Appendix H

Report on Existing Conditions and Impacts to
Socioeconomics, Aesthetics, and Recreational Resources

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Report

UMCES Contributions to James and Barren Islands Restoration Projects Feasibility Study and Environmental Impact Statement

Report on Existing Conditions and Impacts to Socioeconomics, Aesthetics and Recreational Resources

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Chapter 1: Existing Resources

1.1 Environmental Resources

1.1.1 Noise

Sources of existing noise are identified to provide a context for evaluating any potential noise-related impacts associated with the proposed project's construction and operation.

1.1.1.1 Definitions

- *Sound* – A vibratory disturbance created by a vibrating object, which, when transmitted by longitudinal pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- *Noise* – Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- *Decibel* – A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- *A-Weighted Decibel (dBA)* – An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear.

1.1.1.2 Noise Measurement Methods

For purposes of regulation, noise is measured in dBA or A-weighted decibels. This unit weights sound frequencies according to the sensitivity of the human ear. Individuals with good hearing perceive a change in sound of 3 dB as just noticeable, a change of 5 dB as clearly noticeable, and 10 dB is perceived as doubling (or halving) of the sound level. The threshold of human hearing is 0 dBA. Values above 85-90 dBA would be considered very loud (See Table 1-1) and have the potential to harm hearing given sufficient exposure time. Noise levels above 140 dBA can cause damage to hearing after a single exposure.

Noise transmission depends on many factors including air temperature, wind and atmospheric conditions. Two common rules of thumb are that sound drops by 6 dBA for every doubling of distance over land and by 5 dBA per doubling of distance over water. In other words, a person on land that hears an 88 dBA sound level at 50 feet, will hear a sound level of 82 dBA if he doubles the distance between himself and the noise source by moving to 100 feet from the noise source. As a result of this relationship, sound generally drops off rapidly with distance. For example, in an open setting, the loud noise of a truck (~88 dBA at 50 feet) would drop to nearly background levels (56 dBA) in 2,000 feet.

Table 1-1. Typical noise levels and subjective impressions.

Source	Decibel Level (dBA)	Subjective Impression
Normal breathing	10	Threshold of hearing
Soft whisper	30	
Library	40	Quiet
Normal conversation	60	
Television audio	70	Moderately loud
Ringing telephone	80	
Snowmobile	100	Very loud
Shouting in ear	110	
Thunder	120	Pain threshold

1.1.1.3 Existing Noise Sources

Given the types of residential land uses in the area, noise sources are largely limited to activities within private yards, operation of boats and personal watercraft, and vehicle traffic. These activities can vary widely in the amount of noise produced, but according to the League for the Hard of Hearing (LHH) background noise levels are about 40 dBA on a quiet residential street. A typical maximum permitted sound level in rural and suburban areas is 55 dBA (e.g., Talbot County Code).

While the background noise level for residents in the vicinity of either island might typically be 40 dBA, a resident may also hear acute noise sources, particularly in the daytime, associated with suburban neighborhoods such as a power mower, which will generate up to 95 dBA at 50 feet or a leafblower (110 dBA at 50 feet). Shoreline residents and boaters will be exposed to noise from various types of commercial and recreational watercraft. Powerboats and personal watercraft (PWC) generate noise levels typically in the range of 70-85 dBA at 50 feet (Noise Unlimited 1995), and by law in many states cannot exceed 86-90 dBA from 50 feet away. However, sound levels up to 109 dBA for racing boats have been recorded and PWC noise may be perceived as particularly annoying, despite a moderate decibel reading because of the high pitch and variable nature of the sound. By comparison, freeway traffic is in the range of 70 dBA at 50 feet, although large trucks may typically generate 90 dBA (LHH). Nighttime noise levels are likely to be quite low.

1.1.2 Light

Sources of existing light are identified to provide a context for evaluating any potential light-related impacts associated with the proposed projects' construction and operation.

