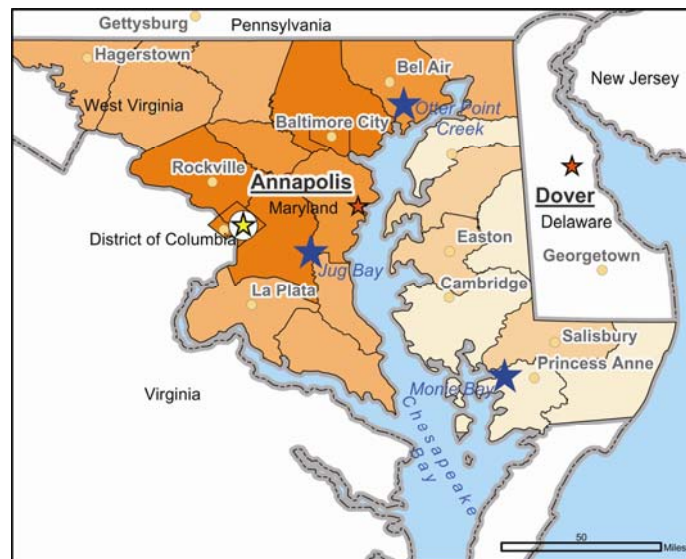


# Chesapeake Bay, MD National Estuarine Research Reserve

## Community Characterization



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for NOAA Coastal Services Center

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## A. Introduction

The Chesapeake Bay, MD National Estuarine Research Reserve (NERR) is composed of three distinct sites: Otter Point Creek in Harford County, Jug Bay in Calvert County, and Monie Bay in Somerset County (see Figure 1). These three sites are distinguishable in terms of geography, area, biophysical conditions, socioeconomic and demographic characteristics, and governance arrangements. Thus, while the Reserve site is complex and potentially difficult to interpret, it also provides a formidable opportunity to learn about estuarine management in complex human-dominated ecosystems.

This site was selected as a case study for this project because it falls along a trajectory from small, rural site to densely populated urban site. All three of the Chesapeake Bay NERR sites are within 100 miles of major centers of population (Baltimore, MD and Washington, DC). However, they are differentially influenced by these urban areas.

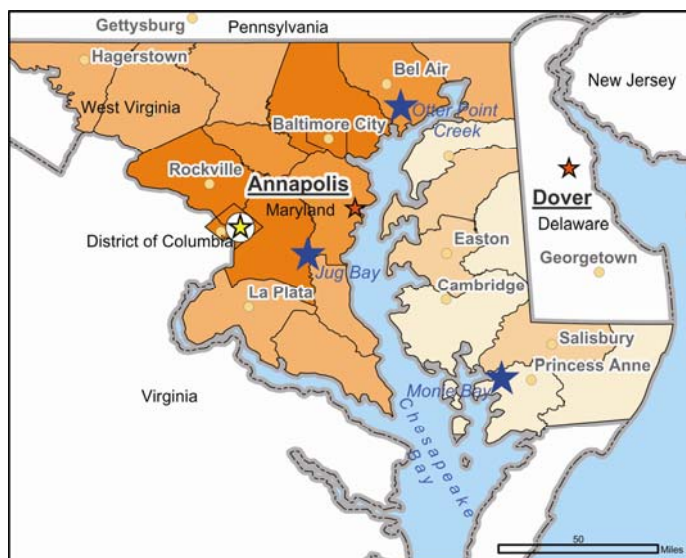


Figure 1. Map of Chesapeake Bay, MD NERR sites

## B. Site Description and Needs Assessment

On April 14, 2005, an informal focus group was conducted with representatives of the Chesapeake Bay National Estuarine Research Reserve, and several of its partner organizations. This meeting took place at Jug Bay Reserve, which is located within the Patuxent River State Park. Attendees included 3 representatives of the Patuxent River State Park/MD Department of Natural Resources, MD Seagrant, and the National Oceanic

and Atmospheric Administration. Combined, this group has a comprehensive understanding of the management issues faced by the Reserve, as well as opportunities to address them.

The primary issues identified fell into three categories, one having to do with the complexity of managing a Research Reserve composed of three sites, another with the complex social systems within which they operate, and finally the heavy level of visitor use as it affects the Jug Bay and Otter Point Creek sites in particular. Specifically, visitor use is increasing at Jug Bay, and includes problems associated with all terrain vehicles, high-speed watercraft, trash dumping, keeping dogs on leashes, and unauthorized uses of the eight miles of trails on the site.

The focus group participants felt that the reserve could benefit from a variety of socioeconomic analyses. These include:

- 1) documenting and analyzing visitor use in order to get a stronger sense of the catchment from which all three sites attract visitors;
- 2) conducting an organizational analysis to improve coordination among the many partners of the Reserve. This would serve to reduce redundancy, overlap, and reinventing the wheel;
- 3) having a better understanding of the communities around the reserve sites would allow managers to reach out more effectively to different existing and potential user groups;
- 4) identifying how the Chesapeake Bay, MD NERR fits into the broader organizational community around the Chesapeake Bay, with specific emphasis on understanding how it can distinguish itself among the many voices speaking to issues regarding the Chesapeake Bay. From research to recreation to outreach and education, the CB NERR is only one of literally hundreds of organizations with compatible missions, mandates, and activities. What makes it different?

This document does not fully address all of these issues. It contributes to improved understanding of the communities around the reserve sites, and provides guidance in terms of how to move forward in addressing the issues identified.

### C. Community Characterization

This document characterizes, at a broad scale, socioeconomic conditions of communities around the three sites. Information for these summaries was derived primarily from the 2000 decennial census, which was downloaded and displayed on a series of maps. The maps are included in this community characterization; each sheet includes text interpreting the findings at different scales for the variable it depicts, including state/county, and region/locale around the Reserve.

The maps present data on a subset of variables in the human ecosystem framework (Machlis et al., 1997): under Biophysical Resources, *energy*; under Socioeconomic Resources, *population, labor, and capital*; under Social Cycles, *institutional cycles*; under Social Order, *age, class, power, wealth*. Figure 2, below, shows the indicators selected for each of these variables, as well as the map sheet on which they are represented. Here, synthesis is intended to detect and present relationships among the variables shown on the maps.

Figure 2.

<b>Variable</b>	<b>Indicator and/or Measure</b>	<b>Sheet Number</b>
Population	Number of persons per census geography	One
Population	Number of people per square mile	Two
Population	Percent change in total resident population between 1990 and 2000	Three
Age	Median age of total population	Four
Capital	Median household income	Five
Class	Percent skilled and professional workers	Six
Power	Percent of households with income over \$100,000	Seven
Wealth	Percent persons living below poverty line	Eight
Institutional Cycles	Ratio of population <18 to >64 years of age	Nine
Energy	Time traveled to work	Ten
Informal Norms	Percent of households with own children under 18 years living at home, headed by a single parent (male or female)	Eleven

Because the Chesapeake Bay, MD National Estuarine Research Reserve comprises three distinct sites, three community characterizations are presented here. All three sites are represented on each of the maps described in Figure 2. Below, the findings in these maps are summarized by variable for the three sites comprising the Reserve: Otter Point Creek,

Jug Bay, and Monie Bay. The relationships among these variables are then discussed, by site, to provide a synthesis of findings.

Finally, the strengths and weaknesses of this multi-site reserve are discussed in terms of meeting the multiple goals and mandates of the National Estuarine Research Reserve System network. We conclude with suggestions for additional social assessments that might be of use to the managers of this reserve.

## C-1. Population

Population includes both the number of individuals and the number of social groups and cohorts within a social system. It is an important socioeconomic resource as it determines the consumption impacts of people as well as their creative actions. Because development is an important issue at most NERR sites, three indicators of population were measured and mapped for the community characterizations: absolute population, population density, and county-level change in population between 1990 and 2000.

Maryland ranks 19<sup>th</sup> among the states in terms of absolute population; however, it is the sixth most densely populated state with an average of 542 people/square mile in 2000. The counties in the vicinities of the three Chesapeake Bay, MD NERR sites differ dramatically in terms of absolute population: 150,001-250,000 around Otter Point Creek; 250,001-875,000 around Jug Bay, and 45,000-90,000 around Monie Bay.

### I. Otter Point Creek

The populations of the counties around the Otter Point Creek site range from 150-001 to 250,000 people. However, nearby Baltimore City and County have populations approaching 800,000 people each. County level population density in the vicinity of Otter Point Creek ranges from 330-8172 people/sq mi. Some census block groups in the area, however, have much higher population densities: up to 11,534 people/sq mi. The population of Harford County, in which the Otter Point Creek site is located, increased by approximately 20% between 1990 and 2000.



## II. Jug Bay

The populations of the census block groups in the Jug Bay area range from 1000-5000 people. However, Washington DC is a mere 20 miles away; and there the population is over 570,000. At the county level, population density in the area around Jug Bay ranges from 330-8172 people/sq mi. The population of Calvert County, in which the Jug Bay site is located, increased by 45% between 1990 and 2000.

## III. Monie Bay

In the region around Monie Bay, the population is relatively sparse. Two centers of population 10 miles away are home to 4000 and 8000 people respectively. Salisbury, with 23,743 people, is 20 miles away, and represents the largest center of population in the Monie Bay region. In the census block groups in the area, population density is less than 562 people/sq mi. The county containing the NERR site, Somerset, grew in population by 5.6% between 1990 and 2000.

## C-2. Age

Age is an important component of social structure for several reasons. Most of human activity is age-dependent. Mining, for example, is an occupation primarily carried out by the young. Certain recreational activities, such as golf, are often associated with the elderly. Age distribution within a community is also an important determinant of social institutions such as education and health care. Likewise, age can be an important factor in political activity and proclivity.

The median age of the people in Maryland, at 36.0 years, is higher than the national median of 33.3 years. This means that half of the people in the state are older than 36.0 years, and half are younger. The counties along and just inland of the western shore of the Chesapeake Bay in MD, including those containing or adjacent both the Otter Point Creek and Jug Bay NERR sites, are at or below the state median. An exception is Baltimore City, where the median age is 37.7.

## I. Otter Point Creek

The census block groups in the area around the Otter Point Creek NERR site are among those with the youngest median age in the vicinity, and

there is a pattern of census block groups with relatively low median ages from the coast directly inland to Belair. This likely indicates that there are many families with young children in the region.

