \$48,705 and the median family income at that time was \$53,242. In 2006, the median household income in 2006 inflation-adjusted dollars was \$61,333 and the median family income was 69,468. Households earning less than \$25,000 in 2000 comprised 17.8% of households in the city, and families with similar earnings comprised 13.8% of families in the city. In 2006, households with equivalent incomes comprised 13.4% of all households in the city and families with similar incomes comprised 9.4% of all families in the city. Median earnings for male full-time, year-round workers in 2000 were \$33,756 and \$25,979 for female full-time, year-round workers. In 2006, the median earnings had increased to \$ 44,349 for male full-time, year-round workers and \$32,651 for female year-round, full-time workers. Per capita income in 2000 was \$22,365 and per capita income in 2006 was \$28,477.

In 2000, 5.1% of families in the city had income below the poverty level and 18.1% of families with a female householder, no husband present, had income below the poverty level. In 2006, unlike most nearby cities which had improvement in the status of families, additional

¹³² <http://data.bls.gov/PDO/outside.jsp?survey=en>

families fell below the poverty level with 5.4% of all families having income below the poverty level, and 18.4% of families with a female householder, no husband present, having income below the poverty level.

4.2.2.20.7 Housing

In 2000, there were 162,277 total housing units, of which 95.2% were occupied. For those occupied units, 65.6% were owner occupied and 34.4% were renter occupied. The vacancy rate in 2000 was 4.8%. Of the vacant units, 32.1% were reported to be for seasonal, recreational, or occasional use. In 2006, the total number of units in the city had increased to 173,335, of which 93.2% were occupied. At that time 69.6% of the occupied units were owner occupied, and 30.4% were renter occupied. The median value of owner occupied units in 2000 was \$123,200 and the median rent was \$734; in 2006, the median value of owner occupied units was \$260,300 and the median rent was \$1,017.

Housing stock in the city is predominantly single unit structures. In 2000, the major type of structure is single unit detached, and in 2006, single unit attached structures become second most important in the city. Housing units in excess of 30 years old in 2000 comprised 25.3 % of the city's housing stock.

4.2.2.21 Westmoreland County

Westmoreland County is a predominantly rural county in northeastern Virginia. It is not within, but adjoins counties that are within the Washington-Baltimore-Northern Virginia metropolitan area. Land uses in the county are mainly forested and agricultural, with development most concentrated near Montross, Colonial Beach, and Potomac Beach. There may be two structures on the island that separates Curritoman and Nomini Bays at the mouth of the Nomini River.

The major employers in the county according to the Virginia Economic Development Partnership include a seafood company, a lumber company and a nursery/winery. The county has some medical services, but for hospital services, residents must leave the county; the nearest hospital is approximately 25 miles away. Retail needs are met within the county in Colonial Beach and Montross, but more selection is available in Richmond (65 miles) and Fredericksburg (45 miles).¹³³

4.2.2.21.1 Location

Westmoreland County is located on the inland segment of the Northern Neck between the Rappahannock and Potomac Rivers. It shares borders with King George County on the west and Northumberland County on the east. Across the Rappahannock River is Essex County, and across the Potomac River is Charles County, MD. Incorporated towns in the county include Colonial Beach and Montross. The county seat is Montross.

¹³³ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51193.pdf>

4.2.2.21.2 Transportation

The major transportation route through the county is State Highway 3 that parallels the long axis of the county; also within the county are State Highways 205, 202, and 612. Rail service is not available in the county nor is there air service within the county. General aviation airports are available at Tappahannock (approximately 20 miles), and Fredericksburg (approximately 45 miles), and commercial service is available at Reagan National approximately 40 miles away or in Richmond approximately 45 miles away.

4.2.2.21.3 Demographics

The total population of the county in 2000 according to the U.S. Bureau of Census was 16,718 people. The population was generally evenly distributed between males (48%) and females (52%). The median age of the county's population was 42.8 years.

The ethnic composition of the county's residents was 65.4% white people, 30.9% black or African American people, 1.7% "some other race," and the remaining population less than 1% Asian, Native Hawaiian or other Pacific Islander, or American Indian or Alaska Native. Hispanic or Latino people comprised 3.5% of the county's population. The most commonly reported ancestries in the county included "other ancestries" (32.3%), English (13.1%) and United States or American (11.8%).

The average household size in 2000 in the county was 2.43 persons and the average family size was 2.91 persons. For the population 15 years of age and over, 58.1% of males were married and 53.3% of females were married. Single parent families with children under 18 years of age comprised 12.1% of all families in the county. Single person households comprised 26.9% of all households in the county in 2000 and nonfamily households made up 4.9% of all households in the county at that time.

People with a disability comprised 24.2% of the population 5 years of age and over in Westmoreland County in 2000. At that time 45.2% of the age cohort 65 years of age and over reported having a disability.

4.2.2.21.4 Education

The residents of Westmoreland County 25 years of age and over have substantially lower levels of educational attainment than the national rates for both high school graduation and higher levels and bachelor's degree and higher levels. In 2000, 69.3% of Westmoreland County's population reported levels of educational attainment at the high school graduate or higher level compared to 80.4% for the national rate, and 113.3% reported having bachelor's degree or higher levels of educational attainment while the national rate at that time was 24.4%. In 2000, 5.1% of the county's population had graduate or professional degrees.

4.2.2.21.5 Employment

In 2000, of the 13,301 people in the county 16 years of age and over, 56.2% were in the labor force and 2.3% were unemployed. Of females 16 years of age and over, 51.1% were in the labor force and 49.4% were employed.

The most frequently cited occupations for employed residents of the county included management, professional and related occupations (26.5%), sales and office occupations (25.8%), and service occupations (16.3%). Farming, fishing and forestry occupations were reported by 1.9% of the workers in the county. By class of worker, 68.6% of the county's workers were private wage and salary workers, 22.9% were government workers, and 8.5% were self-employed workers in own not incorporated business. There were no unpaid family workers in 2000.

The industries in which county residents were most commonly employed in 2000 included educational, health and social services (15%), construction (12.1%), and retail trade (11.5%). Agriculture, forestry, fishing and hunting, and mining provide employment for 2.9% of the employed population of the county in 2000.

According to the Bureau of Labor Statistics quarterly survey,¹³⁴ Westmoreland County had a high concentration of seafood product preparation and packaging establishments between 2001 and 2006, exceeded only by Accomack and Northumberland Counties. In 2001 there were nine seafood product preparation and packaging establishments (seafood processors), but in the following two years data were not disclosed regarding numbers of establishments. In 2004 and 2005, there were eight seafood processors in the county and in 2006 the number had declined to six. The maximum number of employees in the county in seafood processing was 197 in 2001, but the maximum total wages were in 2006 at over \$4.1 million. From 2004-2006 there were also two establishments, one each in finfish fishing and shellfish fishing in the county. No data were disclosed regarding numbers of employees in finfish fishing and shellfish fishing or wages for those categories.

4.2.2.21.6 Income

The median household income for Westmoreland County in 1999 was \$35,797, and the median family income was \$41,357. Households with income under \$25,000 comprised 36% of all households in the county, and families with equivalent income comprised 29.7% of all families in the county. Median earnings in 2000 for male full-time, year-round workers were \$31,333 and median earnings for female full-time, year-round workers were \$22,221. Per capita income in 2000 was \$19,473.

In 1999, 11.2% of the families in the county had income below the poverty level. At that time, 27.8% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.21.7 Housing

In 2000, there were 9,286 total housing units in the county, of which 73.7% were occupied. For those occupied units, 79.2% were owner occupied and 20.8% were renter occupied. The vacancy rate was 26.3%. Of the vacant units, 69.4% were reported to be for seasonal, recreational or occasional use. The median value of owner occupied units in the county was \$95,300 and the median rent for units in the county was \$537.

¹³⁴ <http://data.bls.gov/PDO/outside.jsp?survey=en>

Housing stock in the county was predominantly single unit detached structures (84.5%) and mobile homes (10.7%). Units in excess of 30 years old in 2000 comprised 46.1% of the county's housing stock.

4.2.2.22 City of Williamsburg

Williamsburg is within the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area. It is the most inland city of the metropolitan area, and served as the colonial capital of the commonwealth. The city is one of the three loci of the "Historic Triangle" (Williamsburg, Jamestown, Yorktown), landmark communities that offer historic recreation and museums of Colonial and Revolutionary Era lifeways. While Williamsburg is on tributary creeks, it is primarily landlocked, so has no isolated occupied islands.

Williamsburg serves as the northerly hub community for the region and in general could be referred to as a cultural center for metropolitan area. Williamsburg has several art galleries, the College of William and Mary, and music and dance performances are regularly staged at the college or other venues in the city. The city has shopping opportunities that bring in people from surrounding counties for retail needs such as clothing and groceries. The city also serves as a hub for medical and library access. Major employment in the city includes museums and hotels related to the colonial area, research, education, and news. The city draws in commuters from the surrounding area, with nearly six times as many commuters coming into the city as leaving on a daily basis.¹³⁵

4.2.2.22.1 Location

The City of Williamsburg is situated on what is locally known as "The Peninsula," between York and James City Counties. It is approximately five miles northeast of Newport News and 45 miles southeast of Richmond.

4.2.2.22.2 Transportation

The major highways in this small city are State Highway 5 and US Highway 60. Circling the city is State Highway 199, and immediately outside the city is Interstate 64 that provides rapid access to the coastal communities of Norfolk and Virginia Beach, in addition to the bay communities of Hampton and Newport News to the southeast, and in the opposite direction to Richmond and Charlottesville to the northwest. There is a general aviation airport in the city, and commercial service is available at the Newport News-Williamsburg International Airport approximately 12 miles away. Rail service is available in the city, with twice-daily Amtrak service.

4.2.2.22.3 Demographics

The total population of Williamsburg in 2000 according to the Census Bureau was 11,998 people. The population had slightly more females (55.1%) than males (44.9%). The median age of the city's population was 22.6 years.

¹³⁵ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51830.pdf>

For the population that self-identified a single race, the city's ethnic composition was 79.5% white, 13.3% black or African American, 4.6% Asian, and less than 1% each of the remaining categories ("some other race," American Indian and Alaska Native, and Native Hawaiian and other Pacific Islander). Hispanic or Latino people comprise 2.5% of the city's population. In 2000, 94.8% of the population was native born Americans. For those foreign born people, the most frequently reported areas of birth included Asia (39.1%), Europe (33.8%), and Northern America (9.8%) The most commonly reported ancestries for city residents included "other ancestries" (20.1%), English (15%), and German (12.4%).

The average household size in 2000 in Williamsburg was 2.07 persons and the average family size was 2.66 persons. In the city, 58.9% of males 15 years of age and over were married and 50.1% of females in the same age cohort were married. Single parent families with children comprised 13.9% of all families in the city. Single person households comprised 37.3% of all households in the county, and nonfamily households made up 13.9% of all households in the city in 2000.

In 2000, 14.5% of people 5 years of age and over reported having a disability. The highest rate of reporting having a disability (35%) occurred among the population 65 years of age and over.

4.2.2.22.4 Education

The population of Williamsburg is well educated. In 2000, 89.6% of the population had high school graduate or higher levels of education, and 45% of the population had a bachelor's degree or higher level of education. At that time 21.4% of the city's population had graduate or professional degrees.

4.2.2.22.5 Employment

For the 10,951 people in the city 16 years of age and over in 2000, 67.5% were in the labor force; 28% were unemployed. At that time, 62.7% of females 16 years of age and over were in the labor force and 36.5% were employed.

The most common occupations for employed residents of Williamsburg included management, professional and related occupations (41.7%), sales and office occupations (28.1%), and service occupations (18%). Farming, fishing and forestry occupations were reported by 0.2% of the city's workers. By class of worker, the composition of the city included 73.4% private wage and salary workers, 22.8% government workers, and 3.8% self-employed workers in own not incorporated business. There were no unpaid family workers in the city in 2000.

The industries most frequently employing workers who resided in the city included educational, health and social services (25.6%), arts, entertainment, recreation, accommodation and food services (22.5%), and retail trade (13.2%). Agriculture, forestry, fishing and hunting, and mining employed 0.2% of the city's worker in 2000.

The City of Williamsburg had no fishing establishments or employees in finfish fishing, shellfish fishing or seafood product preparation and packaging according to the Bureau of Labor Statistics¹³⁶ between 2001 and 2006. There may have individuals working in fishing who were self employed or otherwise not participating in unemployment insurance upon which the Bureau of Labor Statistics survey is based who were unreported.

4.2.2.22.6 Income

The median household income in 1999 was \$37,093 and the median family income was \$52,358. Households with income under \$25,000 comprised 33.9% of all households in the city in 1999, and families with equivalent incomes comprised 17.9% of families in the city at that time. Median earnings for male full-time, year-round workers were \$28,625, and median earnings for female full-time, year-round workers were \$26,840. The per capita income was \$18,483.

In 1999, 9.3% of families in the city had income below the poverty level. At that time, 37.6% of families with a female householder, no husband present, had income below the poverty level.

4.2.2.22.7 Housing

In 2000, there were 3,880 total housing units in the city, of which 93.3% were occupied. Of these occupied units, 44.3% were owner occupied, and 55.7% were renter occupied. The vacancy rate was 6.7%; for the vacant units, 44.1% were reported to be for seasonal, recreational or occasional use. The median value of owner occupied units in 2000 was \$212,000, and the median rent for units in the city was \$615.

Housing stock in the city is nearly evenly divided between single unit detached structures and multiple units. Units in excess of 30 years old comprised 47.4% of the city's housing stock.

4.2.2.23 York County

York County is in the area locally known as "The Peninsula." It serves mainly as suburb of the cities of Newport News, Hampton and Williamsburg, but has businesses of its own. The portion of York County nearest Williamsburg has been more developed as has the southern York County mainly as residential uses, but that is changing with development of the Riverfront area in Yorktown and other developments. In the southeastern area of the county is Seaford, an unincorporated village that is home to some commercial fishing enterprises, mainly focused upon the Atlantic sea scallop fishery. No occupied isolated islands are within York County.

Major employers in the county include a computer hardware company, a petroleum refinery, a manufacturer of floor and roof trusses, a soft drink producer, the Department of

¹³⁶ <http://data.bls.gov/PDO/outside.jsp?survey=en>

Defense, an electrical utility, a discount store, local government, and the local school system. By and large, though, the county's residents commute outward for work, mainly to Newport News and Hampton.¹³⁷

4.2.2.23.1 Location

York County is situated on the south side of the York River between the City of Hampton and James City County. York County also shares boundaries with the City of Williamsburg to the south of the county and the City of Newport News also along the south of the county. To the east of the county is the City of Poquoson, which the county shares some political and policing duties. To the north, across the York River is Gloucester County. The county seat is Yorktown.

4.2.2.23.2 Transportation

The major highways in the county include Interstate 64 (connecting Richmond to Hampton and Norfolk), U.S. 17 (connecting North Carolina to the Washington DC area), State Highway 199 (which circle the south side of the City of Williamsburg), and State Highway 31 (connecting Wakefield and Williamsburg). The county has rail service, but passenger service is available in adjoining Williamsburg. The county does not have general aviation or commercial service, but general aviation is available in Williamsburg, and commercial service is available at the Newport News-Williamsburg International Airport adjoining the county's south end and more commercial services are available at Norfolk International Airport approximately 20 miles away or Richmond International Airport approximately 30 miles away.

4.2.2.23.3 Demographics

The population of York County in 2000 totaled 56,297 people according to the U.S. Bureau of Census. The population was evenly split between males (49.1%) and females (50.9%). The median age of the population was 36.5 years.

The ethnic composition of the county in terms of race for those who self-identified a single race in 2000 was 80% white people, 13.4% black or African American people, 3.2% Asian people, and less than 1% each of the remaining categories ("some other race," American Indian and Alaska Native, and Native Hawaiian and other Pacific Islander). At that time, 2% of the population self-identified as two or more races. Hispanic and Latino people comprised 2.7% of the population. Native-born Americans comprised 94.8% of the county's population. For the remaining 5.2% of the population that was foreign born, the most frequently reported regions of birth included Asia (49%), Europe (31.9%), and Latin America (12.8). The most commonly reported ancestries for residents of the county included "other ancestries" (26.9%), English (15.8%), and German (15.7%).

The average household size was 2.78 persons, and the average family size was 3.15 persons. In 2000, 68% of males 15 years of age and over in the county were married, and synchronously 64.1% of females in the same cohort were married. Single parent families with children under 18 years of age comprised 9% of all families in the county. Single person households comprised 16.7% of all households in the county and nonfamily households comprised 3.6% of all households in the county in 2000.

¹³⁷ <http://virginiascan.yesvirginia.org/Admin/CommunityProfiles/Profiles/CityCounty51199.pdf>

For the segment of the population 5 years of age and over, 13.3% had a disability. The age cohort most frequently reporting a disability (34.4%) was the segment of the population 65 years of age and over.

4.2.2.23.4 Employment

Of the 41,855 people in the county 16 years of age and over in 2000, 70.9% were in the labor force, and 1.8% were unemployed. For females in the age cohort, 63.2% were in the labor force and 59.3% were employed.