1.1.2.1 Definitions

- *Glare* -- Light emitted at an intensity great enough to reduce a viewer's ability to see, and in extreme cases causing momentary blindness
- *Light trespass* – Light that shines beyond the boundaries of the property on which it is located and onto areas where it is unwanted or interferes with land use

1.1.2.2 Existing Sources of Light

The shoreline adjacent to James and Barren islands is marked by detached single family homes interspersed with agricultural or open fields, wetlands and forest patches. A few small commercial establishments are scattered along major roads. Further inland, wetlands and forests are the dominant land uses. This type of land development has few major light sources. Existing light sources include occasional street lights in a few public spaces and commercial establishments, car headlights along local roads, and indoor and outdoor lighting of private homes. Therefore, the overall level of existing light in residential areas is low.

Within the waterway, light sources include: lighted aids to navigation (e.g., buoys), lighthouses off the southern end of Tilghman Island (near James), off Hooper Island (near Barren) and Cove Point (near Barren), low wattage dock lights, signage, and lights on pilings or posts marking marinas and entrance channels. The lights used in aids to navigation would typically be visible for miles but are not generally perceived as generating light trespass to users of the waterway or residences. In general, light levels from the waterway will be perceived as low from most locations in the vicinity of the project.

1.2 Socioeconomic Resources

Socioeconomic and demographic characteristics that influence the potential economic impact of the project are identified and discussed.

1.2.1 Land and Water Use

Land and water use are briefly characterized to identify uses that may be affected by project construction and operation. Special attention is given to sensitive resources such as public lands and scenic areas.

1.2.1.1 Local and Regional Land Use

Land use on James Island is predominantly forest and wetland (Figure 1-1). The island remnants are subdivided into three privately-owned parcels, but no residences have been built on these parcels. The nearest landmass to James Island is Taylors Island to the south. Land use on Taylors is predominantly agricultural or open fields, forest and low-density residential development. The shoreline that faces James is all privately owned, but part of Taylors Island is a wildlife management area.

The land use on Barren Island is mixed wetland and forest (Figure 1-2). The land is entirely publicly owned and the USFWS manages the area as a wildlife refuge. The nearest landmass to the island is Hooper Island where land is predominantly low to medium density residential use. Scattered commercial establishments are also present including seafood processors. Across the Bay, about 7 miles away from Barren Island, is the federally-owned Patuxent Naval Air Station where aircraft and aircraft components are tested.

The central business district for Dorchester County is Cambridge which lies along the Choptank River, to the east of James Island at the north edge of the county (Figure 1-3). Cambridge has much higher population density than the Bay shoreline and well-developed commercial zones. The northern and eastern parts of Dorchester County are dominated by

agricultural land use and also support low to medium density residential uses and scattered forest tracts (see Figures 1-1 and 1-2). Land cover in the southern portion of the county is dominated by wetlands and contains extensive tracts of federal and state holdings including Blackwater National Wildlife Refuge and several wildlife management areas.

1.2.1.2 Water Use Around James and Barren Islands

The waters in the vicinity of James and Barren islands are used primarily by recreational and commercial boaters and fishers although the areas also have other military, commercial and educational uses. The James Island area has a higher concentration of recreational users than areas around Barren Island, while the Barren Island area has a greater proportion of commercial boat use. A major shipping channel that runs the length of the Bay mainstem and which connects Baltimore Harbor with other East Coast and international shipping destinations is about 2 miles west of the proposed James Island project and 1.8 miles west of Barren Island.

James Island lies at the mouth of the Little Choptank River (see Figure 1-3). To the north of James is the entrance to the Choptank River, a common boating destination. The historic town of Oxford along that river draws recreational boaters from throughout the Bay and beyond. Unlike James, Barren Island does not lie at the entrance to any major waterway although a dredged channel to the north of the island is a route for local residents and commercial fishers traveling between the Bay mainstem and inland ports.

Certain recreational water uses are either declining slightly or holding steady depending on which statistics are used (USFWS 2001). The number of participants in fishing has declined nationwide, although the number of fishing *days* has recently increased. Hunting participation nationwide is down slightly overall, but waterfowl hunting is holding steady. The statistics for Maryland show no significant change in either hunting or fishing participation in recent years.