## II. Jug Bay

The census block groups in the area around Jug Bay have median ages of upwards of 38.9 to 41.8 years of age, well above both the national median and state medians. This indicates that there may be relatively few families with children at home in this area.

## III. Monie Bay

Many of the counties along the eastern shore of Maryland display a high median age, up to 43.3 years. These include the two counties in the immediate vicinity of the Monie Bay NERR site. The census block groups in this area mimic this trend, having populations with a median age of 38.9 or higher. The median age decreases toward centers of population.

## C-3. Capital

In the human ecosystem framework, capital is defined as the economic instruments of production; that is, financial resources (money or credit supply), resource values (such as underground oil), and the human ability to manipulate these (human capital). Capital can be measured in a variety of ways; for our purposes, median household income is used to measure capital.

In Maryland's eastern and central counties, the median household income is well above the national median of \$41,994 and the state median of \$52,868. In particular, the counties along Maryland's western shore of the Chesapeake Bay have higher median incomes than other counties in the region.

## I. Otter Point Creek

There is a concentration of wealth in the area around Otter Point Creek, where in some cases the median income is as high as \$150,000. However, areas closer to the coast, and along and south of the I95 corridor, including in of Baltimore City, have median incomes among the lowest in the state.

## II. Jug Bay

Similarly, there is a concentration of wealth in the area around Jug Bay, where again, in some census block groups the median income is \$150,000. This pattern persists for 10 miles in all directions from the Jug Bay site. Median incomes diminish rapidly in the District of Columbia to the west, and there are small pockets of low median income census geographies along the coast to the east of the Reserve.

## III. Monie Bay

In the area around Monie Bay, there is a diversity of median incomes by census block group, ranging from quite low (\$0-31,199) to quite high (\$72,700 and more). However, the majority of census block groups in the area around the Monie Bay site are in the lower two quantiles of the data sets.

## C-4. Class

The term, class, is used in various ways in sociology. It usually implies a group of individuals sharing a common situation within a social structure, usually their shared place in the structure of ownership and control of the means of production (Dictionary of Social Science, <http://bitbucket.icaap.org/dict.pl>).

Class is represented in this work as the percent of the work force who are employed in skilled or professional occupations. These include doctors, lawyers, professors, computer specialists, and so on. In Maryland, 13.7-36.6% by county fall into this category, with highest concentrations located along the western shore of the Chesapeake Bay.

## I. Otter Point Creek

In the area around Otter Point Creek, higher concentrations of professional workers can be detected in areas inland from the Bay's shore, near and in Baltimore City. Some of the census block groups in these areas are home to up to 57% skilled and professional workers, well above the national average of 20%.

## II. Jug Bay

In the area around Jug Bay, higher concentrations of professional workers (35% or more) are scattered throughout the region, increasing in concentration in the suburban regions near the District of Columbia. Some of the census block groups in these areas are home to up to 57% skilled and professional workers, well above the national average of 20%.

## III. Monie Bay

In the area near Monie Bay, higher concentrations of skilled and professional workers tend to cluster in towns such as Salisbury, and diminish in concentration toward the eastern shore of the Chesapeake Bay. The census block groups containing and adjacent to Monie Bay approximate the national average of 20% skilled and professional workers.

## C-5. Power

Power is the ability to alter others' behaviour, either by coercion or deference (Wrong, 1988; Mann, 1984). The powerful, often elites with political or economic power, or both, can have access to resources denied the powerless. Here, we measure power in terms of income, with those having a household income of \$100,000 or more considered to be more powerful than those with lower incomes.

In Maryland, the concentration of households by county with this income level displays a wide range (4.3% to 32.4%). There is a pattern of higher concentration of power in and around the centers of population along the western and northeastern shores of the Chesapeake Bay.

## I. Otter Point Creek

There are high concentrations of power northwest of the Otter Point Creek site, where many census block groups have between 29.5% and 100% households in this range. In particular the areas in Baltimore County near the Baltimore City limit, i.e. the suburban fringe, have very high concentrations of power. In the area immediately surrounding the Otter Point Creek site, this rate diminishes to less than 11% in most census block groups.

## II. Jug Bay

Throughout the locale of the Jug Bay Reserve site, most census block groups are home to 29% or more households having an income of \$100,000 or more. This indicates a concentration of power in the area around this site, and is particularly prominent in the suburban regions around the District of Columbia and the state capitol, Annapolis.

## III. Monie Bay

In the census block groups around Monie Bay, concentrations of powerful households are lower than both the areas along the western shore of the Chesapeake Bay in Maryland, and lower than the national average of 10.9%. Most census block groups in the immediate vicinity of the NERR site have between 5.4% and 10.8% households with incomes over \$100,000. There are higher concentrations in Salisbury.

## C-6. Wealth

Wealth is access to material resources, in the form of natural resources, capital (money) and credit. The distribution of wealth is a central feature of social inequality and has human ecosystem implications: the rich have more life opportunities than the poor. Here, we measure the inverse of wealth by examining poverty rates in the areas around the research reserve sites. The poverty line in the United States is defined as an annual income of \$18,660 or less for a family of four.

In Maryland, there is a wide range of poverty levels, by county, ranging from 0.0-80.0%. Counties with higher poverty levels are those on the eastern and southwestern shores of the Chesapeake Bay.

## I. Otter Point Creek

In the area around Otter Point Creek, high concentrations of poverty are found in Baltimore City and south of the I95 corridor. There are several census block groups with high concentrations of poverty immediately adjacent to the OPC reserve site. In the larger vicinity of the Reserve site, however, the percentage of people living below the poverty line is generally 6.4% or lower.

## II. Jug Bay

In the area around Jug Bay, there are relatively few block groups with high concentrations of poverty, and virtually none immediately adjacent to the Reserve site itself. These block groups have poverty rates of <6.4%. Within the District of Columbia and its Beltway, there are high concentrations of poverty, up to 80% in some census block groups. The same is true of several block groups in the Annapolis region, although the pattern is much less pronounced in this area.

## III. Monie Bay

The area around the Monie Bay Reserve site exhibits varying rates of poverty, ranging from 0.0-3.0% to 17% or more. Most block groups in this area, however, fall into the mid-range: 6.5%-16.9%. The town of Salisbury, however, does have a relatively high concentration of persons living below the poverty line, as compared to the rest of the region around the Monie Bay site.

## C-7. Institutional Cycles

Time is both a fixed resource and a key organizing tool for human behavior. Some cycles may be physiological (such as diurnal patterns); others institutional (permitted hunting seasons). Social cycles, such as the set of collective rhythms within a community or culture that organize its calendar, festivals, harvests, fishing seasons, business days, and so forth, significantly influence the distribution of critical resources.

Institutional cycles are critical to human ecosystem functioning, for they provide guidance and predictability to the ebb and flow of human action. Here, we measure institutional cycles in terms of age distribution, since the relative proportion of children to elderly will influence the need for, flow and use of different resources in a community.

In Maryland, counties with the highest ratios of children to elderly are those along the Potomac River, where the range in ratios is 2.11-3.90. The national average is 2.11.

## I. Otter Point Creek

In the area around Otter Point Creek, the census block groups immediately around the Reserve site exhibit high ratios of children to elderly, in many cases 4.5 and above. This pattern persists along the I95 corridor and inland from it in a northerly direction. In contrast, in those areas closer to the coast, and between OPC and Baltimore City, lower ratios of children to elderly are present.

## II. Jug Bay

The area around Jug Bay displays a southeast to northwest pattern of increasingly high children-elderly ratios. Throughout the region, though, there are relatively high ratios, ranging primarily from 2.11 to 4.49. This trend is particularly prevalent in the suburban areas around the District of Columbia.

## III. Monie Bay

In the Monie Bay region, there are few children compared to elderly in the census block groups surrounding the reserve site, and high ratios in the Salisbury area. Given the high median ages of the population in this areas, this is not an unusual finding.

## C-8. Energy

Energy is the ability to do work or create heat. Energy is a critical natural resource and is tremendously influential on social systems. The energy available to humans “limits what we can do, and influences what we will do” (Cottrell, 1955). Here, we have used commuting time as a proxy measure for energy consumption. Analysis of commuting data from the US census indicated that a majority of the 128.3 million commuters in the United States travel alone by car, and travel for between 15 and 45 minutes to get to work. The percentage of commuters traveling 15-45 minutes by census geography was measured to give a sense of relative energy consumption patterns.

In Maryland, the average percentage of commuters traveling in this timeframe was 49.9% by county. Higher concentrations are detectable in the counties along the Baltimore-Washington corridor – 55.0%-62.6%).

Almost three quarters of Maryland's workforce (73.7%) drive to work alone each day.

### I. Otter Point Creek

In the area around Otter Point Creek, 64.0%-92.5% of commuters are in this category. However, those with the highest rates are located southwest of the Reserve site, close to Baltimore City. Immediately around the Reserve, in particular toward the Bay, 51.5% or fewer commute 15-45 minutes to work. North of Otter Point Creek, there is no clear pattern in this commuting rate.

### II. Jug Bay

In the area around Jug Bay, relatively few commuters (in many census block groups, <45%) fall into the 15-45 minute time-frame. However, this does not necessarily mean that energy consumption is lower in this region, since many people could be commuting more than 45 minutes to work, as well as less than 15 minutes.

### III. Monie Bay

In most census block groups in the area around Monie Bay, 51.2-63.9% of commuters travel 15-45 minutes to get to work. North of the site, this rate increases to 64.0%-92.5%. In the Salisbury area, relatively few people are in this commuting time-frame.

## C-9. Informal Norms

Informal norms are the unwritten, and sometimes unspoken, rules that govern human behaviour. Informal norms are delivered to children as they are socialized; as we age, we continue to acquire expertise regarding structure and function of our social interactions. We are often unaware of informal norms until they have been violated. Here, we measure informal norms by determining the rate of single-parent households. Most single-parent households are, in fact, single-mother households: "Of all custodial parents, 85% were mothers and 15% were fathers" in 2000 (<http://www.parentswithoutpartners.org/Support1.htm>). Informal norms around family structure and composition are changing in North American families.



In Maryland, up to 43.7% of households, by county, are headed by single parents. There is a higher concentration of single-parent households in the counties along the eastern shore of the Chesapeake Bay in Maryland, than on the western shore. However, Baltimore City and County are among those with the highest concentrations of single-parent households

#### I. Otter Point Creek

In the region around Otter Point Creek, the rate of single-parent households is relatively low, particularly at distances from the I95 corridor. There, rates are 13.9% or lower in many cases. Along the I95 corridor the rates are substantially higher (35% or more), both north and south of the Reserve site, and particularly dense in Baltimore City and its immediate environs.