The most common occupation for employed workers residing in the county included management, professional and related occupations (45.9%), sales and office occupations, (24.3%), and service occupations (13.1%). Farming, fishing, and forestry occupations comprised 0.3% of those reported. Private wage and salary workers comprised 68.9% of workers in the county, government workers comprised 25.9%, self-employed workers in own not incorporated business made up 5% and unpaid family workers made up 0.2% of workers residing in the county.

The most frequently reported industries in which workers residing in the county participated included education, health and social services (21.2%), professional, scientific, management, administrative, and waste management services (11.6%), and public administration (10.9%). Agriculture, forestry, fishing and hunting, and mining employed 0.2% of the county's workers in 2000.

According to the Bureau of Labor Statistics quarterly survey,¹³⁸ between 2001 and 2006 there were two shellfish fishing establishments in 2004 and 2005, increasing to three in 2006, one finfish fishing establishment in 2005, and one seafood product preparation and packaging establishment from 2004-2006. Data was disclosed on shellfish fishing employees which totaled 10 in 2006, and for whom total wages were \$565 thousand. Data were not disclosed for numbers of employees or wages in the other categories.

4.2.2.23.5 Income

The median household income for York County in 1999 was \$57,956, and the median family income in 1999 was \$64,892. Households with incomes under \$25,000 comprised 13.7% of all households in the county in 1999, and families with similar incomes comprised 9.1% of all families in the county. Median earnings for male full-time, year-round workers residing in the county were \$42,948, and median earnings for female full-time, year-round workers were \$28,713 in 2000. Per capita income for the county was \$24,560.

In 1999, 2.7% of families in the county had income below the poverty level. Families with a female householder, no husband present, were more likely to be in poverty with 12.1% of these families having income below the poverty level.

¹³⁸ <http://data.bls.gov/PDQ/outside.jsp?survey=en>,

4.2.2.23.6 Housing

In 2000, there were 20,701 housing units in York County, of these units, 96.6% were occupied. Of the occupied units, 75.8% were owner occupied, and 24.2% were renter occupied. The vacancy rate was 3.4%. Of the vacant units, 10% were reported to be for seasonal, recreational or occasional use. The median value of owner occupied units in 2000 was \$152,700, and the median rent was \$708.

Housing stock in the county was predominantly single family detached units (77.1%) and secondarily single unit attached units (15.1%). Structures in excess of 30 years old comprised 28.7% of the county's housing stock.

5.0 Economic Impact Assessment

5.1 *The Economic Impact Assessment Framework*

Presently, the reduction fishery, which is limited to OMEGA Protein, is allowed to harvest 109,020 tons of menhaden from Chesapeake Bay. The fishery is also conducted in the Atlantic coastal ocean. In the event of harvesting less than the allocated quota, the allowable harvest may increase up to 122,740 tons in the next year, but only for that one year. Numerous associations and individuals have argued that either the Bay quota should be reduced or the reduction fishery prohibited from operations (e.g., the Recreational Fishing Alliance “4000 RFA Members Weigh in With ASMFC Seeking More Conservation for Menhaden!;” the Coastal Conservation Association; Greenpeace; and Chesapeake Bay Foundation). Since the reduction fishery is such an integral part of the economy of Northumberland County and Reedville, VA, there is a need to assess the economic impacts of reducing the allowable quota or shuttering the operation.

In this chapter, we examine the economic ramifications of reducing the quota on the economies of Maryland and Virginia. We focus our examination on the state economies because information for assessing the economic impact at the county level is extremely limited; it is even more limited relative to the economy of Reedville. A major limitation is an inability to adequately determine where products used to harvest and process menhaden were purchased or originated (e.g., Virginia no longer has an operational oil refinery and the purchase of fuel involves large leakages from the local economy). In addition, the regional purchase coefficients (percentage of local demand met by local production) for fish for Northumberland county is quite low as well as are many of the multipliers for items purchased for harvesting and processing.

In order to assess the economic impacts for reductions in allowable landings, an input/output or IO model was developed specifically to reflect economic activities of the reduction fishery. An IO model facilitates the estimation and assessment of the economic impacts of economic activity (e.g., the sales, income, and employment generated in a county, state, or region by OMEGA Protein operations). The model was initially developed using IMPLAN, an off the shelf IO software package for developing impact models, based on 2006 multipliers and associated coefficients. The model was, subsequently, updated using IMPLAN for 2008, which became available in late 2009. The 2008 IMPLAN reflects multipliers and coefficients for 2008.

The economic impacts or contributions are measured in terms of total sales or output, employment, and income generated by harvesting and processing activities of OMEGA Protein. The metrics are defined as follows:

- Output is the gross sales by businesses within the economic region affected by an activity.
- Labor income includes employee compensation (wages and salaries) and proprietors’ income (income from self-employment).

- Employment is specified on the basis of full-time and part-time jobs. There is significant part-time and seasonal employment in commercial fishing and many other industries.

Impacts are measured in terms of direct, indirect, and induced impacts:

- Direct effects express the economic impacts (for output, income or employment) in the sector in which the expenditure was initially made. For example, the direct income multiplier for the harvesting sector would show the total income generated among harvesting employees and proprietors by demand for services from the harvesting sector. This direct impact would result, for example, from expenditures made by commercial fishermen to suppliers of gear and equipment.
- Indirect effects measure the economic impacts in the specific sectors providing goods and services to the directly affected sector. For directly affected harvesters, indirect effects would include the purchases of products from manufacturers and purchases of accounting services. These indirect impacts extend throughout the economy as each supplier purchases from other suppliers in turn. For example, the accounting firms would need to purchase office supplies and business equipment. Thus, the indirect output multiplier would represent the total output generated in the various supplier sectors resulting from demand for goods or services from the direct sector.
- Induced effects are the economic activity generated by personal consumption expenditures by employees in the directly and indirectly affected sectors, as fishermen, accountants, and other directly and indirectly affected employees spend their paychecks. These household purchases have additional “indirect” and “induced” effects as well, all of which are defined as induced effects.

IMPLAN, while having multipliers for fish harvesting and seafood processing and preparation, does not have multipliers specific for the reduction fishery and production of meal, oil, and solubles. OMEGA Protein, subsequently, provided detailed data on sales, production activities, costs, earnings, and employment. This information was used, together with information available from IMPLAN, to develop custom multipliers and an impact model to facilitate the estimation and assessment of the economic contributions of menhaden to the regional economy.

Since the information provided by OMEGA Protein is confidential, it cannot be presented in detail in this report.¹³⁹ We can, however, report baseline information provided by OMEGA, which was used to develop the input/output model and to facilitate the assessment of the economic impacts of the reduction fishery. All information pertains to production and related sales activities in 2008. OMEGA provided detailed information on the following revenue and cost categories, as well as payroll costs (Table 5.1).

¹³⁹ Individuals interested in obtaining the detailed data should directly contact OMEGA Protein.

Table 5.1. Cost Categories for OMEGA Protein

Category
Ads and promotions
Boat/captain licenses
Environmental fees
Fuel and Lubricants
Business Fees
Insurance
Licenses and Permits
Orthodox union
Property Taxes (County)
Real Estate Rent
Repair and Maintenance
Security
Shipping
Supplies/office/food
Utilities and telephone
Vehicle operating costs
Payroll
Vessel
Plant
Health Care Benefits
Sales
Meal
Oil
Solubles
Bait ^a
Other Products ^a

^aOMEGA Protein of Reedville, VA had no sales of bait and other menhaden products in 2008.

In 2008, OMEGA Protein employed up to 317 individuals (Table 5.2). Average monthly wages ranged from \$2,248.00 to \$6,923.30. The total payroll equaled \$11.3 million, which was nearly evenly divided between vessel and plant payroll. The average payroll, annualized, equaled \$48.4 thousand in 2008. Total revenue equaled \$59.9 million and total cost equaled \$31.4 million. Total gross profit equaled \$28.5 million in 2008. Total landings of menhaden equaled 141,100 tons of which approximately 85,000 metric tons were taken from Chesapeake Bay.

Table 5.2. Employment and Payroll for OMEGA Protein, 2008

Month	Employment	Vessel Payroll	Plant Payroll	Union Premiums	Average Payroll Per Individual ^a
<i>January</i>	116	552,981.00	250,122.00	97,418.00	6,923.30
<i>February</i>	105	2,880.00	233,131.00	81,090.00	2,247.72
<i>March</i>	99	3,190.00	309,853.00	98,996.00	3,162.05
<i>April</i>	140	11,568.00	405,247.00	98,996.00	2,977.25
<i>May</i>	138	1,433.00	391,025.00	98,996.00	2,843.90
<i>June</i>	288	587,670.00	465,993.00	106,341.00	3,658.55
<i>July</i>	299	600,528.00	541,589.00	86,515.00	3,819.79
<i>August</i>	300	925,800.00	740,527.00	98,050.00	5,554.42
<i>September</i>	307	708,162.00	718,743.00	99,380.00	4,647.90
<i>October</i>	304	729,369.00	501,593.00	99,680.00	4,049.22
<i>November</i>	304	782,794.00	416,951.00	99,090.00	3,946.53
<i>December</i>	317	677,103.00	779,957.00	99,090.00	4,596.40
TOTAL		5,583,478.00	5,754,731.00	1,163,642.00	48,427.04

^aExcludes union premiums.

5.2 The Economic Impacts of the Reduction Fishery

In 2008, total landings of Atlantic menhaden from all Atlantic resource areas and Chesapeake Bay equaled 141,100 metric tons of which 85,000 metric tons were harvested from Chesapeake Bay. In 2008, vessel and plant operations generated total sales of \$88.2 million, income of \$22.8 million, and 519 full and part time jobs for the economies of Maryland and Virginia (Table 5.3). The majority of the impacts were generated for the Virginia economy (Table 5.4), and to a large extent, most of the direct and indirect impacts occurred in Northumberland County (Table 5.5).¹⁴⁰

Table 5.3. Baseline Economic Impacts of OMEGA Operations in 2008

Total	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	299	114	106	519
Income (thousands)	\$12,562	\$6,191	\$3,997	\$22,750
Output (thousands)	\$59,919	\$15,750	\$12,486	\$88,155

¹⁴⁰ Although we present the impacts of the reduction fishery on the economy of Northumberland, we caution that county level impacts are subject to more uncertainty than are the impacts for the state. This is because the various IO coefficients tend to be less accurate at a more detailed level.

Table 5.4. Virginia Baseline Economic Impacts of OMEGA Operations in 2008

Virginia Total	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	299	114	106	519
Income (thousands)	\$12,562	\$6,191	\$3,988	\$22,741
Output (thousands)	\$59,919	\$15,750	\$12,459	\$88,127

Table 5.5. Estimated Economic Impacts of OMEGA Operations, Northumberland

Total	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	217	75	55	347
Income (thousands)	\$9,117	\$4,487	\$2,441	\$16,045
Output (thousands)	\$59,919	\$11,639	\$7,066	\$78,624

5.3 Impacts of Shuttering the Reduction Operations and Reducing the Bay Quota

If the reduction fishery was prohibited, the economic impacts on the region, state, and Northumberland County would equal those depicted in Tables 5.3 – 5.5. Total employment for the region would decline by 519 jobs; income would decline by \$22.8 million; and total output for the regional economy would drop by \$88.2 million. A large portion of these impacts would occur directly in Northumberland County. Northumberland jobs would fall by 347; income would decline by \$16.0 million; and total output for Northumberland’s economy would decline by \$78.6 million.

In 2008, the largest source of employment in Northumberland County was seafood production preparation and packaging, which includes reduction operations. Out of 440 industries, commercial fishing ranked 22 in terms of number of jobs. Seafood product preparation and packaging also generated the largest output and level of employee compensation for Northumberland County. Average employee compensation for the county equaled \$26,512.00 in 2008, while the average compensation for individuals in the seafood product preparation and packaging industry earned \$50,544.00. Average employee compensation for the reduction fishery equaled \$42,013.00 in 2008.

In comparison, the total number of jobs in Northumberland County equal 4,277 in 2008. Total output of the economy of the County was \$551.7 million, and total employee compensation equaled \$113.4 million. A closure of the reduction operation would reduce total output, income and employment, respectively, by 14.3 %,14.1% and 8.1 % relative to 2008 economic activity in Northumberland County.

While it is relatively straightforward to estimate the economic impacts of a complete prohibition on harvesting menhaden for reduction purchases, it is much more difficult to do so for reductions in the allowable Bay-wide quota of 109,020 metric tons. Some information is

available, however, to do a limited assessment of reducing the allowable Bay harvest. In 2007, 08, and 09, OMEGA Protein harvested approximately 85,000 metric tons in each year from Chesapeake Bay (ASMFC, 2008, 2009, and 2010). In 2006, the reduction fishery harvested only 65,000 metric tons of menhaden from the Bay; total landings in 2006 for reduction equaled 157.4 thousand metric tons. The harvest cap was not established, however, until the Fall of 2006. Total landings by the reduction fishery for each year between 2007 and 2009 equaled, respectively, 174.5, 141.1, and 143.8 thousand metric tons (NMFS, Sustainable Fisheries Branch, 2010).

Given that the reduction fishery harvested only 85,000 metric tons from the Bay in each year between 2007 and 2009, which was below the Bay-wide quota of 109,020 metric tons, in each year between 2007 and 2009, a reduction of the quota to between 85,000 and 90,000 metric tons would have little impact on the fishing and processing activities, at least, relative to production levels of 2008. This may not be the case for 2011, however, with rising fuel prices. Fuel cost was approximately 17.0 % of total revenues in 2008. In 2011, the price of number 2 diesel is approximately 8.0 % lower than it was in 2008, but 17 % higher than it was in 2010. Diesel prices have already exceeded the high levels of 2008 in some regions of the nation.

An assessment of the economic ramifications of reducing the Bay quota is complicated by numerous factors. First, the reduction fishery has not harvested in excess of 85,000 metric tons from the Bay since the implementation of the Bay quota of 109,020 metric tons in 2006. In 2006, the reduction fleet harvested 92,400 metric tons from the coastal ocean and 65,000 metric tons from the Bay for a total of 157,400 metric tons. There is considerable uncertainty as to how the fleet would spatially alter their activities in response to reduced and binding quotas (those that actually limit harvest levels). This complicates estimating changes in fuel and other costs. Prices for meal, oil, and solubles are highly volatile and can quickly change in response to availability and prices of substitute products, which, of course, would affect revenues from the sale of menhaden-based products. As noted by OMEGA in its annual report, production and processing production levels and sales are highly variable and fluctuate with yields, weather, other factors, and global markets, many of which are beyond the control of the company. Another concern is that if the quota were reduced and subsequently lowered production, OMEGA Protein could reduce overall operations by taking vessels out of service, reducing the number of employees, and taking other actions to control costs. We lack information to determine their actual responses to binding quotas.

Using a combination of input/output and simulation models, we examine possible production levels and net returns for different levels of quotas. We do not consider any quotas in excess of 85,000 metric tons simply because the reduction fishery and processing facility operated between 2006 and 2009 without harvesting in excess of 85,000 metric tons from the Bay. Also, diesel fuel prices in 2008 were extremely high and the company still earned a gross profit (sales less annual fixed and operating costs) at the Reedville facility. We consider two baseline cases: (1) fixed and operating costs remain the same as 2008; and (2) fixed costs remain the same as 2008 but operating costs change in response to binding levels of quota. The assessment of the latter case is based strictly on a simulation model in which variable costs change in response to changes in landings. We also assume no change in the mix of meal, oil, and soluble. All 2008 costs, sales, and earnings data were provided by OMEGA Protein.

5.3.1 ECONOMIC IMPACTS OF VARYING BAY QUOTA LEVELS: NO CHANGE IN COST

We initially examine the potential economic changes resulting from different levels of the quota and assuming no change in fixed and operating costs. We also initially assume no change in employment, but subsequently relax this assumption with the analysis via the input output model. Also assumed is no change in the product mix; that is, as landings change, the percentage of total production of each product would remain unchanged. Impacts are assessed relative to activities in 2008.

In 2008, the reduction fishery harvested 141.1 thousand metric tons of menhaden. Approximately 85.0 thousand mt was harvested from the Bay, and 56.1 thousand mt was harvested from the coastal ocean (ASMFC, 2010). Gross sales of meal, oil, and solubles equaled \$59.9 million; total fixed plus operating cost equaled \$33.8 million; and gross profit equaled \$26.1 million. The company employed approximately 299 individuals. For the regional economy (Maryland and Virginia), harvesting and processing activities at the Reedville facility generated a total of 519 jobs; income of \$22.8 million; and a total regional output of \$88.2 million.

We consider reducing the Bay quota from 109.0 thousand metric tons to 75.0 thousand mt. We then consider quotas of 50.0 thousand mt, 25.0 thousand mt, and 0.0 mt. In all cases, we assume the coastal ocean harvest will remain at its observed level of 56.1 thousand mt. For the 0.0 quota case, we also consider a coastal ocean harvest of 92.4 thousand mt, which equals the coastal ocean harvest by the reduction fishery in 2006. We also impose the assumption that fuel, food, and repair and maintenance costs will all increase by 25.0 %.