Commercial fishing and crabbing are common activities in the waters surrounding both project areas. Blue crabs are currently the highest value commercial fishery within the Bay and the waters around both islands are used extensively by watermen for setting crab pots. Barren Island is considered a major center of crabbing activity and the area hosts two major commercial ports. Different water depths are used by crabbers to reflect seasonal movement of the species. Bottom areas down to 15 feet are typically targeted in the spring and fall, while shallow areas (as little as 4 feet) are sought after in summer.

Pound net and gill net fisheries are active near both islands, but activity is heavier near Barren Island. Near James Island, 3 pound nets are actively set according to a February/March 2004 survey of license-holders, but only one waterman (using two nets) has reported catches to the State within the past 5 years. Near Barren Island, 17 pound nets are actively used according to a survey and 4 report catch data. In both areas, striped bass, menhaden and croaker have provided the bulk of the value of the catch for the past 5 years. An unknown number of gill nets contribute to the total mid-Bay finfish catch shown in Tables 1-2 and 1-3. Near Barren, fishers use the eastern edge of the deep channel to catch migratory species such as striped bass and red and black drum. Landings data show that finfishing in this area is seasonal with highest catches in the spring, summer and fall and little to no catch during the winter months.

Another measure of commercial fishing effort in the region is the number of striped bass permits granted locally. A total of 57 commercial striped bass collection permits were issued in 2004 to residents of the county subdivisions (see Figure 1-4) near James Island and within Cambridge. Another 57 permits have been issued to residents of the Hooper Island area near Barren Island (M. Luisi, Maryland Department of Natural Resources (DNR), pers. comm. Oct. 2004). Together these represent 9% of the 1,231 permits issued statewide and represent any fish taken using pound nets, gill nets, or hook and line.

Shellfish harvests are not thought to be significant near either island at present. Shellfish harvests have been highly variable in the Chesapeake Bay within the past decades. Despite the fact that the Little Choptank River Natural Oyster Bars (NOBs), to the east of James Island (Figure 1-5), were a productive source of oysters in the late 1990s, the oyster fishery has been devastated in recent years by high mortality (Tarnowski, 2004). Several NOBs in the vicinity of Barren have seen little or no commercial harvest in recent years due to a variety of factors (MD DNR). Shellfish catch data specific to the areas nearest the islands are not available, but data reported for the mid-Bay (South Central Bay and Southern Bay segments, Figure 1-6) show that the value of soft clam and oyster catches in the mid-Bay dropped dramatically in the past 6 years (Tables 1-2 and 1-3).

Clam productivity surveys conducted in March 2004 at both islands show a lack of productive soft clam beds. Razor clam densities were higher but still fell short of being commercially productive beds, as defined by Maryland DNR. No hard clams were found in either location.

Table 1-2. Volume and value of fisheries in South Central Bay segment (DNR waterbody code 027). Source data from Maryland DNR

	Fishery							
	Blue Crabs		Soft Clams		Oysters		Finfish	
Year	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1998	6,027,588	$5,979,995	113,237	$772,777	279,533	$913,393	1,329,367	$939,372
1999	6,629,981	$5,756,791	65,129	$433,067	182,947	$536,181	1,962,384	$1,129,631
2000	4,211,210	$4,728,700	82,886	$504,617	59,706	$187,499	1,892,971	$1,385,482
2001	4,489,051	$4,856,868	12,312	$62,860	24,698	$73,152	1,786,933	$1,030,142
2002	5,119,869	$4,760,557	86,448	$330,461	12,688	$54,281	1,879,490	$1,185,776
2003	4,429,076	$4,517,560	5,754	$40,495	6,368	$31,757	1,119,532	$1,152,047

Table 1-3. Volume and value of fisheries in Southern Bay segment (DNR waterbody code 029). Source data from Maryland DNR

Fishery								
	Blue Crabs		Soft Clams		Oysters		Finfish	
Year	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1998	4,550,741	$4,714,452			50,074	$161,572	1,143,228	$575,705
1999	5,744,427	$4,795,239			32,036	$105,290	1,758,425	$766,854
2000	3,801,205	$4,772,426	3,579	$22,260	13,555	$46,596	1,748,146	$780,514
2001	4,307,685	$4,637,805			7,642	$26,222	2,150,957	$814,408
2002	4,701,228	$4,595,136					2,658,111	$864,369
2003	5,555,132	$5,950,389			486	$2,380	2,586,250	$832,612