#### II. Jug Bay

In the region around the Jug Bay Reserve site, the rates of single-parent households are relatively low. The most common range in this region is 14.0%-20.2%. These rates increase northwest of the Reserve site, in particular in and around Washington DC, and northeast of the Jug Bay site near Annapolis. There is also a high concentration of single-parent households in the District of Columbia and its immediate environs.

#### III. Monie Bay

The census block groups near Monie Bay are home to either 20.3%-25.7% or 25.8-35.7% single-parent households. These rates are in keeping with the national average of 25.8%. There is one block group in Salisbury with a lower rate of 13.9% or less.

### D. Summary of Findings

#### I. Otter Point Creek

The Otter Point Creek region displays stark contrasts in demographics and socioeconomic characteristics. The region northwest of the Reserve site is quite affluent, educated (as indicated by the concentration of skilled and professional workers), and home to stable families with children at home. The area immediately around the Reserve site, however, is characterized by lower incomes and less skilled and professional workers. The areas

closest to Baltimore City, to the south along the I95 corridor, are quite disadvantaged.

There are a number of implications to this mosaic of demographic and socioeconomic characteristics. First, because the area around the Reserve site is quite densely populated, and home to those of less advantaged status, it is quite likely that the Otter Point Creek Reserve site, as a relatively urbanized park, is or has the potential to be well-used and much valued as a recreational amenity by local people. This can be a tremendous source of support, volunteer activity, and opportunities to teach local ecology to local residents.

However, the upland portions of the Otter Point Creek watershed are separated from the estuary itself by both geographic and socioeconomic barriers, including I95 and a stark contrast in socioeconomic status. Thus, it is unlikely that the upstream communities have as strong ties to the estuary, and possibly the water courses that drain into it, as those living near the Reserve site. This can cause barriers to integrated watershed management, and make it difficult to protect and enhance headwaters in the catchment.

Third, it is also unlikely that the Baltimore City and County areas have strong ties to this system, because of the geographic distance and the likely socioeconomic disconnect between that highly urban area and this region. Despite the likelihood that many residents of the area around Otter Point Creek commute to Baltimore or its environs to work, the social and cultural connection between urban residents and Otter Point Creek may be limited.

There are likely to be socioeconomic, and possibly cultural, hurdles to overcome in the management and fulfillment of the NOAA mandate at Otter Point Creek. However, there are also opportunities to learn how to better manage the watershed and local environment of an urban/suburban estuary. Given the increasing concentration of population along our coastlines across the country, this is arguably a critical role for the National Estuarine Research Reserve System.

## II. Jug Bay

This region displays more homogeneity than the Otter Point Creek site. The locale around the Jug Bay site is characterized by affluence, family stability, and likely a politically influential population. Visitor use management is the most important issue raised regarding this site, which would not be obvious from the socioeconomic characterization using the indicators selected for this exercise.

Home to many professionals, who are likely commuting to the nation's capitol to work, this region provides an opportunity to examine the relationships among power, local resource use and management, and consumption patterns. Often, despite strong environmental values, the affluent consume more resources than the less well-to-do. Likewise, because private land parcels tend to be larger in more affluent areas, individual land management strategies in this region may affect local water chemistry and other biophysical characteristics relatively strongly.

According to staff, the Jug Bay Reserve has a strong core of volunteers. There is an opportunity to examine relationships between socioeconomic status and civil society – the role of volunteers and volunteerism in governance.

## III. Monie Bay

The region of the Monie Bay site of the Chesapeake Bay National Estuarine Research Reserve appears in many ways to be fairly average compared to national numbers. It also seems to be ripe for a demographic and socioeconomic transition, although to what type of community is unclear. There is low population density in many areas of the eastern shore of the Chesapeake Bay, average incidence of single-parent households and poverty rates, and relatively high median age. According to staff at the Reserve, the communities in the area are composed of tight-knit families who have lived in the area for generations. This would not be readily apparent from the data presented in the maps; however, there are some clues that this would be the case.

Distance and water separate the Eastern Shore from the rest of the state, likely rendering it other-worldly in many ways. The general impression of this region is that of a place away from the general busy-ness of urban and suburban regions. It is unlikely to become a bedroom community to

Baltimore or Washington; however, it is also unlikely to substantially benefit economically from these cities either.

#### E. Recommended Future Directions for Related Activities at the Chesapeake Bay, MD National Estuarine Research Reserve

The Chesapeake Bay, MD National Estuarine Research Reserve poses many interesting and challenging issues in regard to the multiple mandates of the Reserve system. Because this Reserve comprises three distinct sites, in three very different types of social systems, its managers are, in effect, in charge of three separate Research Reserves. In essence, this triples their workload, requiring management, research, and education plans for the three distinct locales.

However, because of its variety, it also offers unique opportunities for comparative research in the Chesapeake Bay region. This may be the feature that distinguishes it from the multitude of other organizations studying and working to protect and restore the Bay: because the Reserve is managed by a single, although complex, organizational unit, it can host comparative research into both socioeconomic and biophysical parameters of estuaries through one conduit. This poises this site uniquely to make a significant contribution to urban-rural gradient studies of human-dominated estuarine ecosystems.

#### F. Maps of Socioeconomic Characteristics: Chesapeake Bay, MD National Estuarine Research Reserve

# Map 1: Population

## Human Ecosystem Framework\* Variable: Population

**Indicator / Measure:** Number of People per Census Geography (Census 2000, 100% sample data)

This set of maps depicts absolute population at the state, county, and locale levels of geography. The area of each circle symbol is proportional to the number of people in each county or census block group, and represents the range from the next lowest valued circle to the maximum number indicated; the absolute number of people represented by each circle differs by map.

While MD ranks 19<sup>th</sup> among the states in terms of absolute population (est. Census 2000 pop. 5,296,486), it is the sixth most densely populated (642 people/square mile in 2000) state in the nation, preceded by the District of Columbia, New Jersey, Rhode Island, Massachusetts, and Connecticut. **Nearby Delaware is the 7<sup>th</sup>, and Pennsylvania 11<sup>th</sup>, most densely populated state in the US.**

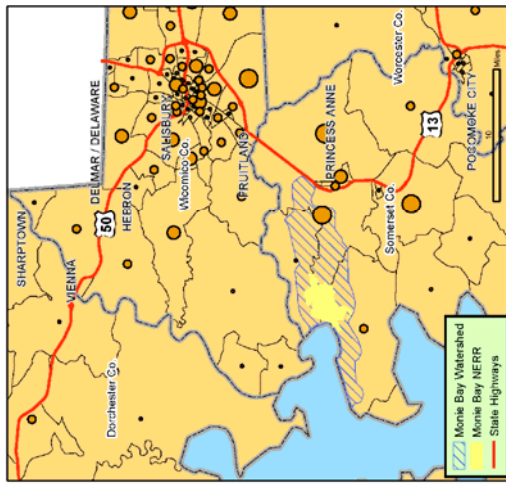
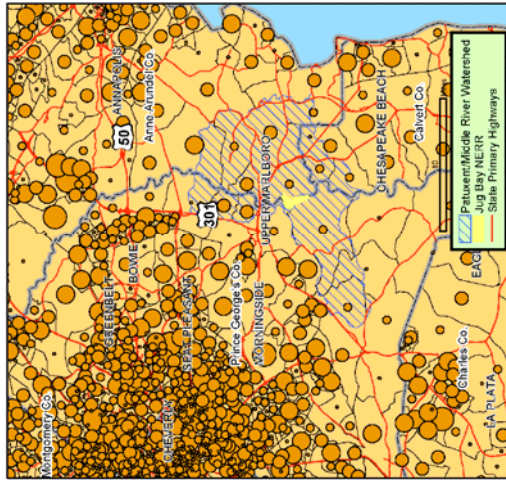
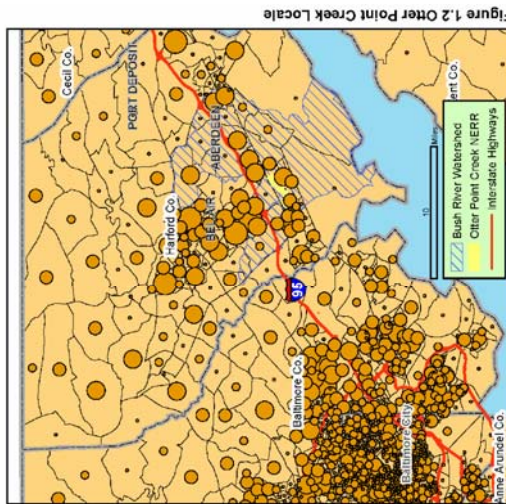
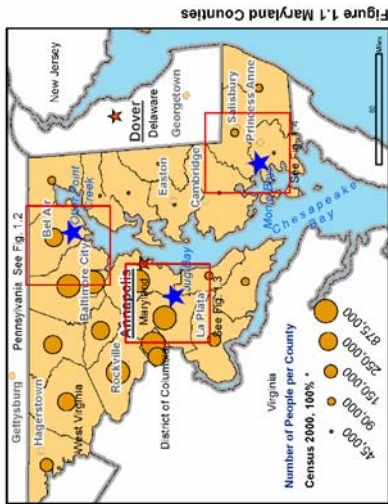
The counties in the vicinities of the three Chesapeake Bay, MD NERR sites differ dramatically in terms of absolute population. 150,001 - 250,000 around Otter Point Creek, 250,001 - 875,000 around Jug Bay, and 45,000 to 80,000 around Monie Bay. All counties on the western side of the MD portion of the Chesapeake Bay shoreline are home to between 250,001 and 875,000 people.

These differences are even more dramatic at the scale of the locales surrounding the Chesapeake Bay NERR sites. Below and its neighboring communities essentially encircle the Otter Point Creek NERR site. County populations are approximately 800,000 people, with a population density of 1,500 people per square mile. Jug Bay NERR site is more remote, being surrounded by some blocks of housing between 1,000 and 1,500 in blocks. However, downtown Washington, DC is a more 2D mile from the Jug Bay Reserve. By contrast, a population center of between 4,000 and 8,800 people is within 10 miles of the Monie Bay Reserve, but beyond that the largest nearby center of population is Salisbury (est. Census 2000 pop. 23,743), approximately 20 miles away.