A binding quota of 75.0 thousand metric tons with no change in landings from the coastal ocean would reduce gross profit from \$26.1 million to \$21.9 million, relative to 2008 activities (Table 5.6).¹⁴¹ A Bay quota of 50.0 thousand mt reduces gross profit to \$11.3 million, and a Bay quota of 25.0 thousand mt reduces gross profit to \$0.6 million. If the company operated with a 0.0 Bay quota and no changes in their coastal ocean harvest or fixed and operating costs, they would have a net loss of \$10.0 million. Alternatively, if the company operated with a 0.0 Bay quota but harvested their 2006 level of 92.4 thousand mt from the coastal ocean and experienced a 25.0 % increase in fuel cost, repair and maintenance, and food costs, they would have a gross profit of \$1.5 million.

Table 5.6. Economic Impacts of Bay Quotas and No Changes in Costs

Coastal Ocean Harvest	Bay Quota (1,000's of metric tons)	Total Landings (1,000's of metric tons)	Total Sales \$ Millions	Gross Profit \$ Millions
56,100	85,000	141,100	59.9	26.1
56,100	75,000	131,100	55.7	21.9
56,100	50,000	106,100	45.1	11.3
56,100	25,000	81,100	34.4	0.6
56,100	0	56,100	23.8	(-10.0)
92,400	0	92,400	39.2	1.5 ^a

^aAssumes a 25.0 % increase in fuel, repair and maintenance, and food expenditures.

¹⁴¹ Estimates of revenues and gross profit are in terms of 2008 dollars.

5.3.2 ECONOMIC IMPACTS OF VARYING BAY QUOTA LEVELS: CHANGE IN COST

In this section, we consider the economic impacts allowing for changes in operating costs, particularly fuel, repair and maintenance, and food expenditures. We allow these costs to decline in response to a decline in the quota, but we also consider increases in the base cost of these expenditure categories, which would likely occur as a result of the company harvesting larger quantities of menhaden from the coastal ocean. Between 2006 and 2009, the total catch per week of fishing effort in each year equaled, respectively, 488.8, 524.0, 538.5, and 479.3 tons. In 2009, the reduction fishery had its lowest catch per week of fishing effort—479.3 tons. Its total catch and its landings from the Bay and coastal ocean were similar to levels reported in 2008. Mean catch per week of fishing effort in 2008 equaled 538.5, which also coincided with a low level of stock abundance. The 2008 catch per week of fishing effort was the highest for all years between 2006 and 2009.

We examine the same level of Bay quotas on menhaden—75.0, 50.0, 25.0, and 0.0 thousand metric tons. We also assume that the reduction fishery will harvest the same quantity of menhaden from the coastal ocean as reported in 2008—56.1 thousand mt. We also examine the case of allowing the coastal ocean harvest to equal the highest observed level between 2006 and 2009—141.1 thousand metric tons but impose a 0.0 Bay quota. We assume fuel, repair and maintenance, and food expenditures will increase in proportion to the increase in number of weeks required to harvest the total reported landings in 2008—12.4 %.

A Bay quota of 75.0 thousand metric tons was estimated to yield a gross profit of \$22.2 million with total sales of \$55.7 million (Table 5.7). A quota of 50.0 thousand mt was estimated to yield a gross profit of \$17.2 million with total sales of \$45.1 million. A 0.0 quota yielded a gross profit of \$7.3 million with total sales of \$23.8 million. For additional comparison, we assume that the 2008 catch of 141.8 thousand mt was harvested in the coastal ocean but allow the cost of fuel, repair, and maintenance to increase by 50.0 %. Total sales remain at \$59.9 million but gross profit declines to \$18.2 million relative to its reported level of \$26.1 million in 2008.

Table 5.7. Economic Impacts of Bay Quotas and Allowing Costs to Change

Coastal Ocean Harvest	Bay Quota (1,000's of metric tons)	Total Landings (1,000's of metric tons)	Total Sales \$ Millions	Gross Profit \$ Millions
56,100	85,000	141,100	59.9	26.1
56,100	75,000	131,100	55.7	22.2
56,100	50,000	106,100	45.1	17.2
56,100	25,000	81,100	34.4	12.3
56,100	0	56,100	23.8	7.3
141,100	0	141,100	59.9	18.2 ^a

^aAssumes a 50 % increase in fuel, repair and maintenance, and food expenditures.

5.3.3 ECONOMIC IMPACTS OF FISHERY WIDE QUOTAS

This study was not designed nor did it propose to examine an overall quota on the entire reduction fishery; that is, it was not intended to examine the economic ramifications of imposing a quota on either or both the coastal ocean and Bay fishery. The reduction fishery vessels harvest menhaden as far north as northern New Jersey and as far south as Cape Hatteras. In June of 2009, vessels were fishing off New Jersey, and in November, vessels were fishing as far south as Ocracoke Inlet, North Carolina. The area fished depends on numerous factors, such as availability, abundance, possible yields, market prices, production costs, vessel capability, and weather. Obviously, the farther offshore or away from Virginia, the higher the production cost.

We consider a series of scenarios for analysis. In all cases, the Bay quota is assumed to equal zero (i.e., no reduction landings are allowed from the Bay). Our baseline reference is 2008 operations, which includes landings from the Bay. In 2008, the coastal ocean harvest equaled 56.1 thousand metric tons, and the landings from the Bay equaled 85.0 thousand mt. Total sales equaled \$59.9 million, and gross profit (total sales less fixed plus operating costs) was \$26.1 million. The Reedville facility operated 10 vessels; employed 299 individuals; and had an annual payroll of \$11.3 million (excludes health care benefits and union premiums). We cannot account for differences in yields associated with landings from different areas, and thus, assume the same level of yields as produced in 2008. We also cannot adequately incorporate cost changes associated with fishing farther away from the Bay; we thus, impose the assumption that costs or expenditures for fuel, repair and maintenance, and food will increase by 75.0 %. We do, however, allow operating cost or expenditures for fuel, repair and maintenance, and food to decline with declines in production levels.¹⁴²

Under the scenario of taking 141.1 thousand metric tons from the coastal ocean and a 75.0 % increase in costs, gross profit declines from \$26.1 million to \$14.2 million (Table 5.8). Total sales are assumed to be the same as reported in 2008. A quota of 100.0 thousand metric tons reduces total sales and profit to, respectively, \$42.5 and \$8.8 million. A quota of 50.0 thousand mt allows sales of \$21.2 million and a gross profit of \$2.3 million.

Table 5.8. Economic Impacts of Coastal Ocean Quotas and Allowing Costs to Change

Coastal Ocean Harvest	Bay Quota (1,000's of metric tons)	Total Landings (1,000's of metric tons)	Total Sales \$ Millions	Gross Profit \$ Millions
141,100	0	141,100	59.9	14.2
100,000	0	100,000	42.5	8.8
75,000	0	75,000	31.8	5.6
50,000	0	50,000	21.2	2.3

¹⁴² Total cost of production is typically viewed to be a function of output levels. We assume fixed proportions or a strictly linear relationship.

5.3.4 IMPACT ASSESSMENT VIA THE INPUT/OUTPUT MODEL

In this section, we present an assessment of the economic impacts of different quotas based on the input/output model developed for the fishery and processing facility. Impacts reflect economic activity after imposing the quotas; losses or reductions can be determined via differences between baseline and estimates contained in Tables 5.9 and 5.10. All data used to develop the model were provided by OMEGA Protein. These results provide an assessment in terms of total sales or output, employment, and income generated with each quota. Impacts from the model are driven by total sales, and thus, we use the sales' estimates from the previous two analyses. We stress, however, that IO models tend to overestimate losses associated with reductions in economic activity.

A quota of 75.0 thousand metric tons does not have a large impact on either the regional economy or on the economy of Virginia (Tables 5.9 and 5.10). The regional output is reduced from \$88.2 to \$81.9 million; income is reduced from \$22.8 to \$21.1 million; and employment declines from 519 to 482 jobs. A quota of 0.0, without additional landings from the coastal ocean to compensate for the reduction, reduces total output to \$35.0 million; employment to 206 jobs; and income to \$9.0 million. The impacts are nearly the same for the Commonwealth of Virginia and for Northumberland County (Table 5.11).

**Table 5.9. Economic Impacts on Regional Economy of Bay Quotas
(1,000's of metric tons)**

<i>Quota 75,000</i>				
Total impacts in VA and MD	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	278	106	99	482
Income (thousands)	\$11,677	\$5,755	\$3,716	\$21,148
Output (thousands)	\$55,700	\$14,641	\$11,607	\$81,948
<i>Quota 50,000</i>				
Total impacts in VA and MD	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	225	86	80	391
Income (thousands)	\$9,455	\$4,660	\$3,009	\$17,124
Output (thousands)	\$45,100	\$11,855	\$9,398	\$66,353
<i>Quota 25000</i>				
Total impacts in VA and MD	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	172	65	61	298
Income (thousands)	\$7,212	\$3,554	\$2,295	\$13,061
Output (thousands)	\$34,400	\$9,042	\$7,168	\$50,611
<i>Quota 0</i>				
Total impacts in VA and MD	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	119	45	42	206
Income (thousands)	\$4,990	\$2,459	\$1,588	\$9,036
Output (thousands)	\$23,800	\$6,256	\$4,960	\$35,015
<i>0+</i>				
Total impacts in VA and MD	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	196	74	70	339
Income (thousands)	\$8,218	\$4,050	\$2,615	\$14,884
Output (thousands)	\$39,200	\$10,304	\$8,169	\$57,673

Table 5.10. Economic Impacts on Virginia's Economy of Bay Quotas

<i>Quota 75000</i>	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	278	106	99	482
Income (thousands)	\$11,677	\$5,755	\$3,707	\$21,140
Output (thousands)	\$55,700	\$14,641	\$11,582	\$81,923
<i>Quota 50000</i>				
	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	225	86	80	390
Income (thousands)	\$9,455	\$4,660	\$3,002	\$17,117
Output (thousands)	\$45,100	\$11,855	\$9,378	\$66,332
<i>Quota 25000</i>				
	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	172	65	61	298
Income (thousands)	\$7,212	\$3,554	\$2,289	\$13,056
Output (thousands)	\$34,400	\$9,042	\$7,153	\$50,595
<i>Quota 0</i>				
	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	119	45	42	206
Income (thousands)	\$4,990	\$2,459	\$1,584	\$9,033
Output (thousands)	\$23,800	\$6,256	\$4,949	\$35,005
<i>Bay quota 0, 92,400.00 coastal ocean</i>				
	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	196	74	69	339
Income (thousands)	\$8,218	\$4,050	\$2,609	\$14,878
Output (thousands)	\$39,200	\$10,304	\$8,151	\$57,655

Table 5.11. Economic Impacts of 0.0 Quota on Northumberland's Economy

<i>0.0 Quota, 56,100 Coastal ocean harvest</i>	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	119	30	22	171
Income (thousands)	\$4,994	\$1,784	\$971	\$7,749
Output (thousands)	\$23,823	\$4,628	\$2,809	\$31,260

5.4 Economic Impacts and the Recreational Fisheries of the Bay

The harvesting of menhaden by the reduction fishery has been identified as a major concern of recreational anglers. Menhaden is a forage species and heavily consumed by major game fish species—striped bass, bluefish, spotted sea trout, and weakfish—of the Bay and coastal ocean. The concern is that removals of menhaden by the reduction fishery will have a detrimental effect on the experience or quality of recreational angling.

In numerous studies on recreational angling, the number of angling trips is usually specified as a function of the expected quality or experience of the trip. The quality or experience is typically perceived or measured in terms of number or size of fish caught (Kirkley et al., 1998). The demand (D) for number of trips is typically specified to be a function of travel and fishing cost per trip (C), expected catch of species (EC), and other variables (X) where X is a vector of other variables believed to influence the demand for trips):

$$D = f(C, EC, X) + u$$

where u is an error term assumed to be normally distributed with a mean of 0.0 and a constant variance. The model has been estimated using both a Tobit or censored regression approach or a Poisson or negative binomial model.

Unfortunately, we lack sufficient information to estimate the demand for angler trips by species. Obtaining this information would require a very time consuming and expensive survey (the cost of such surveys typically exceed \$200.0 k). Moreover, the number of restrictions imposed on recreational fishing over time would seriously complicate the estimation and assessment of the demand for angler trips relative to each of the four major game fish species.

We, subsequently, examine the possible relationships between recreational catch, in terms of numbers of fish, and menhaden abundance, and the abundance of striped bass and weakfish as functions of the abundance of menhaden. We also consider total angler trips as available from the National Marine Fisheries Service recreational survey. The examination of possible relationships between recreational catch or resource abundance of the recreational species and the abundance of menhaden is accomplished with standard causality testing (i.e., does X or menhaden abundance cause Y or resource abundance or recreational catch). We close this section with an analysis of the economic impacts of directed trips in 2008 for striped bass, weakfish, bluefish, and spotted sea trout.

5.4.1 THE RELATIONSHIP BETWEEN RECREATIONAL CATCH/ABUNDANCE AND MENHADEN

Much of the debate about the reduction fishery focuses on the potential ramifications of removals of menhaden by the reduction fishery on recreational angling. In a 1999 study by Kirkley et al., it was estimated that the economic value to Virginia anglers of harvesting one more striped bass, bluefish, or sea trout equaled \$56.00 if fishing from a boat and \$14.00 if fishing from shore. The economic value on a per trip basis equaled \$92.19. If we consider the estimated economic value per trip in 1999 and adjust it for 2008 constant dollar values and the

number of trips (2.9 million) taken by Maryland and Virginia anglers seeking the four species, the economic value or net benefits enjoyed by Maryland and Virginia recreational anglers fishing for striped bass, bluefish, weakfish, and spotted sea trout in 2008 is estimated to equal \$349.5 million.¹⁴³ In a study done by ECO Northwest (2009) on the economic value of sport fishing for salmon in the Rogue River, it was estimated that the economic value or benefit to anglers fishing steelhead was \$299.00 per fish. It is, therefore, quite apparent the recreational angling generates large economic benefits to society.

If removals by the reduction fishery do affect the angling experience, and subsequently, the number of angler trips, the loss in benefits and contributions to the economy could be substantial. We explore the potential causality between numbers of fish caught, abundance of the various game fish, and the abundance of menhaden via causality analysis. In this case, we specify fish catch (game fish species abundance or biomass) as a function of menhaden abundance:

$$FC_t = \alpha_0 + \beta_1 * FC_{t-1} + \dots + \beta_n FC_{t-n} + \delta_1 MENAB_{t-1} + \dots + \delta_m MENAB_{t-m} + u_t,$$

where FC is angler catch of species at time t, t-I refers to the t-ith preceding period, MENAB refers to menhaden stock abundance in preceding time periods. The same specification is used to examine the possible causal relationship between game fish abundance and menhaden abundance. If the dependent variables (FC_t) are non-stationary (non-constant mean), we take first differences of all variables (e.g., $FC_t - FC_{t-1}$). The model is estimated by least squares and the parameters, δ_1 through δ_m , are subject to the statistical test that all equal zero. A conclusion of not being able to reject the hypothesis implies that there is no causality between menhaden abundance and the number of game fish caught (or there is no causality between game fish abundance and the abundance of menhaden).

It was necessary to impose stationarity by taking first differences for all four species—striped bass, bluefish, weakfish, and spotted sea trout. In all cases, we rejected causality between game fish abundance and menhaden abundance and game fish catch (numbers) and menhaden abundance.¹⁴⁴ We were unable, however, to examine the relationship between game fish abundance of bluefish and menhaden abundance and sea trout abundance and menhaden abundance. The estimates of abundance for bluefish were not sufficiently current, and there were no estimates of abundance for spotted sea trout.

Although the statistical tests rejected causality, that does not mean there is no relationship between menhaden and the game fish species. Other models using different functional forms and other information might indicate a possible relationship. Moreover, causality testing only documents the possibility of a possible causal relationship between variables.

¹⁴³ Economic value should not be confused with economic impact. Activities such as recreational angling have economic value in that anglers would be willing to pay more for the opportunity to fish than they actually have to pay; anglers receive benefits or value in excess of what they pay to go fishing. We measure the value of these trade-offs in terms of income change. Value is reflected in peoples' willingness to make a trade-off, and the willingness to make a trade-off is reflected in peoples' willingness to pay some amount of money for access to recreational fishing.

¹⁴⁴ We omit the estimates and results of the F-tests for causality because they all rejected the possibility of causality. These results are available from the author of this report.

5.4.2 THE ECONOMIC IMPACTS OF RECREATIONAL ANGLING

In 2008, Maryland and Virginia anglers of the Bay made an estimated 2.9 million angling trips directed at striped bass, bluefish, weakfish, and spotted sea trout (Table 5.12). Trips made from private and rental boats dominated the total number of trips for each state. The estimated number of directed angler trips for spotted sea trout in Maryland was 0.0; that does not mean, however, that there were no trips in which spotted sea trout were caught. Often many trips are taken by anglers in which no specific species was targeted.

In 2008, targeted trips for which a species was caught generated \$332.1 million in total regional sales, \$122.3 million in total regional income, and 3,499 jobs for the regional economy (Tables 5.13 – 5.14). The total output, income, and employment generated for the economy of Virginia equaled, respectively, \$193.8 million, \$70.9 million, and 2.1 thousand jobs. Total output, income, and employment generated by fishing for the Maryland economy in 2008 equaled, respectively, \$138.3 million, \$51.5 million, and 1.4 thousand jobs.