Another important water user in the vicinity of Barren Island is the US Navy. The region around Barren Island includes a large restricted area used for military exercises conducted out of the Patuxent Naval Air Station in St. Mary's County. The area is periodically off limits to boats. The northern extent of the restricted area begins just south of the existing remnant of Barren Island and continues across the Bay to the western shore to a point south of the mouth of the Patuxent River. The restricted area extends south along the mainstem of the Bay to a point about 4 miles north of the Maryland State line. The area includes the majority of waters deeper than 18 feet in this region.

Finally, the region's waters contain monitoring stations used in Bay-wide research on the condition of the estuarine ecosystem. Data on water quality and biota are collected as part of regional and long-term data sets used by researchers, educators, and resource managers. Some bottom areas in the vicinity of James and Barren islands are part of ongoing oyster restoration efforts.

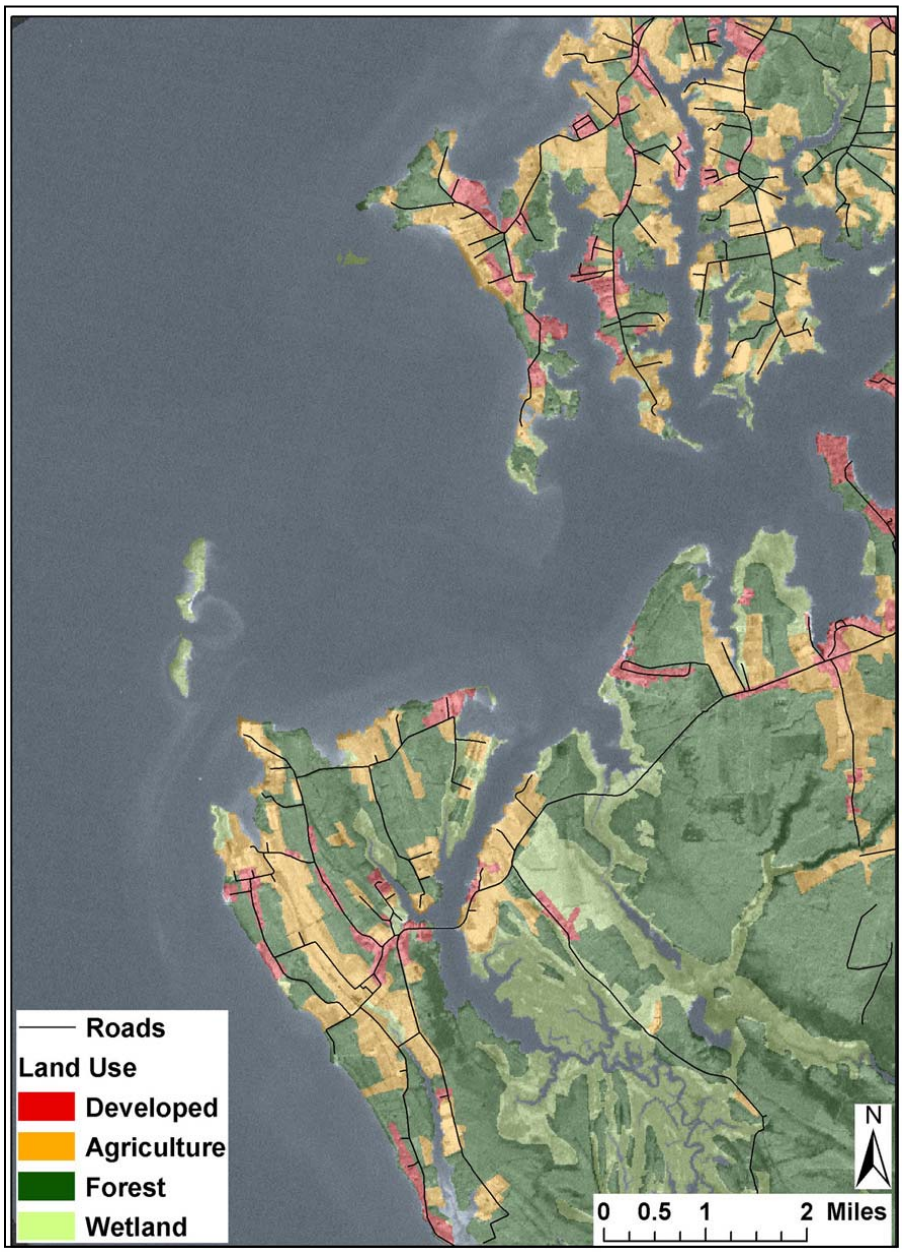

Figure 1-1. Land use near James Island. Land use source data from Maryland Department of Planning 2002.

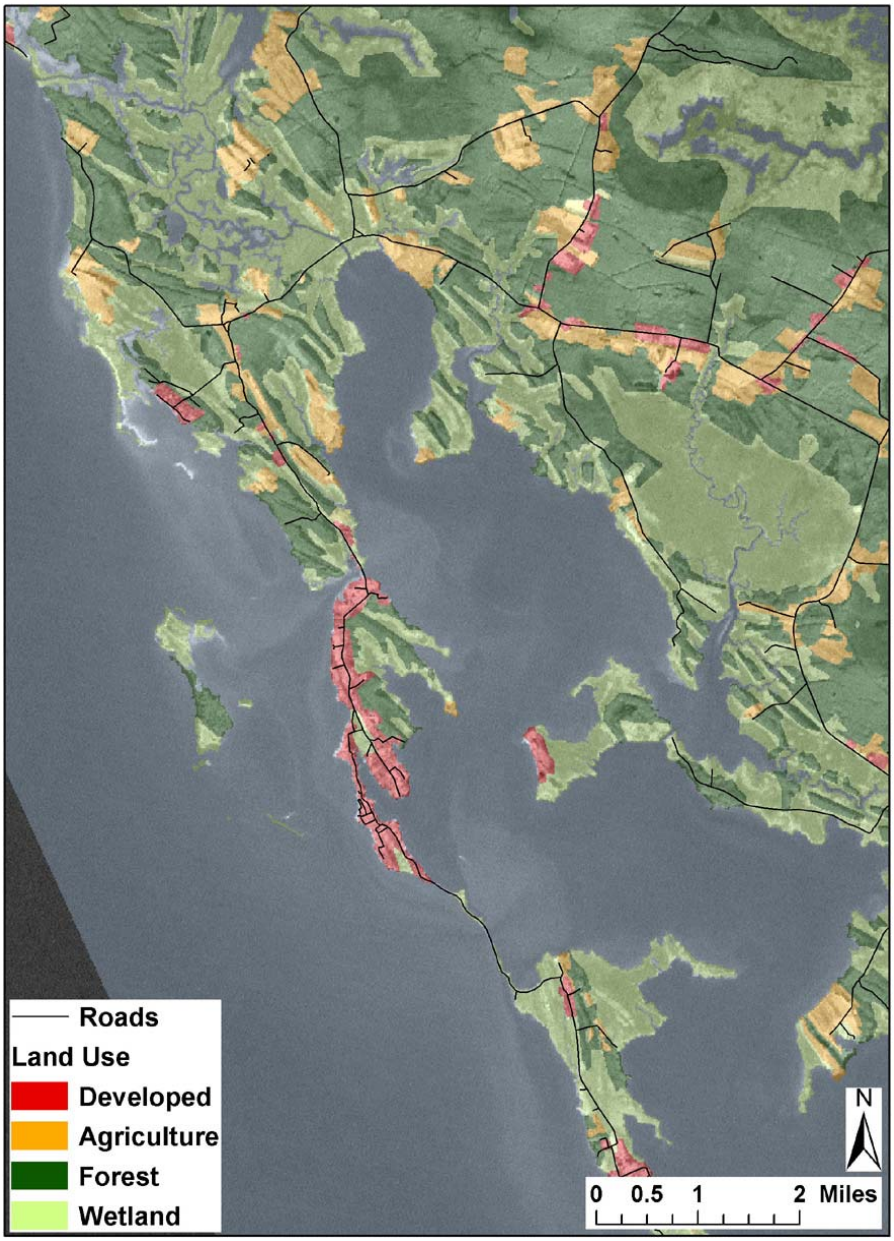

Figure 1-2. Land use near Barren Island. Land use source data from Maryland Department of Planning 2002.