Number of People per Block Group

Census 2000, 100%	NERR	Annapolis	Baltimore	Bellevue	Dover, DE	Washington, DC
1,000	19	34	20	13	45	55
1,500	36	62	70	20	20	20
2,500	65	87	98	67	81	81
4,000						
8,800						

Table 1.1: Approximate Distance in Miles



**NOM Coastal Services Center**  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Original maps produced in color by Reed Malins, C-Zone Consulting, Ltd. and Steven Dalton, ©1999 NEI, Inc.  
Geography, NOAA Coastal Services Center at <http://www.csc.noaa.gov/mcsc> provides census data and mapping tools.  
\*Mabini, G. E., Fook, J. E. and Breen, W. R., Jr. (2004).  
Map projection: NAD83 equal area

## Case Study: Chesapeake Bay, Maryland NERR

# Map 2: Population Density

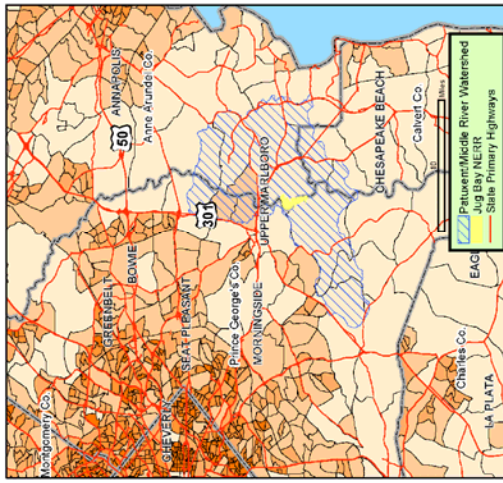
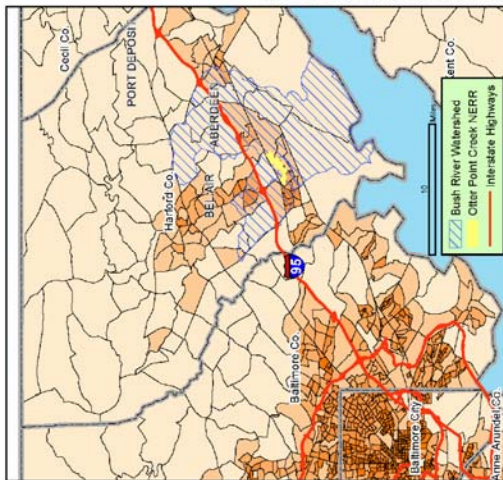
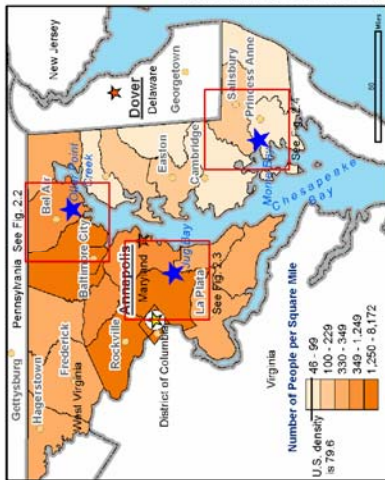
## Human Ecosystem Framework\* Variable: Population

**Indicator:** Density

**Measure:** Number of People per Square Mile (Census 2000, 100% sample data).

The eastern seaboard, from Maryland north, is the most densely populated region in the United States. In many cases densities are upwards of 3,000 people per square mile. According to 2000 Census statistics, the average population density in Maryland was 542 people per square mile, or approximately eight times the national average of 79.6. By county, this figure ranges from as low as 48 to as high as 8,172 people per square mile. In general, population density in Maryland is higher in the center of the state, i.e. the Baltimore-Washington, DC corridor, and lower in the western and eastern counties.

The county level map shows that the population density around the Otter Point Creek and Jug Bay Reserve sites range from 330-8,172 people per square mile, and 48-229 people per square mile around the Monie Bay Reserve site. However, the locale maps indicate a much broader range of population densities: from <582 to as many as 170,680 people per square mile. The population densities of the census block groups directly surrounding the Otter Point Creek Reserve site are as high as 11,543 people per square mile. While the Jug Bay and Monie Bay sites have far lower population densities in their immediate vicinities, the former is within 20 miles of a concentration of block groups among the highest in the region. In all three cases, population densities tend to increase inland of the reserves.



Sheet Two

# Map 3: Population Change

## Human Ecosystem Framework\* Variable: Population



Figure 3.1 US

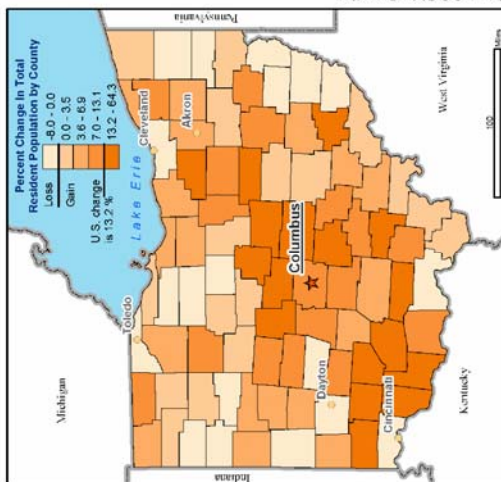


Figure 3.2 Ohio Counties

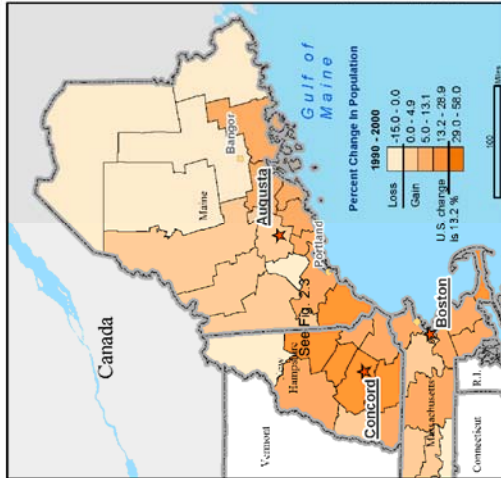


Figure 3.3 Maine Counties

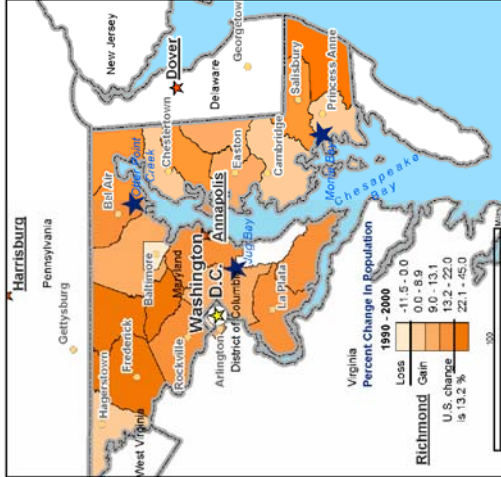


Figure 3.4 Maryland Counties

**Indicator:** Population Change  
**Measure:** Percent Change in Total Resident Population by Census Geography, between 1990 and 2000 (Census 1990, Census 2000, 100% sample data)

Change in population at the national level, by state, varies from a net loss of population of 5.7% (District of Columbia) to an increase of as much as 68.3% (Nevada). All states with the exception of the District of Columbia experienced a net increase in population, although in some cases this increase was marginal. The national average is an increase of 13.2%. There is an obvious pattern of higher rates of population increase in the southern and western states, ranging from 13.2% - 66.3%. The northern and central states show in population less dramatically, between 0.0% and 13.1%.

The population of Ohio grew by 4.7%, Kentucky by 9.7%, Michigan by 6.9%, and West Virginia by 0.8%. In Ohio, counties in the southern and central regions of the state increased in population by between 7.0 and 64.3%. In the counties around the Old Woman Creek NERR site, however, the population actually decreased by 1.3% (Cuyahoga), or grew very little - 3.0% in Erie County, 5.8% in Huron County, and 5.0% in Lorain County.

In Maine, while overall the state experienced an increase in population of 3.8%, there is an obvious decrease in population in the northernmost counties - up to 15% in some cases. The coastal and southern counties in Maine increased in population between 1990 and 2000 by as much as 56.0%. The counties in the vicinity of the Wells NERR are among those with the highest growth rates. The population of York County, where the Wells NERR is located, grew by 13.5%. The population of neighboring Massachusetts increased by 5.8% overall, while New Hampshire grew by 11.4%.

Maryland's population increased by 10.8%; Virginia's by 14.4%, Delaware's by 17.8%, and Pennsylvania's by 3.4%. The increase in population in Maryland, by county, ranged from 0.0% - 45%, with the county where the Jug Bay NERR site is located, Calvert, having the highest growth rate in the state. The populations of nearby Prince George's County grew by 9.9% and Anne Arundel by 14.6%. Baltimore City, near the Otter Point Creek NERR site, lost 11.5% of its population, while surrounding Baltimore County gained 8.9%. Harford County, where the Otter Point Creek site is located, gained 20.0%. The counties in the vicinity of the Monie Bay NERR site experienced a much broader range in population growth: 5.6% (Somerset); 1.2% (Dorchester); 13.9% (Wicomico); 32.8% (Worcester).

# Map 4: Age

## Human Ecosystem Framework\* Variable: Age

**Indicator / Measure:** Median Age of Total Population (Census 2000, 100% sample data)

The median age of the people in Maryland, at 36.0 years, is higher than the national median of 33.3 years. This means that half of the people in the state are older than 36.0 years, and half are younger. The counties along and just inland of the western shore of the Chesapeake Bay in MD, including those containing or adjacent to both the Otter Point Creek and Jug Bay NERR sites, are at or below the state median. An exception is Baltimore County, where the median age is 37.7.

Likewise, many of the counties along the eastern shore of Maryland display a high median age, up to 43.3. These include the two counties in the immediate vicinity of the Monie Bay NERR site, where the median age is between 36.6 and 37.5 years.

The maps of the locales of the three sites indicate that these trends are more pronounced at this scale than at the county level. The census block groups in proximity to Otter Point Creek are among those with the youngest median age in the vicinity, many of those in the Jug Bay area have median ages upwards of 38.9 to 41.8 years of age, and in the area around Monie Bay, those census block groups closest to the Reserve site and closest to the shore are home to populations having a median age of 38.9 or higher.