A simple linear regression of total angler trips against resource abundance of menhaden suggests a possible causal relationship between angler trips and menhaden abundance for the years 1981 through 2008.¹⁴⁵ The adjusted R^2 , however, is extremely low—0.18. Moreover, when the data are examined for causality between resource abundance and angler trips, we are unable to reject the hypothesis of no causality (i.e., angler trips are not related to resource abundance). In fact, the regression of angler trips against year provides results with a higher adjusted R^2 value (0.57). The general overall trend is a declining stock abundance for menhaden, and a generally increasing trend in total angler trips for Maryland and Virginia.

We also find no evidence of a statistical relationship between angler catch, in terms of numbers of fish, and menhaden abundance (Figures 5.1-5.2). One thing we cannot analyze is what every angler knows—a school of breaking menhaden usually means there is either a school of bluefish, striped bass, or some other species feeding on the menhaden. We lack any data to estimate such a possible relationship, and incorporate such information into an impact assessment.

¹⁴⁵ Total angler trips equals the total number of all angling trips regardless of mode and species sought. The estimation of species specific directed angler trips typically results in estimates with large errors because the NMFS recreational survey was not originally designed to estimate direct trips. In recent years, however, NMFS has given increasing attention to the estimated of directed trips by doing add-on surveys, which do attempt to provide estimates of directed trips.

Table 5.12. Estimated Number of Directed Angler Trips Selected Game fish Species (NMFS)

Year	State	Species	Mode	Total directed effort (caught and/or targeted)
2008	Maryland	Bluefish	Private/Rental	405,985
2008	Maryland	Bluefish	Shore	236,774
2008	Maryland	Bluefish	Party/Charter	24,141
				666,900
2008	Maryland	Rockfish	Private/Rental	783,863
2008	Maryland	Rockfish	Shore	287,468
2008	Maryland	Rockfish	Party/Charter	87,901
				1,159,232
2008	Maryland	Weakfish	Private/Rental	12,338
2008	Maryland	Weakfish	Shore	7,481
				19,819
2008	Virginia	Bluefish	Private/Rental	223,613
2008	Virginia	Bluefish	Shore	139,644
2008	Virginia	Bluefish	Party/Charter	1,251
				364,508
2008	Virginia	Speckled Trout	Private/Rental	141,867
2008	Virginia	Speckled Trout	Shore	18,400
				160,267
2008	Virginia	Rockfish	Private/Rental	386,308
2008	Virginia	Rockfish	Shore	53,083
2008	Virginia	Rockfish	Party/Charter	6,607
				445,998
2008	Virginia	Weakfish	Private/Rental	99,357
2008	Virginia	Weakfish	Shore	17,085
2008	Virginia	Weakfish	Party/Charter	282
				116,724
	Virginia			1,087,497
	Maryland			1,845,951
	Total			2,933,448

Table 5 .13. Economic Impacts of Recreational Angling for Selected Species, Maryland

MARYLAND	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Rockfish				
Employment (full- and part-time jobs)	633	110	286	1,029
Income (\$ thousands)	21,939	5,342	11,139	38,420
Output (\$ thousands)	54,409	15,517	33,195	103,120
Bluefish				
Employment (full- and part-time jobs)	156	24	53	234
Income (\$ thousands)	4,236	1,173	2,079	7,488
Output (\$ thousands)	10,716	3,388	6,197	20,302
Sea trout/ weakfish				
Employment (full- and part-time jobs)	98	16	40	154
Income (\$ thousands)	3,192	793	1,570	5,554
Output (\$ thousands)	7,883	2,286	4,680	14,848
All species^{aii}				
Employment (full- and part-time jobs)	62	150	380	1,417
Income (\$ thousands)	29,366	7,308	14,788	51,462
Output (\$ thousands)	73,007	21,191	44,072	138,270

^aThe original data for Maryland did not distinguish among the four species. Impacts were determined by allocating a total expenditure among the species. As a result, numbers include impacts for speckled trout, which are not separated out in this table.

Table 5.14. Economic Impacts of Recreational Angling for Selected Species, Virginia

VIRGINIA	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Rockfish				
Employment (full- and part-time jobs)	891	145	416	1,452
Income (\$ thousands)	28,688	6,740	14,882	50,311
Output (\$ thousands)	70,984	20,382	46,648	138,013
Bluefish				
Employment (full- and part-time jobs)	195	27	86	308
Income (\$ thousands)	5,764	1,275	3,077	10,116
Output (\$ thousands)	13,277	3,710	9,641	26,627
Speckled trout				
Employment (full- and part-time jobs)	62	10	26	98
Income (\$ thousands)	1,801	471	933	3,205
Output (\$ thousands)	4,600	1,422	2,925	8,947
Sea trout/ weakfish				
Employment (full- and part-time jobs)	143	24	57	224
Income (\$ thousands)	4,111	1,092	2,042	7,245
Output (\$ thousands)	10,527	3,280	6,406	20,212
Four species				
Employment (full- and part-time jobs)	1,291	206	585	2,082
Income (\$ thousands)	40,365	9,578	20,934	70,877
Output (\$ thousands)	99,388	28,793	65,619	193,800

Table 5.15. Economic Impacts of Recreational Angling for Selected Species, Region

VIRGINIA <i>plus</i> MARYLAND	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Rockfish				
Employment (full- and part-time jobs)	1,523	255	702	2,480
Income (\$ thousands)	50,627	12,082	26,021	88,730
Output (\$ thousands)	125,393	35,899	79,842	241,134
Bluefish				
Employment (full- and part-time jobs)	351	51	139	541
Income (\$ thousands)	10,000	2,448	5,156	17,604
Output (\$ thousands)	23,992	7,098	15,839	46,929
Speckled trout				
Employment (full- and part-time jobs)	62	10	26	98
Income (\$ thousands)	1,801	471	933	3,205
Output (\$ thousands)	4,600	1,422	2,925	8,947
Sea trout/ weakfish				
Employment (full- and part-time jobs)	241	40	97	379
Income (\$ thousands)	7,303	1,884	3,613	12,800
Output (\$ thousands)	18,409	5,565	11,086	35,060
Four species				
Employment (full- and part-time jobs)	2,178	356	965	3,499
Income (\$ thousands)	69,731	16,886	35,723	122,339
Output (\$ thousands)	172,395	49,984	109,691	332,070

Figure 5.1. Menhaden Abundance (Numbers of Fish), 1983-2008

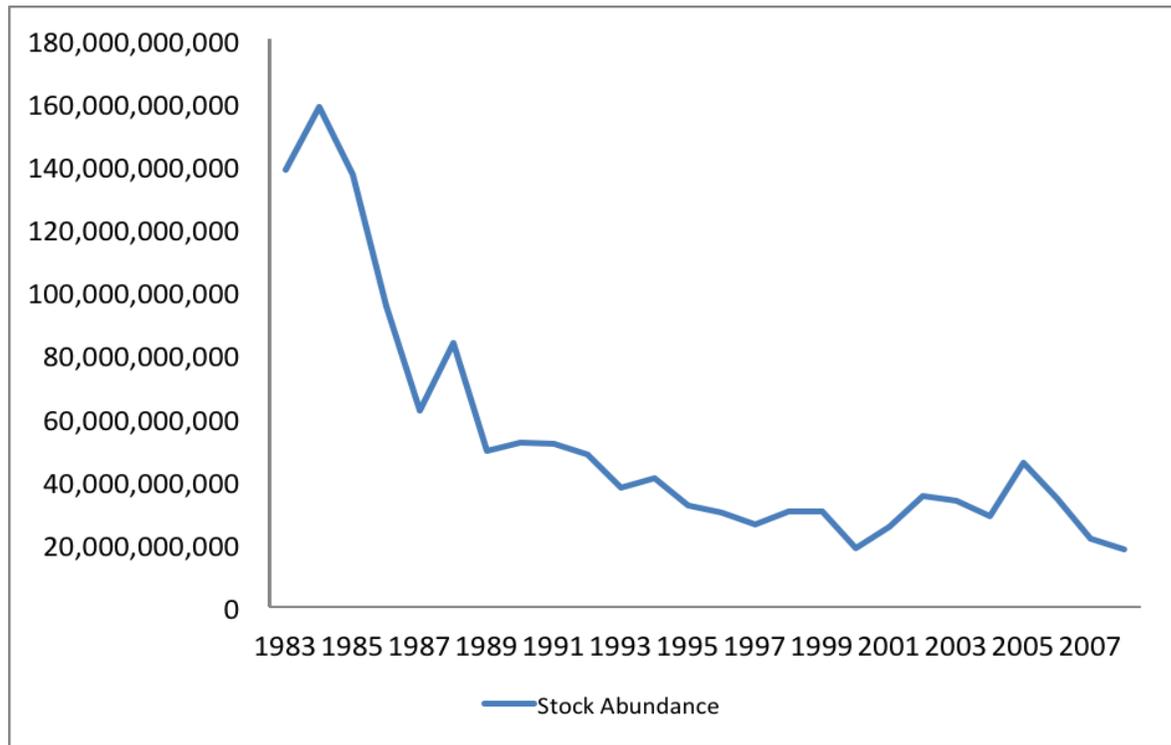
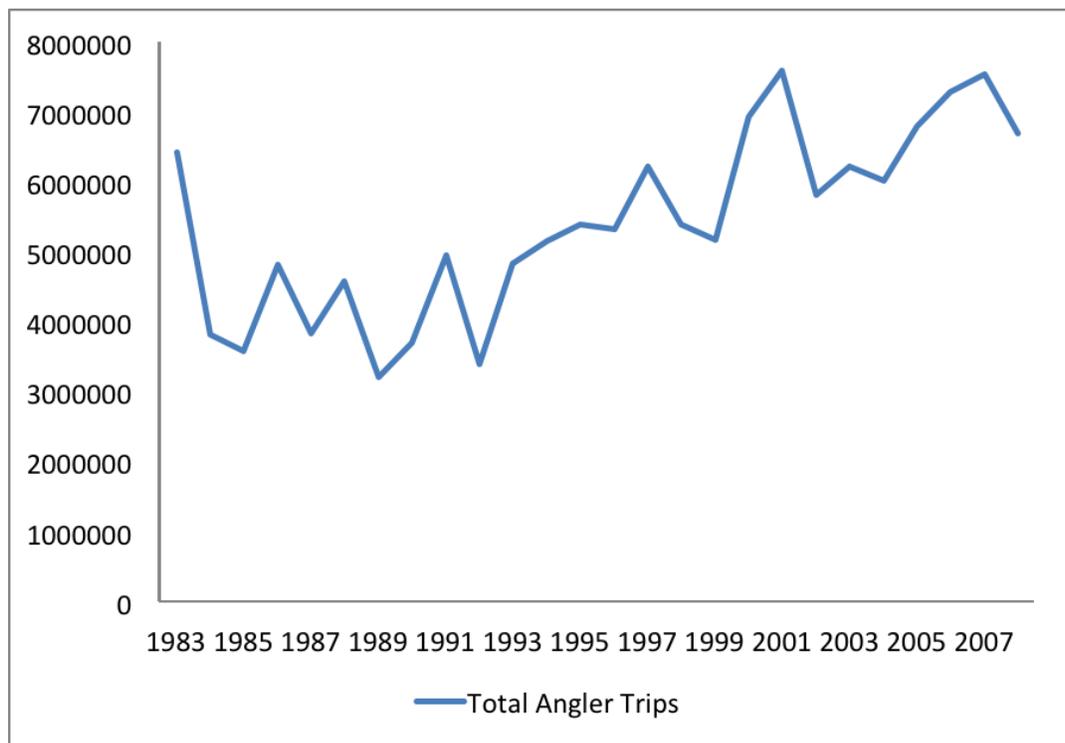


Figure 5.2. Number of Angler Trips, Maryland and Virginia, 1983-2008



Although it might be instructive to conduct a series of “what if” type analyses, such analyses, in the case of relating menhaden abundance to economic impacts, would not be very informative. That is because there is inadequate information to draw strong conclusions about the resource abundance and subsequent angler expenditures on each of the four recreational species. Recreational angling for the four species did generate considerable economic activity for the region in 2008--\$332.1 million in total sales or output, \$122.3 million in income, and nearly 3,500 jobs. Anglers made a total of 2.9 million trips targeting those four species in 2008.

A remaining concern of recreational anglers is the possible inverse relationship between menhaden and the weight of striped bass. A simple regression of mean weight per fish between 1990 and resource abundance of menhaden supports a statistically significant relationship. The adjusted R^2 is relatively low (0.38) but significant. The results suggest that as the abundance of menhaden increases by 1.0 billion fish, the mean weight of recreationally harvested striped bass increases by 0.05 pounds per fish. This result, however, does not characterize the entire data series (1990-2008); it primarily applies to the period 2000-2008.

5.5 Review of Impact Assessment

Chapter 5 provided an assessment of the potential economic impacts in terms of sales, gross profit, employment, and income from imposing different levels of quotas on removals from the Bay and coastal ocean by the reduction fishery. Despite OMEGA Protein providing extensive data on costs and earnings of the Reedville facility, data were inadequate to provide a detailed and precise assessment of how the company might change operations in response to different levels of quotas imposed on the Bay and coastal ocean fisheries. Also, extreme uncertainty characterizes many aspects of production and processing activities, such as weather, market prices, costs, yields, and numerous other factors. For example, if a quota of 0.0 was imposed on the Bay fishery, would OMEGA fish more off New Jersey, more off North Carolina, or some mix? Would the yields be better or worse than they are from the Bay fishery? Because of these limitations, we provide an assessment of the potential economic ramifications of different quotas imposing assumptions on costs, production activities, factory utilization, and yields.

Under a worst case scenario in which fixed and operating cost remain the same as in 2008, a Bay quota of 23.5 thousand metric tons, but with a catch equal to 56.1 thousand mt (reported landings of reduction fishery by coastal ocean in 2008), gross profit equals zero. The same level of operation, but allowing expenditures on fuel, repair and maintenance to increase by 50 % because of having to fish offshore, but also to decrease with respect to production levels (i.e., total operating cost is a function of output levels), generates a gross profit of \$6.1 million. In this latter situation, employment and payroll declines to 169 individuals and \$6.4 million because of the reduction in landings and production of meal, oil, and solubles. Also, fuel, repair and maintenance, and food expenditures decrease relative to 2008 reported levels. We also consider a Bay quota of 0.0 and different levels of quotas for the coastal ocean. We find that coastal ocean quotas of less than 50.0 thousand mt would create economic problems for the reduction fishery.

In terms of economic activity generated by harvesting and production activities of OMEGA Protein, Bay quotas would primarily affect the economies of Virginia and

Northumberland County. For example, a Bay quota of 75.0 thousand metric tons would reduce Virginia employment by 37 jobs, output by \$6.2 million, and income by \$1.6 million. In 2008, the economy of Virginia employed 4.8 million individuals, generated a total output of \$695.7 billion, and a total income of \$242.6 billion. A complete shuttering or the reduction fishery, however, would have a significant impact on the economy of Northumberland. Total output and income would each decline by 14.2 %, and total county employment would decrease by 8.1 %.

We were unable to adequately assess the possible changes in economic activity generated from recreational angling in relation to changes in resource conditions of menhaden. We were unable to determine any statistical relationship between either catch in numbers or number of angler trips and the resource abundance of menhaden. We did find a relationship between the mean weight of recreationally harvested striped bass and the abundance of menhaden, but the explanatory power of the analysis was quite low and only generally applicable to the years 2000-2008. Numerous other factors could also help explain the positive relationship between the mean weight of recreationally harvested striped bass and the abundance of menhaden.

Despite an inability to determine a relationship between angler trips or expenditures for each of the species and resource abundance, the four fisheries are relatively important to the economy of the region. The recreational fisheries for striped bass, spotted sea trout, bluefish, and weakfish (sea trout) generated total sales of \$332.1 million, \$122.3 million in income, and nearly 3,500 jobs for the region.

We stress, however, that while economic impacts are important for decision-making, the primary consideration should be on net benefits or economic value. Value is reflected in peoples' willingness to make a trade-off, and the willingness to make a trade-off is reflected in peoples' willingness to pay some amount of money for a given state of the environment or for some level of goods and services. In this study, the primary valuation focus is on determining the value to society of menhaden. That is, does society receive a higher benefit from the ecosystem services of menhaden or from the reduction fishery? Or is there some mix of the two, which generates the maximum benefit to society. The next Chapter, VI, presents a survey methodology used to obtain data necessary to estimate the economic value of menhaden, and Chapter VII presents a discussion of the estimated economic value of menhaden.

6.0 Valuation Survey Methodology

6.1 Multi-Mode Chesapeake Bay Menhaden Survey: Data Collection Report¹⁴⁶

The Menhaden survey has 12 versions (3 scenarios and 4 tax amounts) distributed in Maryland (MD) and Virginia (VA). The multi-mode survey contains three elements: telephone, mail, and Internet surveys. Data collection followed the “tailored design method” where the budget allowed (Dillman, Smyth and Christian, 2009). Tasks completed include a review of the survey instrument, adaptation of the instrument for mail, telephone and Internet surveys and obtain survey samples. For each mode we will attempt to collect 1080 completed surveys with approximately 30 cases in each of the 18 cells in each state. The samples were obtained from a professional firm. We have coded and cleaned data from the survey responses. The data is available as an MS EXCEL spreadsheet. Other formats are available upon request.