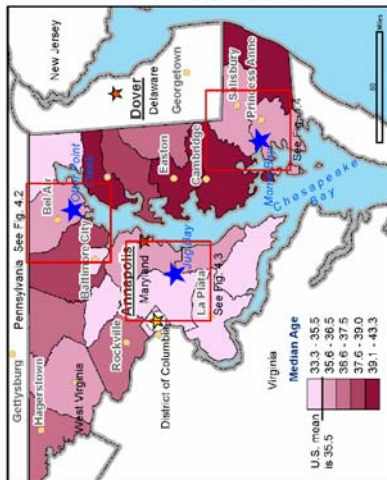


Figure 4.1 Maryland Counties

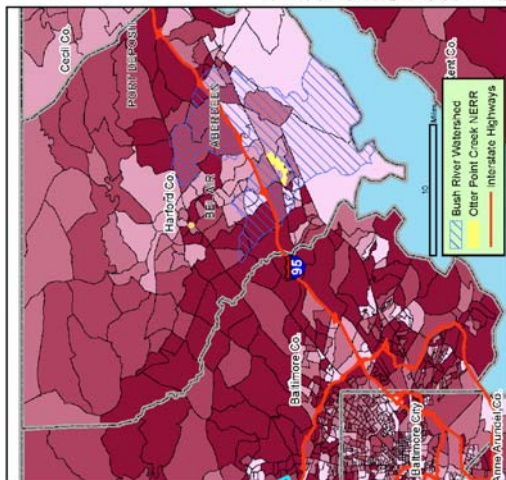


Figure 4.2 Otter Point Creek Locale

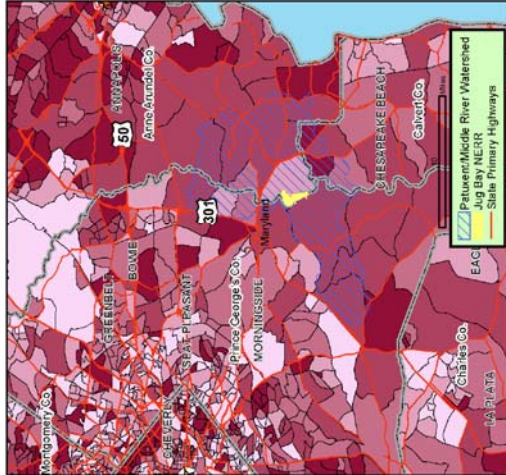


Figure 4.3 Jug Bay Locale

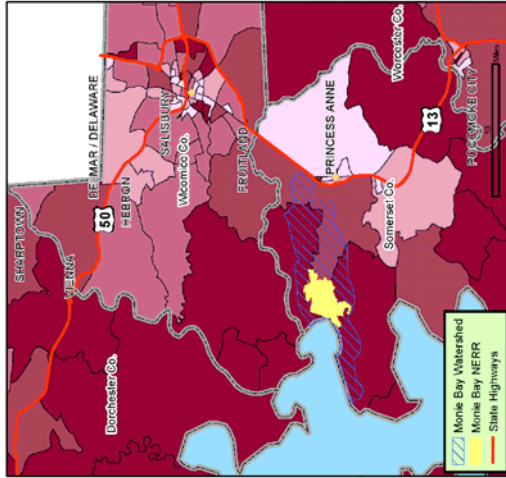


Figure 4.4 Monie Bay Locale



Original maps produced in color by Real Measures, C-Zone Consulting, Ltd. and Steven Dalton, ©1995-1998. Inc. Geographic Information Systems Center at 1501 Wynn Drive, www.csc.noaa.gov/marine provides census data and mapping tools. Map projections: Albers Equal Area.

## Case Study: Chesapeake Bay, Maryland NERR



# Map 5: Capital

## Human Ecosystem Framework\* Variable: Capital

**Indicator / Measure:** Median Household Income (Census 2000, 100% sample data)

The median household income in the United States is just under \$42,000. This means that half the households in the country earn more than this amount and half less. In many states in the northeastern and southwestern US, the median household income is substantially higher than the national median. In the southern states, the opposite is true. With a median income of \$52,868, Maryland is an affluent state.

In Maryland's eastern and central counties, the median household income is well above the national median of \$41,954 and the state median of \$52,868 (Census 2000). In particular, the counties along Maryland's western shore of the Chesapeake Bay have higher median incomes than other counties in this region.

There is a concentration of wealth in the regions around both the Outer Point Creek and Jug Bay Reserve sites, where in some cases the median household income is as high as \$150,000. The differences in median household income were detected through a more detailed analysis of the block group data; the details are not depicted on these maps. In the area around Monte Bay, there is more diversity in median income levels, particularly in the census block groups that compose the town of Salisbury.

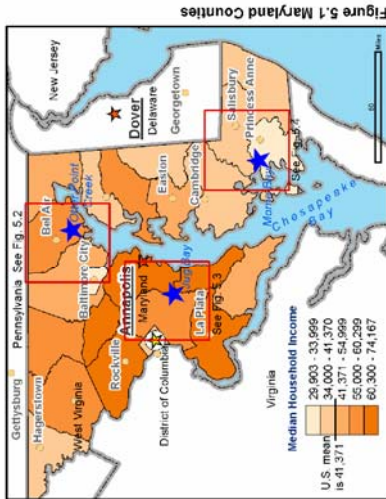


Figure 5.1 Maryland Counties

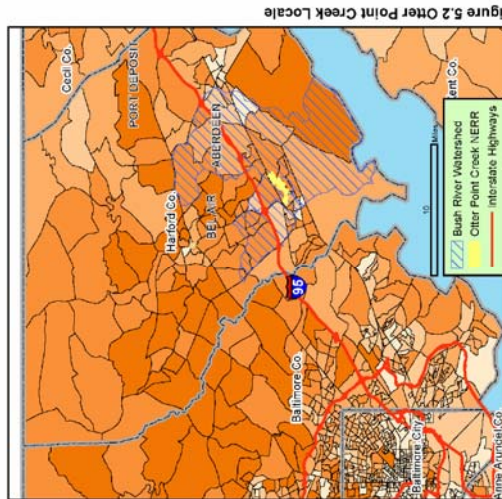


Figure 5.2 Outer Point Creek Locale

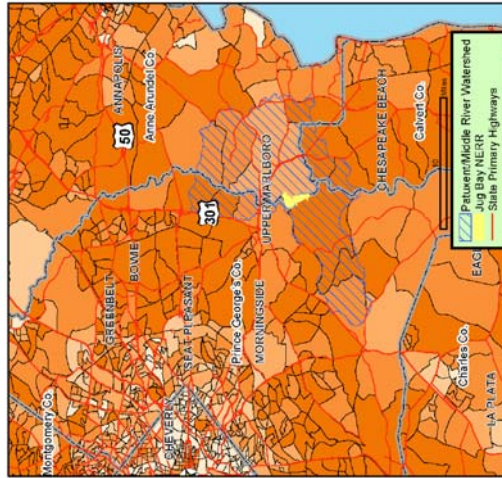


Figure 5.3 Jug Bay Locale

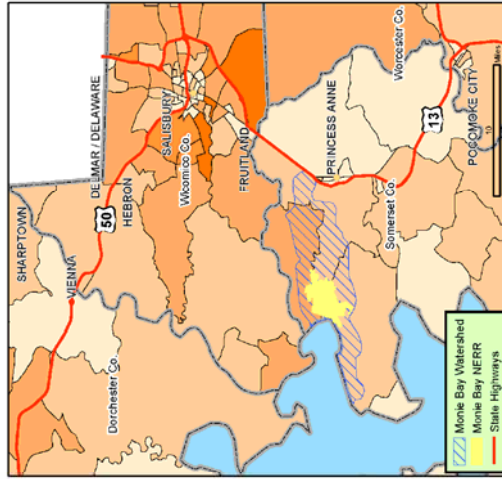


Figure 5.4 Monte Bay Locale

Sheet Five

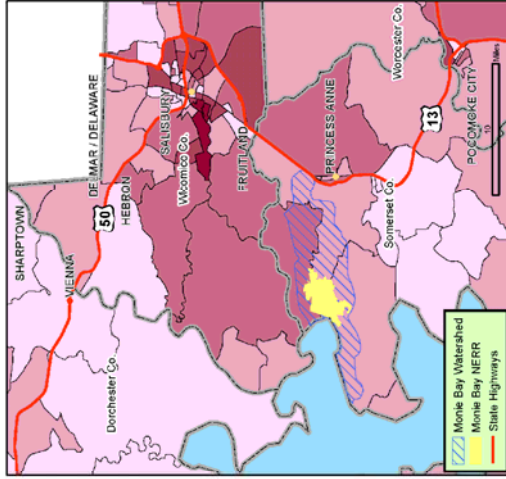
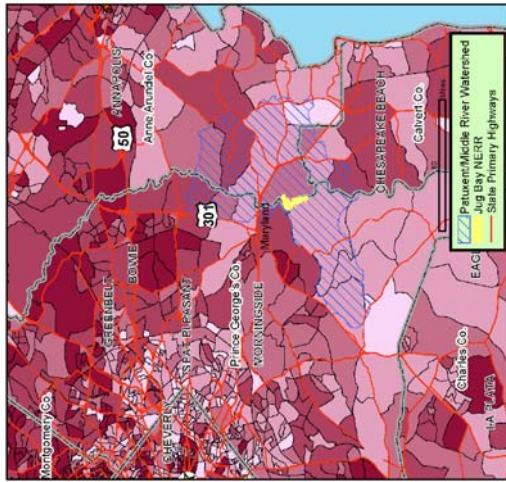
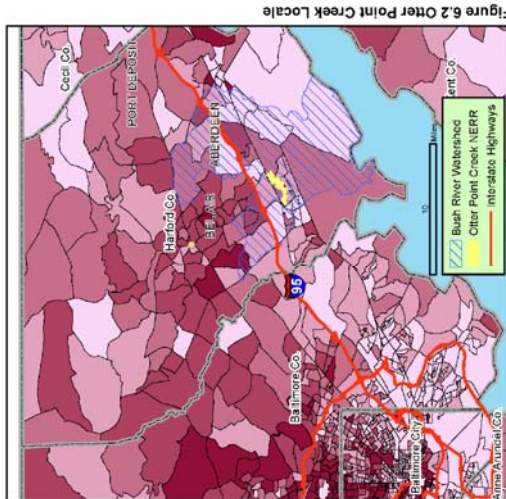
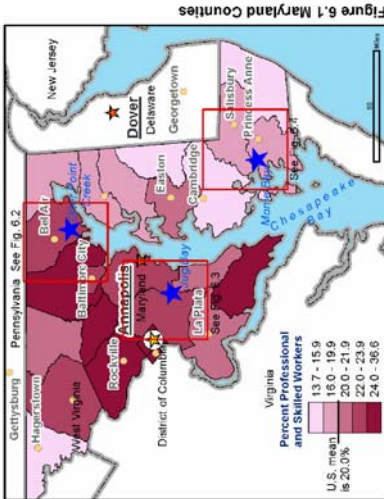
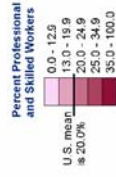
# Map 6: Class

## Human Ecosystem Framework\* Variable: Class

**Indicator / Measure:** Percent Professional and Skilled Workers (Census 2000, 100% sample data)

This set of maps depicts the percentage of people in the workforce who are employed in professional or skilled occupations. Broadly, these include doctors, lawyers, professors, computer specialists, etc. In the United States, between 14.2% and 32.3% of the workforce by state is employed in professional/skilled occupations, with most states on the higher end close to 25%, and an overall national average of 19.9%.

In Maryland, these percentages range from 13.7% to 36.6%, with a concentration of professional and skilled workers in coastal block groups along the western shoreline of the Chesapeake Bay. In the locales surrounding the Otter Point Creek and Jug Bay Reserve sites, however, higher concentrations of skilled and professional workers can be detected in the areas upland of the Bay's shore, and either approaching or beyond the borders of Baltimore and Washington, DC. In fact, some census block groups in these areas have up to 57% skilled and professional workers, well above the national mean of 20%. By contrast, in the area near Montie Bay, higher concentrations of skilled and professional workers tend to cluster in towns such as Salisbury, and diminish toward the eastern shore of the Bay.



Sheet Six

Data Source: U.S. Census Data Bureau, Census 2000  
 \*Map projection: Albers equal area  
 Original maps produced in color  
 \*Map by G. E. Foster, Jr. and Dawn, Wm. R., Jr. (2004)

# Map 7: Power

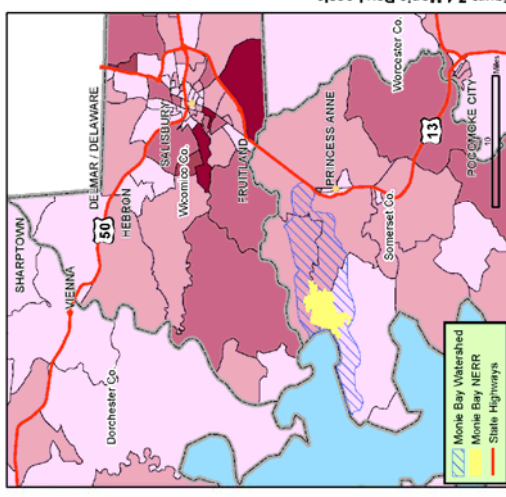
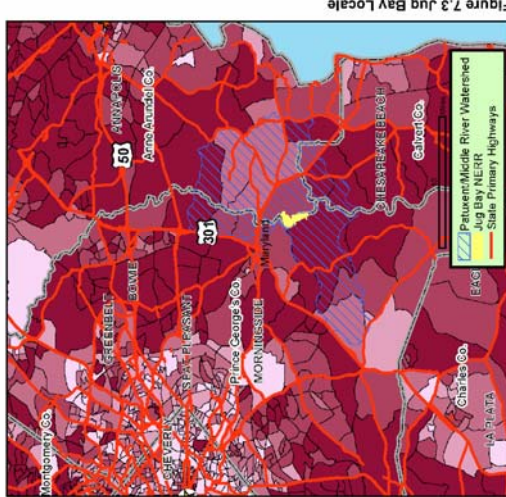
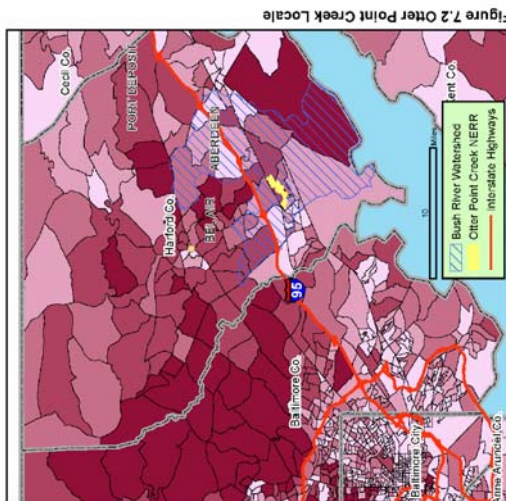
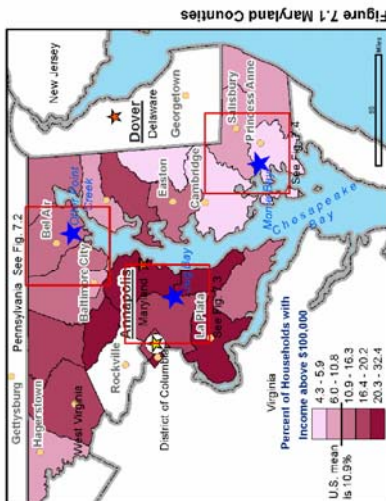
## Human Ecosystem Framework\* Variable: Power

**Indicator / Measure:** Percent of Households with Income above \$100,000 (Census 2000, 100% sample data)

Power can be defined as the ability to influence the allocation and distribution of resources, and is often associated with one's financial status. In these maps, power is displayed as a function of income, with those households earning \$100,000/year or more considered to be more influential than those of lower income. At the national level, power is concentrated on our coasts, in particular the northeast. The national average is 10.9% of households in this annual income range.

In Maryland, the concentration of households by county with this income level displays a wider range (4.3%-32.4%) than the national data (5.0%-21.5%), with a pattern of higher concentration of power in and around the centers of population in the counties along the western and northeastern shores of the Chesapeake Bay.

The locales around the three Chesapeake Bay, Maryland NERR sites display a range of concentrations of power: there are high concentrations of household income above \$100,000 throughout the locale of the Jug Bay site, as well as to the northwest of the Otter Point Creek (OPC) site. Immediately adjacent to and southwest of OPC, however, there are lower concentrations of power (although in many cases still higher than the national average of 10.9%). The census block groups immediately surrounding Monie Bay have still lower concentrations of power, with higher levels in nearby Salisbury.



Sheet Seven

# Map 8: Wealth

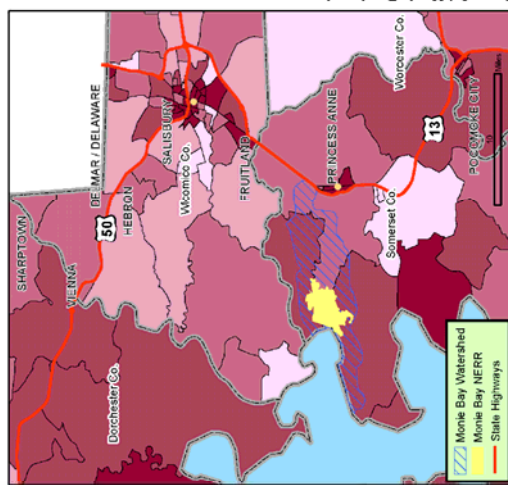
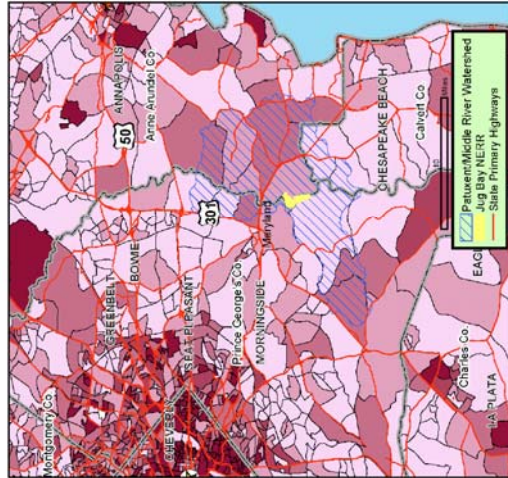
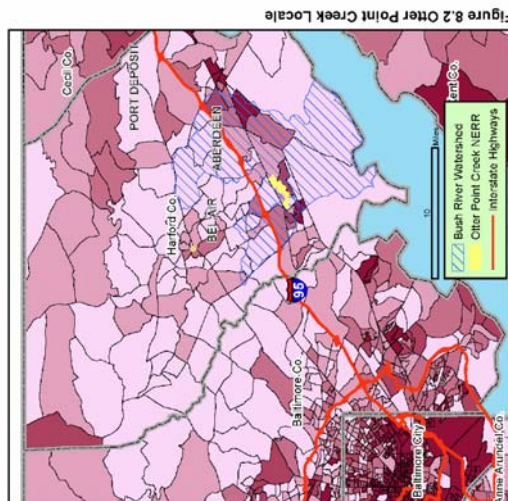
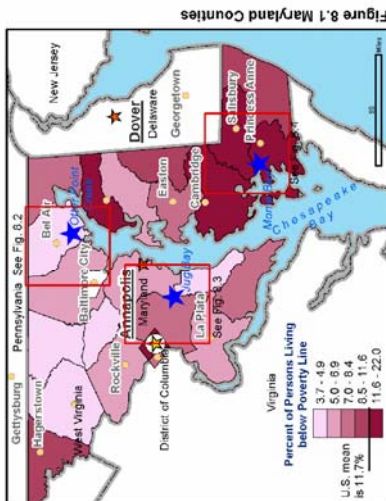
## Human Ecosystem Framework\* Variable: Wealth

Indicator: Poverty Rate

Measure: Percent of Persons Living below Poverty Line (Census 2000, 100% sample data)

Nearly 36 million people in the United States are living below the poverty line, defined as an annual income of \$18,660 or less for a family of four. In most of the southern states, 14.3%-19.3% of the population are living below the official poverty line. In Maryland, there is a wide range of poverty levels, by county, ranging from 0.0%-80.0%. Higher poverty levels are detectable at the county level on the eastern and southwestern shores of the Chesapeake Bay.