6.1.1 MAIL SURVEY

The mail survey was conducted between May and August 2010. 4319 surveys were sent to randomly chosen households in Maryland and Virginia. Survey Sampling International provided the addresses. For the first mailing in late June, 2500 surveys were sent to Maryland residents and 1819 to Virginia residents. 88 surveys to Maryland and 78 to Virginia were undeliverable. A second mailing was completed approximately 6 weeks later to all members of the sample excluding those who responded to the first mailing and excluding undeliverable addresses from the first mailing. Surveys returned with forwarding addresses from either mailing were resent to the new address.

Of the 2412 surveys delivered in Maryland, 193 were completed and returned. Of the 1741 surveys delivered to Virginia, 233 were completed and returned. Using the total number of surveys delivered, the response rates were 8% for Maryland, 13.38% for Virginia and 10.26% overall. The margin of sampling error is 3.8 for Maryland and 4.4 for Virginia.

6.1.2 TELEPHONE SURVEY

The Survey Research Laboratory¹⁴⁷ conducted telephone interviews between June 1 and July 22, 2010. A list-assisted method of random digit dialing (RDD) was used to obtain phone numbers in the sample from Maryland and Virginia. Within selected households, individuals 18 years and over were chosen at random for participation. We made multiple attempts at each contact number (as many as 5 attempts) in order increase response rates and give potentially eligible respondents a reasonable opportunity to participate in the survey. Moreover, households and individuals who were initially unwilling to participate in the survey were contacted multiple times in an attempt to persuade them to participate. Calls were staggered over times of day and days of the week to maximize the chance of making contact with potential respondents.

¹⁴⁶ John Whitehead (Economics), Tanga McDaniel (Economics), Todd Hartman (Government and Justice Studies), Center for Economic Research and Policy Analysis, Appalachian State University, *November 4, 2010*.

¹⁴⁷ Maintained by the Center for Economic Research & Policy Analysis at Appalachian State University
Page | 169

In total, interviewers called 19,044 numbers, each of which was given a final disposition based upon standard definitions from the American Association for Public Opinion Research (AAPOR). A total of 766 interviews were completed (including 57 partially completed interviews, in which respondents answered at least 10 questions) across the general population of Maryland and Virginia. By state, there were 323 completed surveys in Maryland and 390 in Virginia, including 53 interviews for which the state of origin could not be determined (e.g., respondent refused to identify state, partially completed interview, etc.). Given these sample sizes, the margin of sampling error with simple random sampling for the Maryland sample is $\pm 5.45\%$, and the margin of sampling error for the Virginia sample is $\pm 4.96\%$. This means that in 95 out of every 100 samples drawn, estimated proportions based on the entire sample will be no more than 5.45 or 4.96 percentage points away from their true values in the population, respectively. It is important to remember that sampling fluctuations are only one possible source of error in a survey estimate.

As there are several different methods for calculating these response rates, we used two methods of determining levels of participation in this survey. The Cooperation Rate (AAPOR Formula #4) was 35.9 percent and the Response Rate (AAPOR Formula #4) was 15.6 percent. The response rate is based upon the number of complete interviews with reporting units divided by the number of eligible reporting units in the sample. The cooperation rate is based upon the proportion of all cases interviewed of all eligible units contacted. The response rate is a very conservative estimate of participation, while the cooperation rate adjusts for the fact that many phone numbers in the list are non-eligible.

6.1.3 INTERNET SURVEY

Zoomerang¹⁴⁸ is an online survey research firm that has recruited 2 million U.S. residents to complete online surveys in response to a survey incentive.¹⁴⁹ Zoomerang invited a random subsample of Virginia and Maryland residents to take the Menhaden online survey. The survey opened on July 16, 2010 and closed on July 19, 2010 with 849 respondents completing the survey.

¹⁴⁸ www.zoomerang.com

¹⁴⁹ http://www.zoomerang.com/resources/Panel_Profile_Book.pdf

6.2 Survey Questionnaires and Data Summary

APPENDIX A: VIMS 2010 CODEBOOK/TELEPHONE SURVEY

id Unique Respondent Identifier
mode Survey Mode
(1) Mail (2) Phone (3) Internet

=====

knowfish Prior Knowledge of Menhaden

=====

Menhaden ["MEN-HAY-DEN"] is a small fish that lives part of the year in Chesapeake Bay and is part of one coastal stock ranging from Maine to Florida. Menhaden support the largest commercial fishing industry of Chesapeake Bay. How much did you know about menhaden before beginning this survey?

- (1) A lot
- (2) Some
- (3) A little
- (4) Nothing
- (Missing) Don't Know / Refused

=====

overfish Concern About Overfishing

=====

The most recent scientific assessment of the population indicates that Atlantic menhaden are not overfished and overfishing is not occurring on a coast wide basis; however, scientific knowledge supporting these complex issues is limited. How concerned are you about overfishing of menhaden?

- (1) Very concerned
- (2) Somewhat concerned
- (3) Not too concerned
- (4) Not at all concerned
- (Missing) Don't Know / Refused

=====

fishmeal Fish Meal Importance

=====

Menhaden is harvested for bait or processed by “reduction” into fish meal and fish oil. Fish meal is used as feed for livestock, poultry, and farm-raised fish. Soybean and flaxseed meal is a substitute but the protein in fish meal is especially valuable for livestock, poultry, and aquaculture feeds. How important do you think it is to use menhaden to make fish meal for animal feed?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

=====

fishoil Fish Oil Importance

=====

Fish oil containing omega-3 fatty acids is now increasingly used as a human health supplement. Soybean and flaxseed oil are substitutes but the American Heart Association suggests that fish, including menhaden, is the best source of omega-3 fatty acids. How important do you think it is to use menhaden to make fish oil for human health supplements?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

=====

bait Bait Importance

=====

Menhaden is used by recreational fishermen as bait or chum and by commercial fishermen as bait for American lobster, blue crabs, and crawfish. There are bait and chum substitutes but many recreational and commercial fishermen prefer menhaden. How important do you think it is to use menhaden for bait and chum?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

=====

game fish Concerned About Game Fish

=====

As a forage species, menhaden is a significant part of the diet of predators like striped bass, other game fish, and sea birds. There is concern that the “reduction” catch removes the food of these predators. How concerned are you about the impact of menhaden harvesting on game fish and sea birds?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

=====

ecosystem Concerned About Chesapeake Bay Populations

=====

There is concern that the harvesting of menhaden affects their total population living in the Chesapeake Bay. And there is concern that there are too few juvenile fish to support the ecosystem health of the Bay. How concerned are you about the impact of menhaden harvesting on ecosystem health?

- (1) Very concerned
- (2) Somewhat concerned
- (3) Not too concerned
- (4) Not at all concerned
- (Missing) Don't Know / Refused

=====

waterqual Concerned About Water Quality

=====

Various recreational fishing and environmental associations have expressed concern that the reduced levels of menhaden may negatively affect the water quality of Chesapeake Bay. The most recent research indicates there is little, if any, relationship between the population of menhaden and water quality. How concerned are you about the impact of menhaden harvesting on water quality?

- (1) Very concerned
- (2) Somewhat concerned
- (3) Not too concerned
- (4) Not at all concerned
- (Missing) Don't Know / Refused

=====

fishery Prior Knowledge About Fishery Management

=====

The menhaden commercial fishing industry is managed by each state under the direction of the Atlantic States Marine Fisheries Commission. Historically, menhaden catches from Chesapeake Bay have varied widely: from about 50,000 to 170,000 tons. This equals 10% to 75% of the coast wide catch of menhaden. How much did you know about the management of the menhaden fishery prior to this survey?

- (1) A lot
- (2) Some
- (3) A little
- (4) Nothing
- (Missing) Don't Know / Refused

=====
bayfish Concerned About Chesapeake Bay Overfishing
=====

Virginia is the only Atlantic coastal state with an active "reduction" fishery. Virginia vessels also harvest menhaden along the North Carolina coast and in the ocean along the coasts of Maryland, Delaware, and New Jersey beyond three miles from shore. Currently, Chesapeake Bay catches by the Virginia fishery are capped at 100,000 tons per year through 2013. Since the cap was instituted, the total Chesapeake Bay catch by Virginia vessels has been below the cap. How concerned are you about overfishing of menhaden in Chesapeake Bay?

- (1) Very concerned
- (2) Somewhat concerned
- (3) Not too concerned
- (4) Not at all concerned
- (Missing) Don't Know / Refused

=====
industry Commercial Fishing Industry Importance
=====

The Virginia reduction fishery industry employs about 10% of the Northumberland County workforce. In 2008:

The industry had total sales of approximately \$60 million.

Gross earnings by individuals working the boats and the plant were about \$11 million.

Average income for 300 fishermen and plant workers, which includes management, was about \$38,000, compared with average earnings of about \$27,000 per worker in the county.

Expenditures to support harvesting and processing activities, which generate both state and local taxes, were about \$19 million.

How important do you think the menhaden commercial fishing industry is to the Virginia economy?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

random1 RANDOMIZATION 1

[Random Assignment to 1 of 3 Conditions for Management Approach Experiment] (1)
Decrease the harvest by 10%
(2) Decrease the harvest by 50% (3) Maintain the harvest

decrease Decrease version
(0) random1 = 0
(1) random1 = 1, 2

scope Scope of the policy
(0) random1 = 0 (10) random 1 = 1 (50) random1 = 2

economy (Decrease version) Concerned About Virginia Economy

Now I'm going to describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% (50%) in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- (1) Very concerned
 - (2) Somewhat concerned
 - (3) Not too concerned
 - (4) Not at all concerned
 - (Missing) Don't Know / Refused
-

improve (Decrease version) Likelihood of Improving Ecosystem

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- (1) Very likely
- (2) Somewhat likely
- (3) Not too likely
- (4) Not at all likely
- (Missing) Don't Know / Refused

=====
monitor (Maintenance version) Importance of Monitoring Menhaden
=====

Now I'm going to describe a management approach that would maintain the commercial menhaden fishing industry in Chesapeake Bay.

An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring. How important do you think it is to monitor the menhaden catch, game fish, sea birds, and water quality?

- (1) Very important
- (2) Somewhat important
- (3) Not too important
- (4) Not at all important
- (Missing) Don't Know / Refused

=====
economy (Maintenance version) Concerned About Virginia Economy
=====

Without the monitoring program the menhaden harvest would have to be reduced by 10%. The reduced harvest could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the impact of menhaden harvest reduction on the Virginia economy?

- (1) Very concerned
- (2) Somewhat concerned
- (3) Not too concerned
- (4) Not at all concerned
- (Missing) Don't Know / Refused

=====
random2 RANDOMIZATION 2
=====

[Random Assignment to 1 of 4 Conditions for Bid Experiment] (1) Tax = \$10
(2) Tax = \$30 (3) Tax = \$60 (4) Tax = \$90

tax = \$10, \$30, \$60, \$90

=====
vote (\$tax) Proposal Vote
===== [10% & 50% Decrease
version]

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about [tax] in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today, would you vote for or against the proposal to lower the harvest of menhaden?

[Maintenance version]

The monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all Virginia and Maryland households voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail, the monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10%, and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- (1) For
- (2) Against
- (3) Don't Know / Refused

=====
certainty Certainty About Proposal Vote
===== How sure are you about your
vote on the proposal?
(1) Very sure
(2) Somewhat sure
(3) Not too sure
(4) Not at all sure
(Missing) Don't Know / Refused

=====
payleast (\$1) Proposal Vote [Mode = 2, 3 only]
===== Would you be willing to pay
as little as \$1 in taxes for the proposal?
(1) Yes
(2) No
(Missing) Don't Know / Refused

=====
pay10 (\$10) Proposal Vote [Mode = 2, 3 only]
=====

Suppose that a typical household would instead pay about \$10. Would you vote for or against this proposal?

- (1) For
- (2) Against
- (3) Don't Know / Refused

=====
pay30 (\$30) Proposal Vote [Mode = 2, 3 only]
=====

Suppose that a typical household would instead pay about \$30. Would you vote for or against the proposal?

- (1) For
- (2) Against
- (3) Don't Know / Refused

=====
pay60 (\$60) Proposal Vote [Mode = 2, 3 only]
=====

Suppose that a typical household would instead pay about \$60. Would you vote for or against the proposal?

- (1) For
- (2) Against
- (3) Don't Know / Refused

=====
pay90 (\$90) Proposal Vote [Mode = 2, 3 only]
=====

Suppose that a typical household would instead pay about \$90. Would you vote for or against this proposal?

- (1) For
- (2) Against
- (3) Don't Know / Refused

=====
paymost (Highest \$) Proposal Vote [Mode = 2, 3 only]
=====

What is the highest dollar amount that you would be willing to pay in taxes for the proposal? [

Missing for Don't Know / Refused]

=====
memberships Memberships
=====

Now we would like to ask some questions about your recreation activities.

Are you currently a member of any commercial, recreational, environmental or conservation organization or association?

- (1) Yes
- (2) No
- (Missing) Don't Know / Refused

=====
employment Employed in Fishing
=====

Are you currently employed in commercial fishing or a related industry? (1) Yes

- (2) No
- (Missing) Don't Know / Refused

=====
distance Distance to Bay
=====

For the next several questions, when I say "Bay" I am referring to Chesapeake Bay or a stream or river that flows into the Bay.

About how far (e.g., miles) is it from your home to the Bay? [Missing for "Don't Know / Refused"]

=====
visited Visited Bay
=====

Have you ever visited the Bay for the main purpose of outdoor recreation? (1) Yes

- (2) No
- (Missing) Don't Know / Refused

=====
bay_fish Bay Activities: Fishing
=====

What type of activities did you participate in during your visits to the Bay? [Listed Fishing?] (

- 1) Yes

=====
bay_hunt Bay Activities: Hunting
=====

What type of activities did you participate in during your visits to the Bay? [Listed Hunting?]

- (1) Yes

=====
bay_beach Bay Activities: Beach-going
=====

What type of activities did you participate in during your visits to the Bay? [Listed Beach- going?]
(1) Yes

=====
bay_boat Bay Activities: Boating
=====

What type of activities did you participate in during your visits to the Bay? [Listed Boating?] (
1) Yes

=====
bay_nature Bay Activities: Nature Observation
=====

What type of activities did you participate in during your visits to the Bay? [Listed Nature Observation?]
(1) Yes

=====
bay_camp Bay Activities: Camping
=====

What type of activities did you participate in during your visits to the Bay? [Listed Camping?]
(1) Yes

=====
bay_hike Bay Activities: Hiking
=====

What type of activities did you participate in during your visits to the Bay? [Listed Hiking?] (
1) Yes

=====
bay_photo Bay Activities: Bird/Wildlife Photography
=====

What type of activities did you participate in during your visits to the Bay? [Listed Bird/Wildlife Photography?]
(1) Yes

=====
bay_watch Bay Activities: Bird/Wildlife Watching
=====

What type of activities did you participate in during your visits to the Bay?
[Listed Bird/Wildlife Watching]
(1) Yes

=====
bay_other Bay Activities: Other Activities
=====

What type of activities did you participate in during your visits to the Bay?
[Listed Other Activities?]
(1) Yes

=====
trips Number of Trips
=====

About how many trips did you make from your home to the Bay for the main purpose of outdoor recreation during the past 12 months?
[Missing for "Don't Know / Refused"]

=====
daytrips Number of Day Trips
=====

About how many of these were day trips where you returned to your home on the same day that you left?

[Missing for "Don't Know / Refused"]

=====
household People in Household
=====

Finally, we would like to ask some questions about you and your household. These questions will help us analyze the results of this study. Remember your answers will be kept strictly anonymous.

How many people, including yourself, normally live in your household? [Missing for "Don't Know / Refused"]

=====

under18 People in HH Under 18

=====

How many of these people are under 18 years old?

[Missing for "Don't Know / Refused"]

=====

gender GENDER

=====

[Interviewed coded gender]

(1) Male
(0) Female

=====

birthyear Year Born

=====

In what year were you born?

[Missing for "Don't Know / Refused"]

=====

age Respondent's Age

=====

Calculated by subtracting birth year from 2010

=====

education Education

=====

What is the highest degree or level of school that you have completed? (1) Less than 9th grade
(2) 9th to 12th grade, no diploma
(3) High school graduate (includes equivalency) (4) Some college, no degree
(5) Associate degree
(6) Bachelor's degree
(7) Graduate or professional degree

=====
income Income
=====

Ok, I'm going to read off a list of broad income categories, and you just stop me when I get to the category that best describes your total annual income before taxes?

- (1) Less than \$10,000
- (2) 10 to less than \$15,000 (3) 15 to less than \$25,000 (4) 25 to less than \$35,000 (
- 5) 35 to less than \$50,000 (6) 50 to less than \$75,000
- (7) 75 to less than \$100,000
- (8) 100 to less than \$150,000 (9) 150 to less than \$200,000 (10) \$200,000 or more
- (99) Don't Know / Refused

=====
state State
=====

Do you live in Virginia or Maryland?

- (1) Virginia
- (2) Maryland
- (Missing) Don't Know / Refused

=====
county_va Virginia Counties
=====

And what COUNTY or INDEPENDENT CITY do you live in?

=====
county_md Maryland Counties
=====

And, what county do you live in?

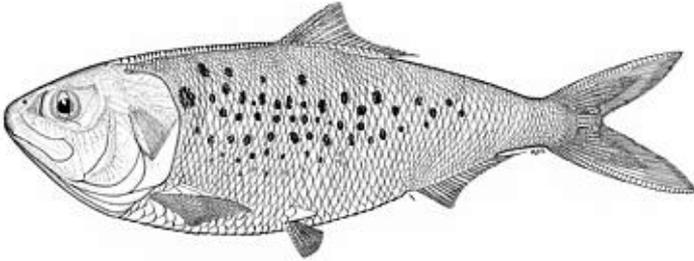
=====
zipcode Zip Code
=====

What is your current zip code?

[Missing for "Don't Know / Refused"]

APPENDIX B: MAIL SURVEY (VERSION 1)

Chesapeake Bay Menhaden: What are they worth to you?



Good fishery management decisions require an understanding of public preferences. A difficult issue facing Chesapeake Bay policy makers concerns the harvesting of menhaden. The big question is whether further restrictions on the harvest of menhaden are a good idea. In other words “How much of the menhaden stock should be restricted from harvest?” We hope to develop answers to these questions and others from the information that we gather from you in this survey.

Please answer all of the questions in this booklet, even if you have never had experience with menhaden. Then return the completed questionnaire in the enclosed, self-addressed, stamped envelope.

The information that you provide will be kept strictly anonymous. Your name will never be placed on your booklet or associated with your answers. If you have any questions about this survey, please contact Jim Kirkley (e-mail: jkirkley@vims.edu; phone: 804-684-7160; FAX: 804-684-7989) or John Whitehead (e-mail: whiteheadjc@appstate.edu; phone: 828-262-6121).

Thank you for participating in this survey!

Section A. Please read this background information and answer the related questions about the menhaden fishery.

A1. Menhaden is a small fish that lives part of the year in Chesapeake Bay and is part of one coastal stock ranging from Maine to Florida. Menhaden support the largest commercial fishing industry of Chesapeake Bay. How much did you know about menhaden before this survey?

- A lot
- Some
- A little
- Nothing

A2. The most recent scientific assessment of the population indicates that Atlantic menhaden are not overfished and overfishing is not occurring on a coastwide basis; however, scientific knowledge supporting these complex issues is limited. How concerned are you about overfishing of menhaden?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not at all concerned
- Don't know

A3. Menhaden is harvested for bait or processed by “reduction” into fish meal and fish oil. Fish meal is used as feed for livestock, poultry, and farm-raised fish. Soybean and flaxseed meal is a substitute but the protein in fish meal is especially valuable for livestock, poultry, and aquaculture feeds. How important do you think it is to use menhaden to make fish meal for animal feed?

- Very important
- Somewhat important
- Not too important
- Not at all important
- Don't know

A4. Fish oil containing omega-3 fatty acids is now increasingly used as a human health supplement. Soybean and flaxseed oil are substitutes but the American Heart Association suggests that fish, including menhaden, is the best source of omega-3 fatty acids. How important do you think it is to use menhaden to make fish oil for human health supplements?

- Very important
- Somewhat important
- Not too important
- Not at all important
- Don't know

A5. Menhaden is used by recreational fishermen as bait or chum and by commercial fishermen as bait for American lobster, blue crabs, and crawfish. There are bait and chum substitutes but many recreational and commercial fishermen prefer menhaden. How important do you think it is to use menhaden for bait and chum?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

A6. As a forage species, menhaden is a significant part of the diet of predators like striped bass, other game fish and sea birds. There is concern that the harvesting of menhaden removes the food of these predators. How concerned are you about the impact of menhaden harvesting on game fish and sea birds?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

A7. There is concern that the harvesting of menhaden affects their total population living in Chesapeake Bay. And there is concern that there are too few juvenile fish to support the ecosystem health of the Bay. How concerned are you about the impact of menhaden harvesting on ecosystem health?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

A8. Various recreational fishing and environmental associations have expressed concern that the reduced levels of menhaden may negatively affect the water quality of Chesapeake Bay. The most recent research indicates there is little, if any, relationship between the population of menhaden and water quality. How concerned are you about the impact of menhaden harvesting on water quality?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

Section B. Please answer the next set of questions about management of the menhaden commercial fishing industry.

B1. The menhaden commercial fishing industry is managed by each state under the direction of the Atlantic States Marine Fisheries Commission. Historically, menhaden catches from Chesapeake Bay have varied widely: from about 50,000 to 170,000 tons. This equals 10% to 75% of the coastwide catch of menhaden. How much did you know about the management of the menhaden commercial fishing industry before this survey?

- | | |
|--------------------------------|-----------------------------------|
| <input type="checkbox"/> A lot | <input type="checkbox"/> A little |
| <input type="checkbox"/> Some | <input type="checkbox"/> Nothing |

B2. Virginia is the only Atlantic coastal state with an active “reduction” fishery. Virginia vessels also harvest menhaden along the North Carolina coast and in the ocean along the coasts of Maryland, Delaware, and New Jersey beyond three miles from shore. Currently, Chesapeake Bay catches by the Virginia fishery are capped at roughly 100,000 tons per year through 2013. Since the cap was instituted, the total Chesapeake Bay catch by Virginia vessels has been below the cap. How concerned are you about overfishing of menhaden in Chesapeake Bay?

- | | |
|---|---|
| <input type="checkbox"/> Very concerned | <input type="checkbox"/> Not at all concerned |
| <input type="checkbox"/> Somewhat concerned | <input type="checkbox"/> Don’t know |
| <input type="checkbox"/> Not too concerned | |

B3. The Virginia “reduction” fishery and related processing activities employ about 10% of the Northumberland County, Virginia workforce. In 2008:

- The industry had total sales of approximately \$60 million.
- Gross earnings by individuals working the boats and the plant were about \$11 million.
- Average income for 300 fishermen and plant workers, which includes management, was about \$38,000, compared with average earnings of about \$27,000 per worker in the county.
- Expenditures to support harvesting and processing activities, which generate both state and local taxes, were about \$19 million.

B4. How important do you think the menhaden commercial fishing industry is to the Virginia economy?

- | | |
|---|---|
| <input type="checkbox"/> Very important | <input type="checkbox"/> Not at all important |
| <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Don’t know |
| <input type="checkbox"/> Not too important | |

Section C. Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% in Chesapeake Bay.

C1. To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

C2. There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

C3. The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For
 - Against
 - Don't know
- C4. How sure are you about your vote on the proposal?
- Very sure
 - Somewhat sure
 - Not too sure
 - Not at all sure

Section D. Next, we would like to ask some questions about your recreation activities.

D1. Are you currently a member of any commercial, recreational, environmental or conservation organization or association?

- Yes
- No

D2. Are you currently employed in commercial fishing or a related industry?

- Yes
- No

For the next several questions, when we say "Bay" we are referring to the Chesapeake Bay or a stream or river that flows into the Bay.

D3. About how far is it from your home to the Bay?

_____ Miles

D4. Have you ever visited the Bay for the main purpose of outdoor recreation?

- Yes
- No → please skip to the next section of this survey.

D5. What type of activities did you participate in during your visits to the Bay? (check all that apply)

- | | |
|---|--|
| <input type="checkbox"/> Fishing | <input type="checkbox"/> Camping |
| <input type="checkbox"/> Hunting | <input type="checkbox"/> Hiking |
| <input type="checkbox"/> Beach Going | <input type="checkbox"/> Bird / Wildlife Photography |
| <input type="checkbox"/> Boating | <input type="checkbox"/> Bird / Wildlife Watching |
| <input type="checkbox"/> Nature Observation | <input type="checkbox"/> Other _____ |

D6. About how many trips did you make from your home to the Bay for the main purpose of outdoor recreation during the past 12 months?

_____ Number of trips → if more than zero go to D7.

→ D7. About how many of these were day trips where you returned to your home on the same day that you left?

_____ Number of day trips

Section E. Finally, we would like to ask some questions about you and your household. These questions will help us analyze the results of this study. Your answers will be kept strictly anonymous.

E1. How many people, including yourself, normally live in your household?

_____ People → If more than one → E2. How many of these people are under the age of 18?

_____ People

E3. In what year were you born?

19_____

E4. Are you male or female?

- Male
- Female

E5. Do you live in Virginia or Maryland?

- Virginia
- Maryland

E6. What county or independent city do you live in? _____

E7. What is your current zip code? _____

E8. What is the highest degree or level of school that you have completed?

- Less than 9th grade
- 9th to 12th grade, no diploma
- High school graduate (includes equivalency)
- Some college, no degree
- Associate degree
- Bachelor's degree
- Graduate or professional degree

E9. What is your household's total annual income before taxes?

- Less than \$10,000
- \$10,000 to \$14,999
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 or more

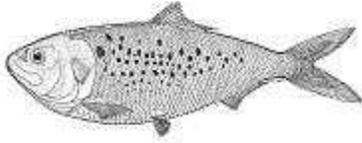
Thank you for taking the time to complete this survey! The results will be available soon. You can read a summary at this website: <http://econ.appstate.edu/menhaden>.

Is there anything else you would like to tell us about your interest in menhaden? If so, please use this space.

APPENDIX C: ZOOMERANG INTERNET SURVEY

Last Modified: July 19 2010, 2:16 PM
Design Theme: Fine Line Gray
Language: English
Button Options: Labels
Disable Browser "Back" Button: False

Chesapeake Bay Menhaden: What are they worth to you?



Page 1 - Heading

Good fishery management decisions require an understanding of public preferences. A difficult issue facing Chesapeake Bay policy makers concerns the harvesting of menhaden. The big question is whether further restrictions on the harvest of menhaden are a good idea. In other words "How much of the menhaden stock should be restricted from harvest?" We hope to develop answers to these questions and others from the information that we gather from you in this survey.

Page 1 - Heading

Please read this background information and answer the related questions about the menhaden fishery.

Page 1 - Question 1 - Choice - One Answer (Bullets)

Menhaden is a small fish that lives part of the year in Chesapeake Bay and is part of one coastal stock ranging from Maine to Florida. Menhaden support the largest commercial fishing industry of Chesapeake Bay. How much did you know about menhaden before this survey?

- A lot
- Some
- A little
- Nothing

Page 1 - Question 2 - Choice - One Answer (Bullets)

The most recent scientific assessment of the population indicates that Atlantic menhaden are not overfished and overfishing is not occurring on a coastwide basis; however, scientific knowledge supporting these complex issues is limited. How concerned are you about overfishing of menhaden?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not at all concerned
- Don't know

Page 2 - Question 3 - Choice - One Answer (Bullets)

Menhaden is harvested for bait or processed by “reduction” into fish meal and fish oil. Fish meal is used as feed for livestock, poultry, and farm-raised fish. Soybean and flaxseed meal is a substitute but the protein in fish meal is especially valuable for livestock, poultry, and aquaculture feeds. How important do you think it is to use menhaden to make fish meal for animal feed?

- Very important
- Somewhat important
- Not too important
- Not at all important
- Don't know

Page 2 - Question 4 - Choice - One Answer (Bullets)

Fish oil containing omega-3 fatty acids is now increasingly used as a human health supplement. Soybean and flaxseed oil are substitutes but the American Heart Association suggests that fish, including menhaden, is the best source of omega-3 fatty acids. How important do you think it is to use menhaden to make fish oil for human health supplements?

- Very important
- Somewhat important
- Not too important
- Not at all important
- Don't know

Page 3 - Question 5 - Choice - One Answer (Bullets)

Menhaden is used by recreational fishermen as bait or chum and by commercial fishermen as bait for American lobster, blue crabs, and crawfish. There are bait and chum substitutes but many recreational and commercial fishermen prefer menhaden. How important do you think it is to use menhaden for bait and chum?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

Page 3 - Question 6 - Choice - One Answer (Bullets)

As a forage species, menhaden is a significant part of the diet of predators like striped bass, other game fish and sea birds. There is concern that the harvesting of menhaden removes the food of these predators. How concerned are you about the impact of menhaden harvesting on game fish and sea birds?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

Page 4 - Question 7 - Choice - One Answer (Bullets)

There is concern that the harvesting of menhaden affects their total population living in Chesapeake Bay. And there is concern that there are too few juvenile fish to support the ecosystem health of the Bay. How concerned are you about the impact of menhaden harvesting on ecosystem health?

- Very concerned
- Somewhat concerned

- Not too concerned
- Not concerned at all
- Don't know

Page 4 - Question 8 - Choice - One Answer (Bullets)

Various recreational fishing and environmental associations have expressed concern that the reduced levels of menhaden may negatively affect the water quality of Chesapeake Bay. The most recent research indicates there is little, if any, relationship between the population of menhaden and water quality. How concerned are you about the impact of menhaden harvesting on water quality?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

Page 5 - Heading

Please answer the next set of questions about management of the menhaden commercial fishing industry.

Page 5 - Question 9 - Choice - One Answer (Bullets)

The menhaden commercial fishing industry is managed by each state under the direction of the Atlantic States Marine Fisheries Commission. Historically, menhaden catches from Chesapeake Bay have varied widely: from about 50,000 to 170,000 tons. This equals 10% to 75% of the coastwide catch of menhaden. How much did you know about the management of the menhaden commercial fishing industry before this survey?

- A lot
- Some
- A little
- Nothing

Page 5 - Question 10 - Choice - One Answer (Bullets)

Virginia is the only Atlantic coastal state with an active "reduction" fishery. Virginia vessels also harvest menhaden along the North Carolina coast and in the ocean along the coasts of Maryland, Delaware, and New Jersey beyond three miles from shore. Currently, Chesapeake Bay catches by the Virginia fishery are capped at roughly 100,000 tons per year through 2013. Since the cap was instituted, the total Chesapeake Bay catch by Virginia vessels has been below the cap. How concerned are you about overfishing of menhaden in Chesapeake Bay?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not at all concerned
- Don't know

The Virginia “reduction” fishery and related processing activities employ about 10% of the Northumberland County, Virginia workforce. In 2008:

The industry had total sales of approximately \$60 million.

Gross earnings by individuals working the boats and the plant were about \$11 million.

Average income for 300 fishermen and plant workers, which includes management, was about \$38,000, compared with average earnings of about \$27,000 per worker in the county.

Expenditures to support harvesting and processing activities, which generate both state and local taxes, were about \$19 million.

How important do you think the menhaden commercial fishing industry is to the Virginia economy?

- Very important
- Somewhat important
- Not too important
- Not at all important
- Don't know

The next two questions are about when you were born.

[Mandatory]

In what year were you born? (enter the last two digits of the year; e.g., if you were born in 1958, enter 58)

19

[Mandatory]

In what month were you born?

- January [Skip to 8]
- February [Skip to 28]
- March [Skip to 24]
- April [Skip to 20]
- May [Skip to 14]
- June [Skip to 26]
- July [Skip to 18]
- August [Skip to 12]
- September [Skip to 22]
- October [Skip to 30]
- November [Skip to 10]
- December [Skip to 16]

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 32]
- Against [Skip to 39]
- Don't know [Skip to 39]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$30 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$30 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 33]
- Against [Skip to 38]
- Don't know [Skip to 38]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$60 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$60 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 34]
- Against [Skip to 37]
- Don't know [Skip to 37]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 10% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 10% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$90 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$90 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 35]
- Against [Skip to 36]
- Don't know [Skip to 36]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 50% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 50% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$30 million, wages and salaries paid to fishermen and processor employees by about \$5.7 million, employment by 150 individuals and taxes paid to Virginia by approximately \$1.7 million. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 32]
- Against [Skip to 39]
- Don't know [Skip to 39]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 50% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 50% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$30 million, wages and salaries paid to fishermen and processor employees by about \$5.7 million, employment by 150 individuals and taxes paid to Virginia by approximately \$1.7 million. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$30 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$30 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 33]
- Against [Skip to 38]
- Don't know [Skip to 38]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 50% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 50% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$30 million, wages and salaries paid to fishermen and processor employees by about \$5.7 million, employment by 150 individuals and taxes paid to Virginia by approximately \$1.7 million. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$60 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$60 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 34]
- Against [Skip to 37]
- Don't know [Skip to 37]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach to decrease the harvest of the commercial menhaden fishing industry by 50% in Chesapeake Bay.

To decrease the harvest of the menhaden “reduction” fishery in the Bay by 50% will require more rigorous monitoring. This approach could decrease the total sales of menhaden by about \$30 million, wages and salaries paid to fishermen and processor employees by about \$5.7 million, employment by 150 individuals and taxes paid to Virginia by approximately \$1.7 million. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

There is some chance that a decrease in allowable Chesapeake Bay harvest will increase the stocks of game fish, bring an increase in sea birds and possibly improve the overall health of the ecosystem. How likely do you think it is that this outcome will be achieved?

- Very likely
- Somewhat likely
- Not too likely
- Not at all likely
- Don't know

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$90 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$90 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 35]
- Against [Skip to 36]
- Don't know [Skip to 36]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach that would maintain the commercial menhaden fishing industry in the Chesapeake Bay.