In the locales surrounding the two western NERR sites, Otter Point Creek (OPC) and Jug Bay, high concentrations of poverty are found in Baltimore and Washington DC. There is a pattern of relatively high concentrations of poverty south of 38° in the vicinity of OPC, including coastal areas between Baltimore and OPC. No similar pattern is detectable at Jug Bay. In the census block groups along the eastern shore of the Chesapeake Bay in Maryland, there are high rates of poverty along the coast (17% and up), as well as in centers of population.



Sheet Eight

## Case Study: Chesapeake Bay, Maryland NERR

Original maps produced in color by Reed McCann, Co-Zone Consulting, Ltd. and Shawn Dalton, 815002 MB, Inc. Digitized by NOAA Coastal Services Center at the University of Maryland. NOAA Coastal Services Center at the University of Maryland provides census data and mapping tools. \*Mauck, G. E., Foose, J.E. and Burch, Wm. R., Jr. (2004) Map Projections: Modern practice

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# Map 9: Institutional Cycles

## Human Ecosystem Framework\* Variable: Institutional Cycles

**Indicator:** Age Distribution

**Measure:** Ratio: Population Age <18 to Age > 64 (Census 2000, 100% sample data)

Institutional cycles are influenced by the relative distribution of age within a population. These maps display the ratio of young persons (age <18) to the elderly (age >64) by census geography. In the southwest United States, there is a relatively high ratio of young people to older people, ranging from 2.31 to 5.5; in the northeast and central states, the ratio is lower, ranging from 1.3 to 1.93. The national average is 2.11.

In Maryland, counties with the highest ratios tend to be those along the Potomac River, where the range in ratios is 2.11-3.90. On the eastern shore of the Chesapeake Bay, the ratios are lower, ranging from 1.00-2.10.

In the census block groups surrounding the three reserve sites, patterns tend to be much less clear. In the area around Otter Point Creek, there are generally higher ratios of children to elderly in the census block groups from northwest to northeast of the Reserve site. Lower ratios are more prevalent to the south of the Reserve site. In the area surrounding Jug Bay, there are in general higher ratios of children to elderly throughout. There are much lower ratios of children to elderly in the coastal census block groups in the area around the Montie Bay NERR site, with higher ratios in the centers of population in that area.

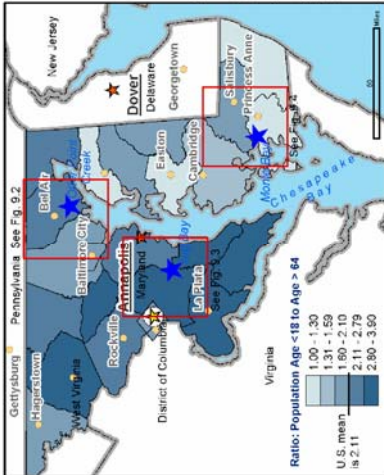
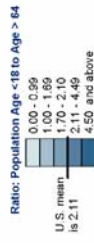


Figure 9.1 Maryland Counties

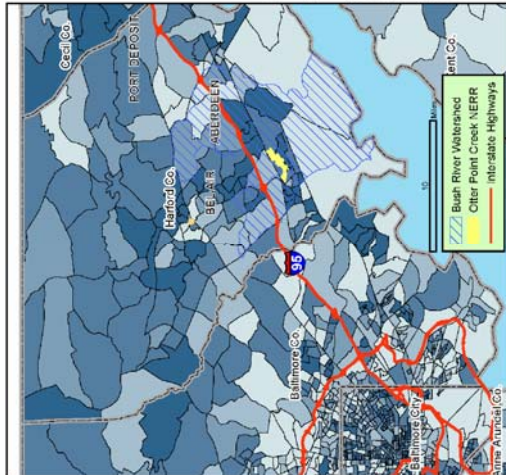


Figure 9.2 Otter Point Creek Locale



Figure 9.3 Jug Bay Locale

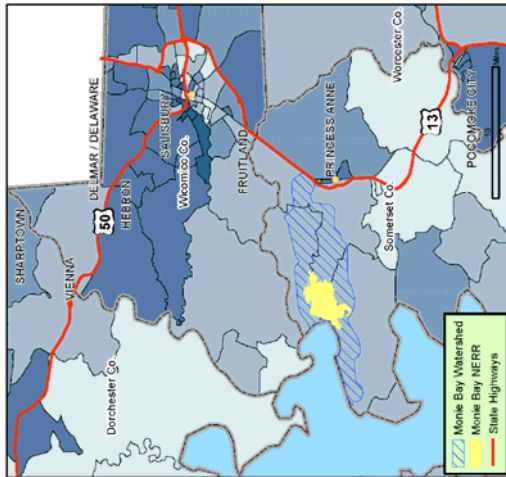


Figure 9.4 Montie Bay Locale

# Map 10: Energy

## Human Ecosystem Framework\* Variable: Energy

**Indicator:** Time Travelled to Work  
**Measure:** Percent Workers over 16 Years Who Travel 15-44 Minutes to Work (Census 2000, 20% sample data)

Every day in the United States, approximately 128.3 million people get up and go to work. Some (3.3%) work at home; the vast majority, however, drive to work alone (76%). The time traveled to work varies within and between regions. In many eastern and southern states, 15%-25% of commuters drive over 45 minutes to get to work. In the Midwest and central northern states, 37%-56% of commuters drive less than 15 minutes to get to work. Most commonly, however, Americans drive between 15 and 45 minutes to reach their place of employment; by state, the national average percentage of commuters driving 15-45 minutes to work is 51.2%.

By county, the average percentage of commuters travelling 15-45 minutes to work in Maryland is 49.9, with higher concentrations of persons travelling this length of time in the Baltimore-Washington corridor (55.0%-62.6%) than in other counties in the Chesapeake Bay area of Maryland. Almost three quarters of Maryland's workforce (73.7%) drive to work alone each day; 7.2% use public transportation, and 2.5% walk.

In the area around Otter Point Creek, a high proportion of workers (64.0%-92.5%) are in this commuting time category; around Jug Bay, fewer commuters fall into this time category. In the region surrounding the Monie Bay NERR site, more commuters north of the site are travelling 15-44 minutes to work (between 62.0% and 74.3%) than those south and inland of the site.

Figure 10.1 Maryland Counties

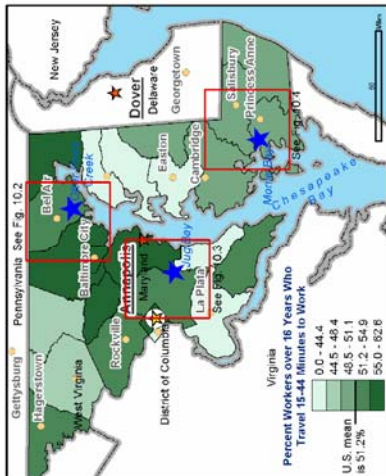
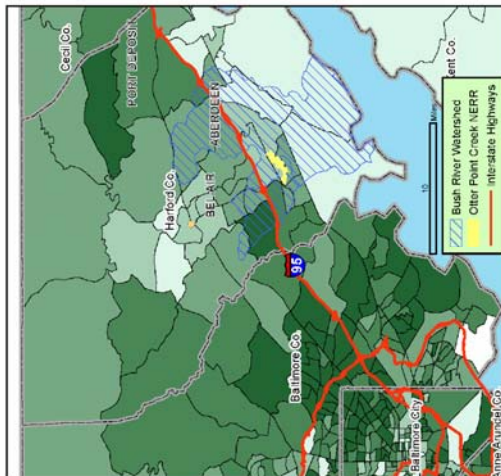


Table 10.1 Means of Transportation

Means of Transportation	Maryland	United States
Drive alone	73.70%	70%
Carpool	12%	12%
Public transportation	7.20%	4.70%
Walk	2.50%	2.50%
Other (e.g. bicycle)	0.60%	0.60%
Worked at home	3.40%	3.30%

Figure 10.2 Otter Point Creek Locale



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Original maps produced in order by Fred McGee, C-Zone Consulting, Ltd. and Steven Dalton, ESIS05 HE, Inc. Digitally, NOAA Coastal Services Center at http://www.noaa.gov/ncsc provides consult data and mapping tools. Map prepared: Anders Auerbach

Figure 10.3 Jug Bay Locale

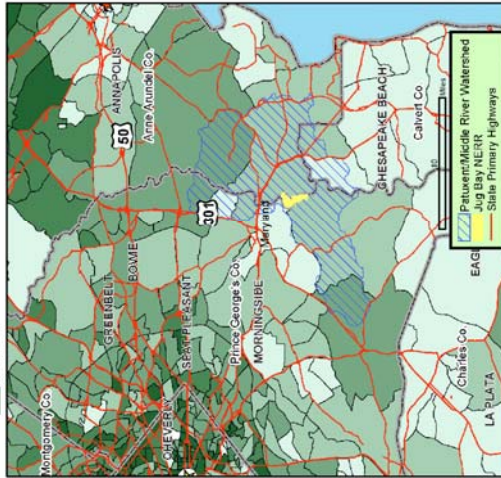
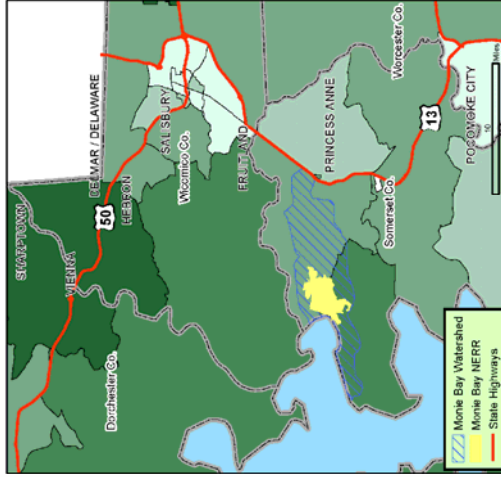