An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring of menhaden catch as well as game fish, sea birds and water quality. How important do you think it is to monitor menhaden catch, game fish, sea birds and water quality?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

Suppose that without the monitoring program the menhaden harvest would be reduced by 10%. The reduced harvest could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

The monitoring program is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and Maryland voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail. The monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10% and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 32]
- Against [Skip to 39]
- Don't know [Skip to 39]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach that would maintain the commercial menhaden fishing industry in the Chesapeake Bay.

An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring of menhaden catch as well as game fish, sea birds and water quality. How important do you think it is to monitor menhaden catch, game fish, sea birds and water quality?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

Suppose that without the monitoring program the menhaden harvest would be reduced by 10%. The reduced harvest could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

The monitoring program is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$30 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and Maryland voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$30 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail. The monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10% and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 33]
- Against [Skip to 38]
- Don't know [Skip to 38]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach that would maintain the commercial menhaden fishing industry in the Chesapeake Bay.

An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring of menhaden catch as well as game fish, sea birds and water quality. How important do you think it is to monitor menhaden catch, game fish, sea birds and water quality?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

Suppose that without the monitoring program the menhaden harvest would be reduced by 10%. The reduced harvest could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

The monitoring program is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$60 in higher state taxes each year for the next 10 years.

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and Maryland voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$60 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail. The monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10% and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 34]
- Against [Skip to 37]
- Don't know [Skip to 37]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

Now we describe a management approach that would maintain the commercial menhaden fishing industry in the Chesapeake Bay.

An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring of menhaden catch as well as game fish, sea birds and water quality. How important do you think it is to monitor menhaden catch, game fish, sea birds and water quality?

- Very important
- Somewhat important
- Not too important
- Not important at all
- Don't know

Suppose that without the monitoring program the menhaden harvest would be reduced by 10%. The reduced harvest could decrease the total sales of menhaden by about \$6 million, wages and salaries paid to fishermen and processor employees by about \$1.1 million, employment by 30 individuals, and taxes paid to Virginia by approximately \$340,000. The impact on the Maryland economy would be minimal. How concerned are you about the decrease of menhaden harvest on the Virginia economy?

- Very concerned
- Somewhat concerned
- Not too concerned
- Not concerned at all
- Don't know

The monitoring program is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$90 in higher state taxes each year for the next 10 years.

[Mandatory]

Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and Maryland voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$90 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail. The monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10% and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

- For [Skip to 35]
- Against [Skip to 36]
- Don't know [Skip to 36]

[Mandatory]

How sure are you about your vote on the proposal?

- Very sure
- Somewhat sure
- Not too sure
- Not sure at all

[Mandatory]

Suppose that a typical household would instead pay about \$30. Would you vote for or against the proposal?

- For [Skip to 33]
- Against [Skip to 40]
- Don't know [Skip to 40]

Suppose that a typical household would instead pay about \$60. Would you vote for or against the proposal?

- For [Skip to 34]
- Against [Skip to 40]
- Don't know [Skip to 40]

Suppose that a typical household would instead pay about \$90. Would you vote for or against the proposal?

- For [Skip to 35]
- Against [Skip to 40]
- Don't know [Skip to 40]

Suppose that a typical household would instead pay more than \$90. What is the highest dollar amount that you be willing to pay before you voted against the proposal?

- Dollars

[Skip Unconditionally to 40]

Suppose that a typical household would instead pay about \$60. Would you vote for or against the proposal?

- For [Skip to 40]
- Against [Skip to 37]
- Don't know [Skip to 37]

Suppose that a typical household would instead pay about \$30. Would you vote for or against the proposal?

- For [Skip to 40]
- Against [Skip to 38]
- Don't know [Skip to 38]

Suppose that a typical household would instead pay about \$10. Would you vote for or against the proposal?

- For [Skip to 40]
- Against [Skip to 39]
- Don't know [Skip to 39]

Would you be willing to pay as little as \$1 in taxes for the proposal?

- Yes
- No
- Don't know

Next, we would like to ask some questions about your recreation activities.

Are you currently a member of any commercial, recreational, environmental or conservation organization or association?

Yes

No

Are you currently employed in commercial fishing or a related industry?

Yes

No

For the next several questions, when we say “Bay” we are referring to Chesapeake Bay or a stream or river that flows into the Bay.

[Mandatory]

About how far is it from your home to the Bay?

Miles

[Mandatory]

Have you ever visited the Bay for the main purpose of outdoor recreation?

Yes

No [Skip to 43]

What type of activities did you participate in during your visits to the Bay? (check all that apply)

Fishing

Hunting

Beach Going

Boating

Nature Observation

Camping

Hiking

Bird / Wildlife Photography

Bird / Wildlife Watching

Other

Page 42 - Question 75 - Open Ended - One or More Lines with Prompt

About how many trips did you make from your home to the Bay for the main purpose of outdoor recreation during the past 12 months?

Trips

Page 42 - Question 76 - Open Ended - One or More Lines with Prompt

About how many of these were day trips where you returned to your home on the same day that you left?

Day trips

Page 43 - Heading

Finally, we would like to ask some questions about you and your household. These questions will help us analyze the results of this study. Your answers will be kept strictly anonymous.

Page 43 - Question 77 - Open Ended - One or More Lines with Prompt

How many people, including yourself, normally live in your household?

People

Page 43 - Question 78 - Open Ended - One or More Lines with Prompt

How many of these people are under the age of 18?

People

Page 43 - Question 79 - Choice - One Answer (Bullets)

Are you male or female?

Male

Female

Page 44 - Heading

These are a few questions about where you live.

Page 44 - Question 80 - Choice - One Answer (Bullets)

Do you live in Virginia or Maryland?

Virginia

Maryland

Page 44 - Question 81 - Open Ended - One or More Lines with Prompt

What county or independent city do you live in?

County

Independent city

Page 44 - Question 82 - Open Ended - One Line

What is your current zip code?

What is the highest degree or level of school that you have completed?

- Less than 9th grade
- 9th to 12th grade, no diploma
- High school graduate (includes equivalency)
- Some college, no degree
- Associate degree
- Bachelor's degree
- Graduate or professional degree

What is your household's total annual income before taxes?

- Less than \$10,000
- \$10,000 to \$14,999
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 or more

Is there anything else you would like to tell us about your interest in menhaden?

Thank You Page

Screen Out Page

Over Quota Page

Survey Closed Page

(Standard – Zoomerang branding)

7.0 Estimating Willingness to Pay for Policies Related to Menhaden Harvests

For many public projects it is useful to know the strength preferences for or against the project weighted in terms of the amount of income that individuals would relinquish to prevent or to implement the project. This is the essence of benefit-cost analysis. It applies to projects that provide objective services to individuals—water supply, flood protection or improvements in air quality. It applies even to situations where there are no objective services, such as the preservation of national monuments. In this case, individuals enjoy the services passively. In a minor way this also applies to menhaden harvests. In this case, households would have preferences on policies towards menhaden harvests because of the impacts of these harvests. Benefit-analysis formally states that if the total amount of income all proponents are willing to pay to obtain a project exceeds the total amount of income all opposed would pay to prevent the same project, the project is considered socially worthwhile.

Benefit cost analysis is a means of adding up preferences to arrive at a choice of public policy. In many cases, many cases, a project can be deemed worthwhile, but many people will be unhappy with the outcome. That will be the case with menhaden management, because people who favor protecting menhaden and those who would be willing to pay to reduce menhaden harvests have prefer opposing outcomes. Both groups cannot be satisfied with the same policy.

Economists have devised approaches for measuring the gains or losses in income that would compensate individuals for changes in public policies. One approach that applies especially well to cases like household preferences for menhaden harvests is known as contingent valuation. This is a direct valuation approach in which households are given information about the provision of a public good and then asked whether they would be willing to pay a randomly assigned amount of money to obtain the public good.¹⁵⁰ Contingent valuation has been applied thousands of times around the world, often resulting in very large estimates of willingness to pay that have influenced policies or payments. For example, Exxon paid over a billion dollars for natural resources damages based on a contingent valuation study of the willingness to pay by households in the lower 48 states to prevent oil spills in Alaska.

The strength of this procedure rests on the robustness of scientific evidence of the impact of menhaden harvests. For example, if households falsely believe that menhaden harvests have no harmful effect on some ecological services of the Bay, and state high willingness to pay for maintaining menhaden harvests they have been misinformed. Such willingness to pay would not be a basis for resource reallocation, because if maintained, menhaden harvests might actually have a deleterious effect, resulting in a different outcome

¹⁵⁰See Haab and McConnell *Valuing Environmental and Natural Resources*, Elgar 2003 for background on the material in this chapter.

from that for which households had expressed a preference. When the scientific evidence in support of different policies lacks robustness, discretion should be exercised in employing willingness to pay estimates to change harvest policies.

The contingent valuation approach works in the menhaden harvesting case by presenting scenarios for maintaining the menhaden harvest and for reducing it. Because of the controversy surrounding the management of menhaden, the structure of any stated choice or contingent valuation question is especially delicate. That is, some respondents could be expected to support a program that would reduce menhaden harvest, while others would favor a program that protected the harvest of menhaden. This controversy gives rise to a novel application of contingent valuation. We develop two scenarios for policies towards menhaden. One called ‘*Decrease*’ is a policy to reduce the harvest of menhaden and one called ‘*Maintain*’ is designed to keep the harvests at their current levels. The scenarios describe the consequences of policies, given the best scientific knowledge. Some respondents are offered the opportunity to support maintaining the menhaden harvest through by paying a tax to support monitoring when others are offered the opportunity to decrease the menhaden harvest by also paying a tax. And since we did not know before the responses to the questions are provided whether a respondent would favor reducing menhaden harvest or sustaining the harvest, the scenarios were assigned randomly to respondents to avoid selection effects. The survey was conducted in three modes: internet, phone, and mail. Each mode has a means of randomly assigning the ‘decrease’ or ‘maintain’ scenario. These are described earlier in the previous chapter.

The basic model for the responses of the contingent valuation scenarios is based on a simple linear utility function:

$$u(y - tax, z, T, c) = b_T(z) + a(y - T \times tax) + c_T$$

Where $T = 1$ when the policy scenario (decrease or maintain) is implemented and $T = 0$ when the scenario is not implemented. The utility function depends on y , household income, tax , the tax that is paid to implement the scenario, z , selected household characteristics. Given this model, the probability of responding ‘yes’ to a question requiring the household to pay the tax would be

$$\begin{aligned} Prob(yes) &= Prob(u(y - tax, z, 1, c) > u(y, z, 0, c)) \\ &= Prob(b_1(z) + a(y - tax) + c_1 > b_0(z) + ay + c_0) \end{aligned}$$

Assuming that the c_T for $T=0,1$ are standard extreme value distributed, this function can be estimated with a logit model:

$$Prob(yes) = 1/(1 + \exp(b(z) - a \cdot tax))$$

where $b(z) = b_1(z) - b_0(z)$. While we have estimated a logit model, similar results result when the original unobserved portion of preferences is distributed normally.

The two scenarios, taken verbatim from the instrument, are as follows:

‘Decrease’:

The program for enforcing the restriction on catch and monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about [tax] in higher state taxes each year for the next 10 years. Suppose that the proposal is put to a referendum vote. If a majority of all households in Virginia and in Maryland voted for the proposal it would pass, the menhaden harvest would be decreased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all households in Virginia and Maryland voted against the proposal then it would fail, commercial fishing of menhaden would remain at current levels and it would cost you nothing. If the vote were held today, would you vote for or against the proposal to lower the harvest of menhaden?

‘Maintenance’:

Now I'm going to describe a management approach that would maintain the commercial menhaden fishing industry in Chesapeake Bay. An option for maintaining the allowable harvest of menhaden at current levels would be to increase the scientific knowledge about how the menhaden population impacts game fish, seabirds and water quality. This would require more scientific monitoring. How important do you think it is to monitor the menhaden catch, game fish, sea birds, and water quality?

The monitoring is costly and will require additional state taxes. We estimate that a typical Virginia and Maryland household would pay about \$10 in higher state taxes each year for the next 10 years. Suppose that the proposal is put to a referendum vote. If a majority of all Virginia and Maryland households voted for the proposal it would pass, scientific monitoring would be increased and you would have about \$10 less to spend each year for the next 10 years. If a majority of all Virginia and Maryland households voted against the proposal then it would fail, the monitoring program would not be implemented, the allowable menhaden harvest would be reduced by 10%, and it would cost you nothing. If the vote were held today would you vote for or against the proposal?

The full text for these questions can be found in the section the instruments.

Both questions permit the following responses:

- (1) For
- (2) Against
- (3) Don't Know / Refused

After these responses, the respondents are asked how certain they are in their answers. The measure of certainty has been shown in various experiments to reduce hypothetical bias.

=====

certainty Certainty About Proposal Vote

=====

How sure are you about your vote on the proposal?

(1) Very sure

(2) Somewhat sure

(3) Not too sure

(4) Not at all sure

(Missing) Don't Know / Refused

The dataset for estimating this model was constructed from the full three sets in the following way:

1. The mail survey responses were deleted.
2. Individuals report age greater than 90 were deleted, due to anomalies.
3. Respondents who report not knowing, to the yes-no vote, their votes are assumed to be no.
4. If respondents state that they are not too sure or not at all sure of their vote, their votes assumed to be no.
5. If respondents state that they would not pay at least \$1 for the program, their votes are deleted. This follows because we know that they won't pay any reasonable amount for the program. It's a way of identifying respondents with zero or negative willingness to pay.

The mail survey responses were eliminated because they failed to pass the most basic test of a negative response to a higher tax. This is the most basic requirement for a contingent valuation survey. It is not surprising, because the mail format for this form of a contingent valuation instrument is forbidding in size and complexity.

The full survey contained 2013 responses. Of these, 877 were deleted because they were part of the mail survey or answered that they were not willing to pay at least \$1 for a policy. Additional observations were deleted for respondents over 90 and for missing values. This leads to a model estimated with 1129 observations. As noted, the mail responses were deleted because a separate analysis lead to the conclusion that respondents were not considering the payment they would be required to make.

Although many models can be estimated from the available data, the random assignment of bids makes it plausible to estimate the simplest model:

$$u(y - tax, maintain) = -a \cdot tax + b_1 + b_2 maintain + c \quad (7.1)$$

The model constructed is meant to capture the variability of tastes. By and large, different covariates will not result in differences in mean willingness to pay for the two policy scenarios because of the random assignment of bids. A model with a series of different covariates might be useful, for example, to understand the impact of state of residence, gender, or other socioeconomics. It would not, however, have an impact on mean willingness to pay.

These variables are given in the table below

Table 7.1. Descriptions of Variables Used in the Estimated Model

<i>Variable</i>	<i>Description</i>	<i>Mean</i>
Vote	Yes =1, no = 0 for policy scenario	0.49
Tax	Amount of tax paid to obtain policy scenario	\$49.60

Table 7.2. Parameters for Discrete Choice Model for Menhaden Policy Scenarios

	Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
	Intercept	1	0.5537	0.1228	20.3413	<.0001
<.0001	tax	1	-0.0122	0.00203	36.2356	
	maintain	1	0.2937	0.1274	5.3127	0.0212

Using the parameter estimates given above, we can calculate willingness to pay for the different combinations of covariates. The expression for willingness to pay for the estimated model is

$$Ewtp(maintain) = (b_0 + b_1 maintain)/a \quad (7.2)$$

This expectation holds for the individuals included in the regression. However, the issue of whether all respondents would be willing to pay a positive amount must be addressed.

In the discrete choice contingent valuation literature a critical issue is whether the willingness to pay for a policy scenario can be negative. In many circumstances, a negative willingness to pay would not make sense. In the current application, however, it is wise to anticipate negative values because the scenarios are randomly assigned. An individual who would prefer to decrease menhaden harvest might be asked what whether he or she would pay \$10 to prevent menhaden harvest from declining. The answer would certainly be no, even at low values of the tax. When we have direct evidence that individuals are not willing to pay even a very small amount, we exclude them from the analysis.

In this case, there are systematic deletions for those individuals who would not pay at least \$1. In this context, where the two programs, *Maintain* and *Decrease*, are competing, it is reasonable to assume that those individuals would have a non-negative willingness to pay for the alternative program. That is, if these respondents would not pay \$1 for the *Maintain* program through random assignment of the scenarios, then we would exclude this proportion of the respondents from the estimate of willingness to pay. Consequently, we take the following approach to calculation of the willingness to pay across the population of users in the states of Maryland and Virginia. Calculating the expected willingness to pay for either the *Maintain* or *Decrease* scenario, we have

$$Ewtp = E(wtp|wtp > 0) \cdot P(wtp > 0) + E(wtp|wtp \leq 0) \cdot P(wtp \leq 0) \quad (7.3)$$

When respondents prefer the *Maintain* scenario, their willingness to pay will be non-negative. Consequently, we can ignore the second term above when calculating the willingness to pay scenario. When we consider the two programs complements of one another, the second term can be ignored, because one or other of the programs is assumed to be adopted. Hence, we will need only

$$Ewtp = E(wtp|wtp > 0) \cdot P(wtp > 0) \quad (7.4)$$

The first term in the right hand side can be obtained from the estimate based on equation (7.2) above. The expected willingness to pay, conditional on being positive, will have some randomness due to the randomness of parameter estimates, which we will deal with separately. To complete the expression we need the probability that willingness to pay will be positive. We can use the following probabilities:

$$\Pr(wtp > 0) = 1 - \Pr(wtp \leq 0)$$

We then calculate the probability $\Pr(wtp \leq 0)$ from the discrete choice contingent valuation question as $\Pr(wtp \leq 0) = \Pr(\text{no to } \$1 | \text{vote} = 0) \Pr(\text{vote} = 0)$. When *vote* is equal to zero, a respondent has registered a ‘no’ on the willingness to pay a given tax. The respondents who stated ‘no’ are then given a series of discrete willingness to pay questions, ending with a willingness to pay \$1 tax. If they do not respond ‘yes’ to the \$1 tax, then we assume that their willingness to pay is non-positive. These observations will be excluded from the analysis.¹⁵¹ We are now in a position to calculate

$$\Pr(wtp > 0) = 1 - \Pr(\text{no to } \$1 | \text{vote} = 0) \Pr(\text{vote} = 0).$$

We do these calculations for the ‘*Maintain*’ and ‘*Decrease*’ scenarios.

¹⁵¹ These non-positive responses are excluded from the analysis. In principle, they might be shifted to the alternative scenario—that is, those who would not pay for the ‘*Maintain*’ scenario would be attributed the mean willingness to pay for the ‘*Decrease*’ scenario. However, we lack sufficient information to take this second step.

Table 7.3 gives the probabilities, taken from the survey, and the estimated willingness to pay, based on the parameters in Table 7.2.

Table 7.3: Components of Willingness to Pay

Scenario	$E(wtp/wtp > 0)$	$Pr(vote = 0)$	$Pr('no' to \$1 vote = 0)$	$Pr(wtp > 0)$	$Ewtp$
Decrease	\$45	0.52	0.72	0.63	\$28
Maintain	\$70	0.44	0.66	0.71	\$50

These parameters are used to calculate the willingness to pay for the representative person in the sample used in the model. However, this sample includes only individuals who are assumed to have some positive willingness to pay. To get the unconditional willingness to pay, we estimate the proportion of the affected population that would have a positive willingness to pay, given in equation (7.4). The final column provides the estimate of the unconditional willingness to pay for the two programs, after correcting for the proportion of the population that would be willing to pay. In effect, it is taken only over those who have positive willingness to pay. For example, we can interpret the \$28 as the mean willingness to pay across all members of the appropriate population to decrease the menhaden harvest. The models were applied randomly with equal probability of having received either scenario.

Given the estimates in the last column, we can calculate the net gains from implementing the 'Maintain' program. This would amount to the gains per household times the number of households less the losses per household times the number of households. Letting the estimates in Table 7.3 refer to households, and taking an approximate number of households as 2.9 million in Virginia and 2.1 million in Maryland, we have a total of 5 million households. And we assume that the scenarios are complementary in the following sense: for the 'Decrease' scenario, the status quo is the 'Maintain', and vice versa. That means that the mean gain for 'Maintain' is \$50 per household, but this is accompanied by a mean loss of \$28 per household. What we have however, from the survey responses is a preference expressed in monetary terms for the 'Maintain' scenario. We add gains and losses across all households amounting to 5 million*(50-28) = \$110 million. Given our interpretation of the scenarios, the gainers would value the 'Maintain' scenario by \$250 million and the losers would value their losses at \$140 million. If the gainers could compensate the losers, the program would be worthwhile.

These estimates of aggregate benefits from the different programs rely on the contingent valuation exercises we have undertaken. There are various reasons to interpret these results cautiously. First, the estimates themselves are not exact. The uncertainty is not easily quantified. Second, our valuation of the scenarios assumes that preferences are independent. That is, respondents, to the extent that they have well formed preferences, care about the management of menhaden. However, in controversial and contentious cases of resource allocation, preferences may evolve such that not only does one side of the issue

value its own management program, but it may also incur 'negative' value if the opposing side gets its way. This phenomenon would most likely occur for those individuals who are active in the lobbying for their programs. The proportion of these individuals is probably quite small relative to the total number of interested individuals. Third, the strength of the results rests on the scientific evidence. We have presented the respondents with the best evidence we could provide. Weaknesses in this evidence will undermine the economic assessment of preferences.

8.0 Summary and Conclusions

8.1 The Beginning and Purpose of Study

The Atlantic menhaden fishery, and subsequently, its controversy appear to have their origins in the early 1600s when an Indian named Tisquantum, or Squanto, advised the Pilgrims on how to use menhaden as fertilizer. There is some question as to whether or not he suggested menhaden as fertilizer to embarrass the Pilgrims or simply to help them. In the 1700s and on up to the 1970s, menhaden were consumed by humans as food and used to produce fertilizer and oil. Menhaden were once even marketed as canned sardines. In 1811, however, menhaden began to be successfully harvested and processed into oil for a wide variety of uses. The harvesting of menhaden, even during the 1800s, was not without controversy. An 1888 article in the New York Times summarized an effort by conservationists and recreational anglers to prohibit the harvesting of menhaden by net in Raritan Bay, New York. The opposition to harvesting menhaden was based on many of the same arguments today—harvesting menhaden affected water quality and the populations of predators.

Fast-forward to today, and we find that the controversy about menhaden not only still exists but has greatly intensified. Until recently, however, the controversy was primarily focused on the fact that one company in Reedville, Virginia, OMEGA Protein, was the only company harvesting menhaden and the primary purpose of harvest was reduction into meal, oils, and soluble. In the past two years, the debate about the harvesting of menhaden has expanded to include the bait fisheries of the Atlantic states, which have expanded to make up for the reductions in the supply of herring as bait for use in the lobster and other fisheries. Presently, every coastal state of the Northwest Atlantic has some type of regulation either limiting or prohibiting the harvested of menhaden for reduction purposes or by purse seine in their coastal waters. Massachusetts, Virginia, New York, and North Carolina are the only states which either permit harvesting for reduction or by purse seine.

Recreational anglers and various conservation associations have long been concerned about the harvesting of menhaden in Chesapeake Bay. Their concerns include the fact that menhaden are filter feeders, and overharvesting menhaden could affect water quality and the fact that menhaden are forage fish for various predators, such as striped bass, weakfish, speckled trout, bluefish, and various marine mammals. Presently, menhaden harvest levels by the reduction fishery are restricted to 109.0 thousand metric tons in the Bay with no restrictions on the coastal ocean resource. In addition, the fishery is regulated by both spatial and temporal restrictions.

The fishery is believed to be important to the social and economic well being of Northumberland County, and in particular, Reedville, VA. This importance, however, has not been quantified. As a consequence, the Virginia Marine Resources Commission

requested a study be done by the Virginia Institute of Marine Science of the social and economic importance of the fishery to Chesapeake Bay region. The emphasis of the study was to document how reducing the Bay quota might affect the social well being and economies of the region and to determine the economic value of menhaden in the region. Alternatively, does the menhaden resource generate more benefits from the fishery or from the ecological services it provides to the various Bay resources?

8.2 Study Methodology

The assessment of the social and economic importance of the menhaden resource was based on analysis: (1) input-output or economic impact analysis; (2) development of county profiles and limited interviews with employees of OMEGA; (3) a financial simulator model which facilitated an assessment of how different Bay-wide quotas would affect economic returns and output or sales, income, and employment in the Maryland and Virginia region; and (4) an economic valuation based on contingent valuation which estimated the economic value to stakeholders of the region of maintaining the status quo (retaining the current Bay-wide quota) or reducing the Bay-wide quota. The valuation, however, required an extensive survey of stakeholders in the region.

The economic impact model was based on information provided by OMEGA on costs, earnings, production, and employment. IMPLAN, which is a widely used software platform to conduct economic impact analysis, was used to develop the impact model. The model permitted estimation of changes in sales, income, and employment associated with different levels of Bay-wide quotas. The model was based on the 2008 version of IMPLAN, the most current version.

The community profiles were developed utilizing mostly secondary sources of data for all Bay-based counties in the region. Profiles were developed for 16 Maryland counties and 26 Virginia counties. Many of the profiles were based on information provided by the US Bureau of Census for the year 2000. Additional information, when available, was also used to develop the county profiles. The profiles provide a background and overview of the county or city, and information on location, transportation, demographics, education, employment, income, and housing.

The financial simulator model was developed using information provided by OMEGA, which facilitated development of algorithms to assess how costs, earnings, and economic impacts might change in response to different Bay-wide quotas. The simulator was based on 2008 costs and earnings data for OMEGA. The model is deterministic and based on mathematical rather than statistical relationships. The model considers Bay and coastal ocean landings as observed over time and reported to the Atlantic States Marine Fisheries Commission (ASMFC). Thus, as the Bay-wide quota is reduced below reported Bay landings, it is assumed that OMEGA will increase its harvest in the coastal ocean but

not in excess of what has been observed. The simulator considers landings for calendar years 2007 through 2010.

The more difficult, and perhaps the most important, analysis was the economic valuation or estimation of economic benefits of how society values the fishery vs. the ecosystem services of the resource. This required an extensive survey of stakeholders in the region. The survey questionnaire was developed and different versions were field tested 23 times. A critical issue was to develop a questionnaire that minimized bias either in support of the fishery or in support of reducing the harvest. Subsequently, a professional survey company was contracted to conduct the survey. The survey followed modern survey procedures for non-response by follow ups. The survey was conducted via mail, telephone, and Internet. Although numerous questions about Bay use and opinions about the resource were asked, the critical question focused on willingness to pay to maintain the harvest or reduce the allowable harvest levels. The reductions ranged from 10 to 50 %. A detailed summary of responses, survey methodology, and survey instruments is contained in Chapter VI.

Data from the survey were used to estimate willingness to pay by Virginia vs. Maryland stakeholders, as well as by gender. Estimation was based on a standard contingent valuation model, which is a discrete choice model in which utility is specified as a function of variables believed to influence values individuals placed on either maintaining the status quo or reducing the allowable Bay-wide harvest of menhaden. It was necessary, however, to conduct a comprehensive Monte Carlo analysis and the Krinsky-Rob approach to estimate willingness to pay because of limited responses.

8.3 Overview of Results

The major objective of this study was to assess the social and economic importance of the menhaden resource to stakeholders of Chesapeake Bay region. Emphasis was given to the potential economic impacts of reducing the Bay quota of 109,020 metric tons, and to the value individuals place on the fishery versus the ecological goods and services of menhaden. Which communities or counties that might be affected by reductions in the Bay quota is also of concern.

The fishery operates out of Reedville, Virginia, which is in Northumberland County. A complete closure of the fishery would result in the loss of 519 jobs in Maryland and Virginia, and 347 jobs in Northumberland County. One major problem of assessing changes in the Bay quota is determining how OMEGA would respond relative to the coastal ocean exploitation of menhaden. We considered several options, which ranged 85.0 to 0.0 thousand metric tons. Assuming the industry harvests 56.1 thousand metric tons from the coastal ocean, which was the reported level for 2008, gross profits were estimated to range from \$26.1 million to \$7.3 million. A quota of 85.0 thousand metric tons would reduce total sales, income, and employment from, respectively, \$88.2 to \$81.9 million,

\$22.8 to \$21.8 million, and 510 to 482 jobs. A Bay quota of 0.0 metric tons, with no change in the 2008 level of coastal ocean harvest, reduces total output, income, and jobs for the region to \$35.0 million, \$9.0 million, and 206 jobs. The economic impact on Northumberland would be reductions in sales, income, and jobs to \$31.3 million in sales, \$7.7 million in income, and 171 jobs. At a total allowable harvest level of only 56.1 thousand metric tons, however, total sales would be inadequate to cover total costs.

Overall, the economic impact assessment indicates that the Bay quota could be reduced to at least 85.0 thousand metric tons with no appreciable economic impacts. The economic impacts associated with quotas below 85.0 thousand metric tons would vary depending upon how the fishery responded and the availability and abundance of menhaden in the coastal ocean. Reductions in the availability or abundance of the resource or spatial changes in the resource could result in substantial reductions in profitability and sales, income, and employment. These changes, however, would depend upon how the industry responded to such changes. Overall, the economy of Northumberland County would be the most affected by a closure of the fishery. A closure of the reduction operation would reduce total output and employment, respectively, by 14.3 % and 8.1 % relative to 2008 levels of economic activity in Northumberland County.

While economic impacts are important for examining the ramifications of changes in the quota, the more important issue is how does society value menhaden as an ecological resource versus the fishery? That is, does society place a higher preference or value on the ecological goods and services of menhaden or on the menhaden fishery? To address this question, a contingent valuation survey was designed and implemented under a professional services contract with a survey firm. The survey was conducted via mail, telephone, and Internet and allowed respondents the option of paying different dollar amounts per year per household. The dollar amounts equaled \$10.0, \$30.0, \$60.0, and \$90.0 per household. Individuals were asked to express their willingness to pay to maintain the status quo or the current Bay quota levels versus reducing the Bay-wide quota.

Individuals expressed a strong preference for maintaining the status quo or not reducing the quota. The expected value or mean willingness to pay or value per household equaled \$50.0 to maintain the status quo versus \$28.0 to reduce the harvest. When estimated for all individuals of the region, the total gross willingness to pay or gross benefit equaled \$250.0 million to maintain the status quo versus \$140.0 million to reduce the Bay quota. Considering those who prefer the status quo versus those desiring a reduction, we have a net gain of \$110.0 million for maintaining the status quo.

The result that society preferred to maintain the status quo was unexpected. The expected result was that society would have a strong preference to reduce the allowable Bay quota. Possible reasons for the preferences include a growing sympathy with watermen, an ailing economy and desire by individuals to prevent additional unemployment, and an inadequate understanding of the potential ecological goods and services of menhaden.

There is no doubt that Northumberland County would be the most affected region or county by a closure of the fishery or substantial reductions in the allowable quota. The extent of the social impacts, however remain unknown. Only a limited number of interviews with plant employees were conducted, which was inadequate to draw large-scale conclusions. A previous unpublished study by Kirkley (1997) involved a survey of the two reduction companies in existence at the time—1997. In that study, most respondents indicated they would simply find other jobs either in the County or nearby. A small number indicated they would probably move to another region. Almost all, however, indicated they would have a difficult time finding other work at or near the same pay level and with similar benefits. In this study, the researcher conducting the social impact assessment interviewed only 12 OMEGA employees before resigning. All indicated happiness with their job and stated they would find other work in the event of a closure of the fishery, but not likely at the same pay level with the same benefits.

Reference

- Ahrenholz, DW 1991. "Population biology and life history of the North American menhadens, Brevoortia spp. Marine Fisheries Review [MAR. FISH. REV.]. Vol. 53, no. 4, pp. 3-19. 1991.
- ASMFC 2001. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Menhaden. Fishery Management Report No. 37, Atlantic States Marine Fisheries Commission, Washington, D.C.
- ASMFC 2004. Addendum I to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Menhaden. Atlantic States Marine Fisheries Commission, Washington, D.C.
- ASMFC 2006 Stock assessment report for Atlantic menhaden. Atlantic States Marine Fisheries Commission, Washington, D.C.
- ASMFC 2010. Atlantic menhaden stock assessment and review panel reports. Atlantic States Marine Fisheries Commission, Stock Assessment Report 10-02. Atlantic States Marine Fisheries Commission. Washington, D.C.
- Dillman, Don A., Jolene D. Smyth, Leah Melani Christian 2009. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. John Wiley & Sons, Inc. Hoboken, N.J., 499 pp.
- ECO Northwest 2009. Economic Arguments for Protecting the Natural Resources of the East Buttes Area in Southeast Portland. Prepared for the Bureau of Environmental Services.
- Frye, John 1978. The men all singing: The story of menhaden fishing. Donning, Norfolk, Va.
- Garrity-Blake, Barbara J. 1994. The Fish Factory. The University of Tennessee Press, Knoxville, Tennessee.
- Goode, George Brown, and W.O. Atwater 1880. "A History of the Menhaden with an Account of the Agricultural Uses of Fish." Orange Judd Company, 245 Broadway, New York.
- Kirkley, James 1997. "Virginia's Commercial Fishing Industry: Its Economic Performance and Contributions." Virginia Institute of Marine Science, School of Marine Science, College of William & Mary.
- Latrobe, B. H. 1802. A drawing and description of the *Clupea tyrannus* and *Oniscus praegustator*. Transactions of the American Philosophical Society v. 5: 77-81, Pl. 1.
- Lanier, T. C. 1985. "Menhaden: Soybean of the Sea." Univ. N.C. Sea Grant Pub!. 85-02,24 p.
- Lynch, Patrick D., Mark J. Brush, Elizabeth D. Condon, Robert J. Latour 2010. "Net Removal of Nitrogen through Ingestion of Phytoplankton by Atlantic Menhaden Brevoortia Tyrannus in Chesapeake Bay." Mar. Ecol. Prog. Ser., 401:195-209.
- National Marine Fisheries Service 2010. Commercial Landings. Office of Sustainable Fisheries, 1315 East West Highway, Silver Spring, MD.
- New York Times 1888.
- Turrentine, J.W. 1913. The Menhaden Industry. Ind. Eng. Chem., 5(5): 378-388.
- Wharton, J. 1957. The Bounty of the Chesapeake. Fishing in Colonial Virginia. University Press of Virginia, Charlottesville, Virginia.