Figure 10.4 Monie Bay Locale



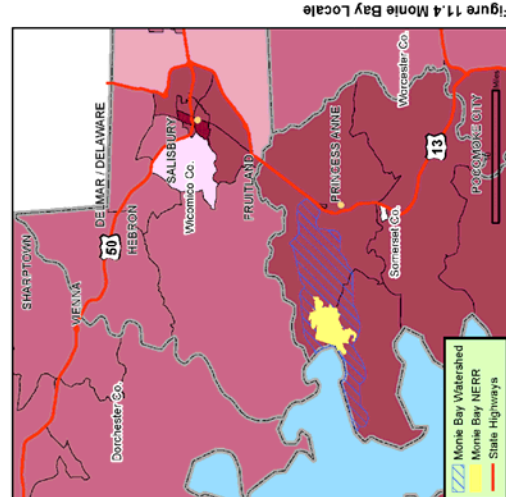
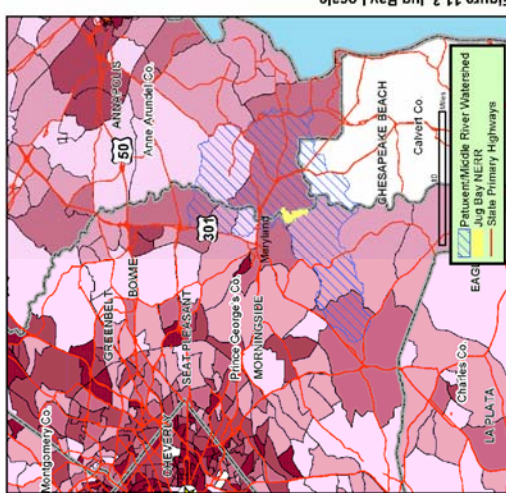
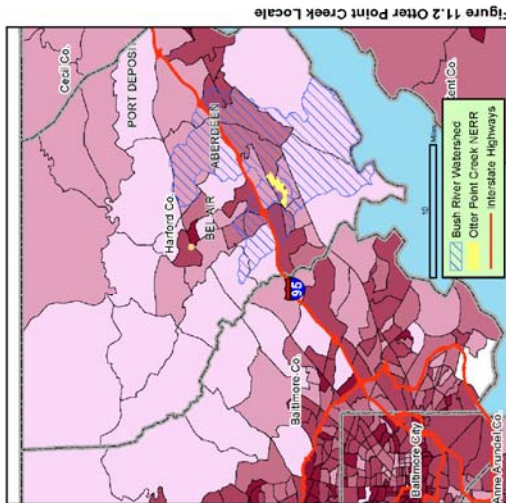
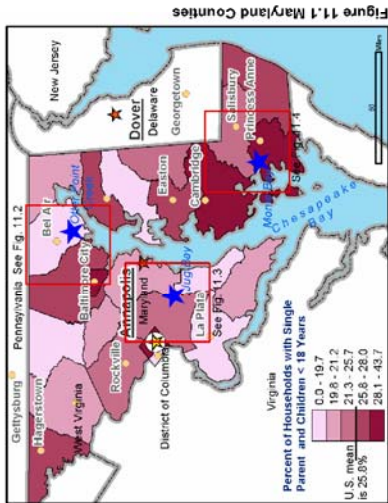
## Case Study: Chesapeake Bay, Maryland NERR

# Map 11: Informal Norms

## Human Ecosystem Framework\* Variable: Informal Norms

**Indicator:** Rate of Single Parenting  
**Measure:** Percent of households with own children under 18 years living at home, headed by single parent (male or female)

In the United States, 25.8% of households with children under 18 years old living at home are headed by single parents. These include not only divorced parents, but also those who were never married, and widowed persons. There is a higher concentration of single-parent-headed households in the north central and northeastern states, ranging from 25.8% - 29.3%, than in the south and west (with the exception of Florida), ranging from 17.5% - 25.7%. In Maryland, these overall rates display a wider distribution, ranging from 0.0-43.7% by county, with higher rates in urban centers and the lower eastern shore of the Chesapeake Bay. At the locale scale, there are higher concentrations of single-parent households on an east-west access near Otter Point Creek (up to 50%), inland of Jug Bay (the majority between 15% and 45%), and a relatively high density throughout the area around Montie Bay (20% - 30%). These percentages were identified from subsets of the data for the census tracts in the immediate vicinities of the NERR sites.



Original maps produced in color by Heidi Mueller, ©Zome Consulting, LLC and Steven Dalton, ©1995-HE, LLC.  
 Geography, NOAA Coastal Services Center at [http://www.csc.noaa.gov/marine\\_products/census\\_data\\_and\\_mapping\\_tools](http://www.csc.noaa.gov/marine_products/census_data_and_mapping_tools).  
 Metadata, U.S. Census Bureau, Wirth, R. J. (2004).  
 Map prepared: April 2004/04

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**Case Study: Chesapeake Bay, Maryland NERR**

Sheet Eleven

## G. Bibliography

Abercrombie, N., S. Hill, & Turner, B. S. (1988). *The Penguin Dictionary of Sociology*. 2d ed. New York: Penguin Books.

Bidwell, C. E., & Friedkin, N. E. (1988). The sociology of education. Pp. 449-471 in N. J. Smelser, (1988). *Handbook of Sociology*. Newbury Park: Sage Publications

Boudon, R., & Bourricaud, F. (1989). *A Critical Dictionary of Sociology*. Chicago: University of Chicago Press.

Burch, W. R., Jr. (1971). *Daydreams and Nightmares: A Sociological Essay on the American Environment*. New York: Harper and Row.

Burch, W. R., Jr., & DeLuca, D. R. (1984) *Measuring the Social Impacts of Natural Resource Policies*. Albuquerque: University of New Mexico Press.

Bormann, F. H., D. Balmori, & G. T. Geballe. (1993). *Redesigning the American Lawn*. New Haven, CT: Yale University Press.

Bormann, F. H., and G. Likens. (1979). *Patterns and Processes in a Forested Ecosystem*. New York: Springer-Verlag.

Caro, R. A. (1974). *The Power Broker: Robert Moses and the Fall of New York*. Alfred a Knopf Inc.

Cheek, N. H., Jr., & Burch Jr., W. R. (1976). *The Social Organization of Leisure in Human Society*. New York: Harper and Row.

Clapham, W. B., Jr. (1998). *Human Ecosystems*. New York: Macmillan.

Cottrell, F. (1955). Energy and society: The relation between energy, social change, and economic development. In *Handbook of Modern Sociology*, ed. F. Robert. New York: Rand McNally.

Dunlap, R. E., Kraft, M. E. & Rosa, E. A. (1993). *Public Reactions to Nuclear Waste*. Durham, NC: Duke University Press.

Durkheim, E. (1938). *The Rules of Sociological Method*. 8<sup>th</sup> ed. New York: The Free Press.

Durkheim, E. (1933). *The Division of Labor in Society*. Glencoe, IL: The Free Press.

Eckaus, R. S. (1972). *Basic Economics*. Boston: Little, Brown and Company.



- Eisenstadt, S. N. (1956). *From Generation to Generation*. Glencoe, IL: The Free Press.
- Field, D. R., & Burch, Jr., W. R. (1988). *Rural Sociology and the Environment*. Middleton, WI: Social Ecology Press.
- Geertz, C. (1963). *Agricultural Involution*. Berkeley, CA: University of California Press.
- Goode, W. J. (1978). *The Celebration of Heroes: Prestige as a Social Control System*. Berkeley: University of California Press.
- Hawley, A. H. (1986). *Human Ecology: A Theoretical Essay*. Chicago: University of Chicago Press.
- Hawley, A. H. (1950). *Human Ecology: A Theoretical Community*. New York: The Ronald Press.
- Jary, D. & Jary, J. (1991). *The Harper Collins Dictionary of Sociology*. New York: Harper Perennial.
- Lenski, G. E. (1984). *Power and Privilege: A Theory of Social Stratification*. Chapel Hill: The University of North Carolina Press.
- Machlis, M. G., & Burch, Jr., W. R. (1983). Relations between strangers: Cycles of structure and meaning in tourist systems. *Sociological Review* 31(4): 666-692.
- Malinowski, B. (1948). *Magic, Science and Religion and Other Essays*. Glencoe, IL: The Free Press.
- Mann, M. (1984). *The Sources of Social Power: Volume 1, A History of Power from the Beginning to A.D. 1760*. New York: Cambridge University Press.
- Morales, E. (1989). *Cocaine: White Gold Rush in Peru*. Tucson, AZ: The University of Arizona Press.
- Rawls, J. (1971). *A Theory of Justice*. Cambridge: The Belknap Press of Harvard University Press.
- Reisner, M. (1986). *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books.
- Rodwin, V. G. (1984). *The Health Planning Predicament: France, Quebec, England and the United States*. Berkeley: University of California Press.
- Rosa, E. A., Machlis, G. E. & Keating, K. M. (1988). Energy and society. *Annual Review of Sociology* 14:149-172.

- Schor, J. B. (1992). *The Overworked American: The Unexpected Decline of Leisure*. New York: Basic Books.
- Scialfa, M. (1992). *An Ethnographic Analysis of Poachers and Poaching in Northern Idaho and Eastern Washington*. Master's thesis, University of Idaho, Moscow.
- Shell, K. L. (1994). *The Democratic Political Process*. Waltham, MA: Blaisdell.
- Theodorson, G. A., & Theodorson, A. G. (1969). *Modern Dictionary of Sociology*. New York: Thomas Y. Crowel Company.
- Thompson, P. (1983). *The Nature of Work: An Introduction to Debates on the Labour Process*. London: Macmillan.
- Turner, B. L., II, Clark, W. C., Kates, R. W., Richards, J. F., Mathews, J. T. & Meyer, W. B. (eds.) (1990). *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years*. Cambridge: Cambridge University Press with Clark University.
- von Bertalanffy, L. (1968). *General System Theory*. New York: Braziller.
- Weber, M. (1930). *The Protestant Ethic and the Spirit of Capitalism*. London: Allen & Unwin.
- Weitz, S. (1977). *Sex Roles: Biological, Psychological and Social Foundations*. New York: Oxford University Press.
- West, P. C. (1982). *Natural Resource Bureaucracy and Rural Poverty: A Study in the Political Sociology of Natural Resources*. Ann Arbor: University of Michigan.
- Wilson, E. O. (1992). *The Diversity of Life*. New York: W. W. Norton and Company.
- Wilson, E. O. (1978). *On Human Nature*. Cambridge: Harvard University Press.
- Wilson, E. O. (1975). *Sociobiology: The New Synthesis*. Cambridge: The Belknap Press of Harvard University Press.
- Worster, D. (1992). *Under Western Skies: Nature and History in the American West*. New York: Oxford University Press.
- Wrong, D. H. (1994). *The Problem of Order: What Unites and Divides Society*. New York: The Free Press.
- Wrong, D. H. (1988). *Power: Its Forms, Bases, and Uses*. Chicago: University of Chicago Press.
- Zelinsky, W. (1973). *The Cultural Geography of the United States*. Englewood Cliffs, NJ: Prentice-Hall.