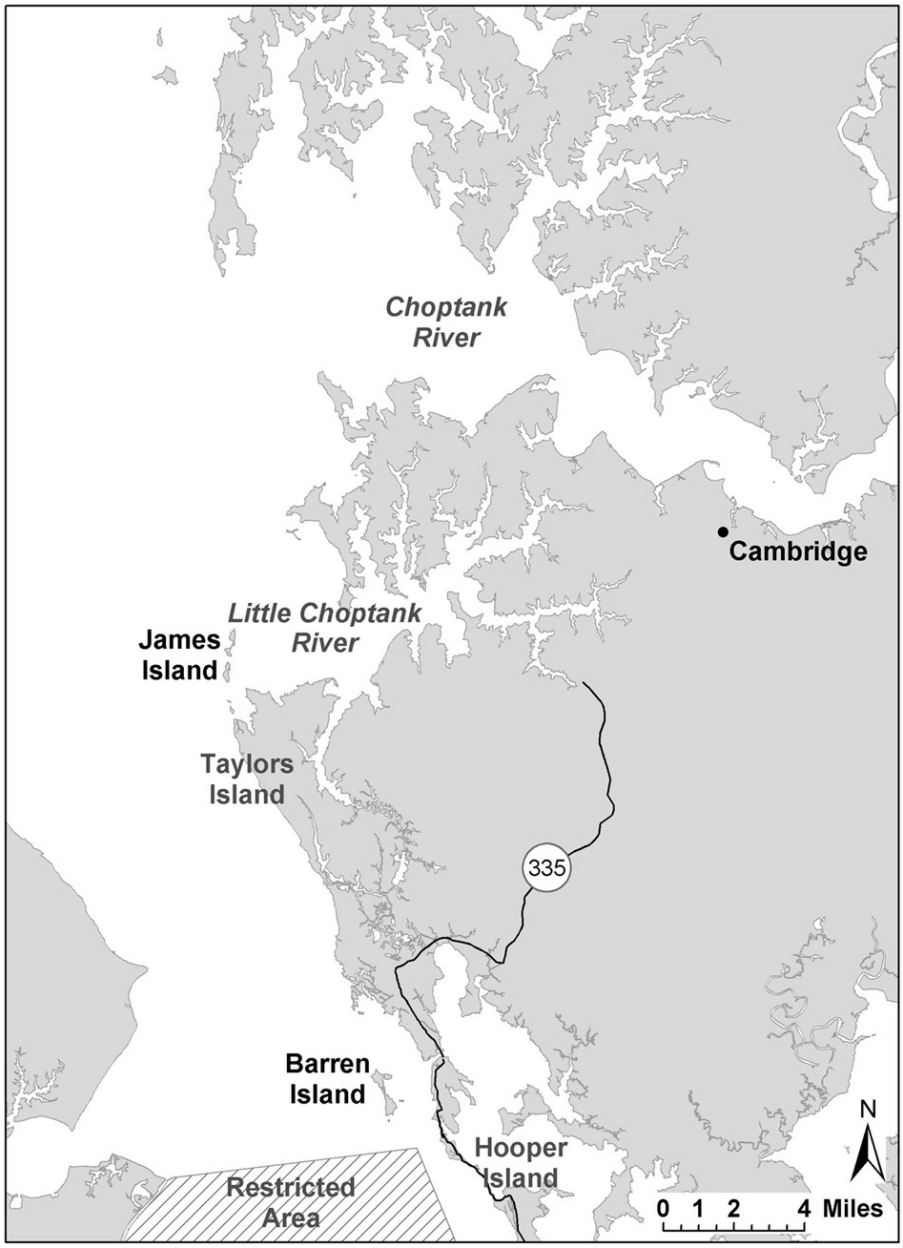

Figure 1-3. Map of James and Barren islands showing points of interest.
Note area of restricted navigation and Maryland scenic road (Maryland 335).

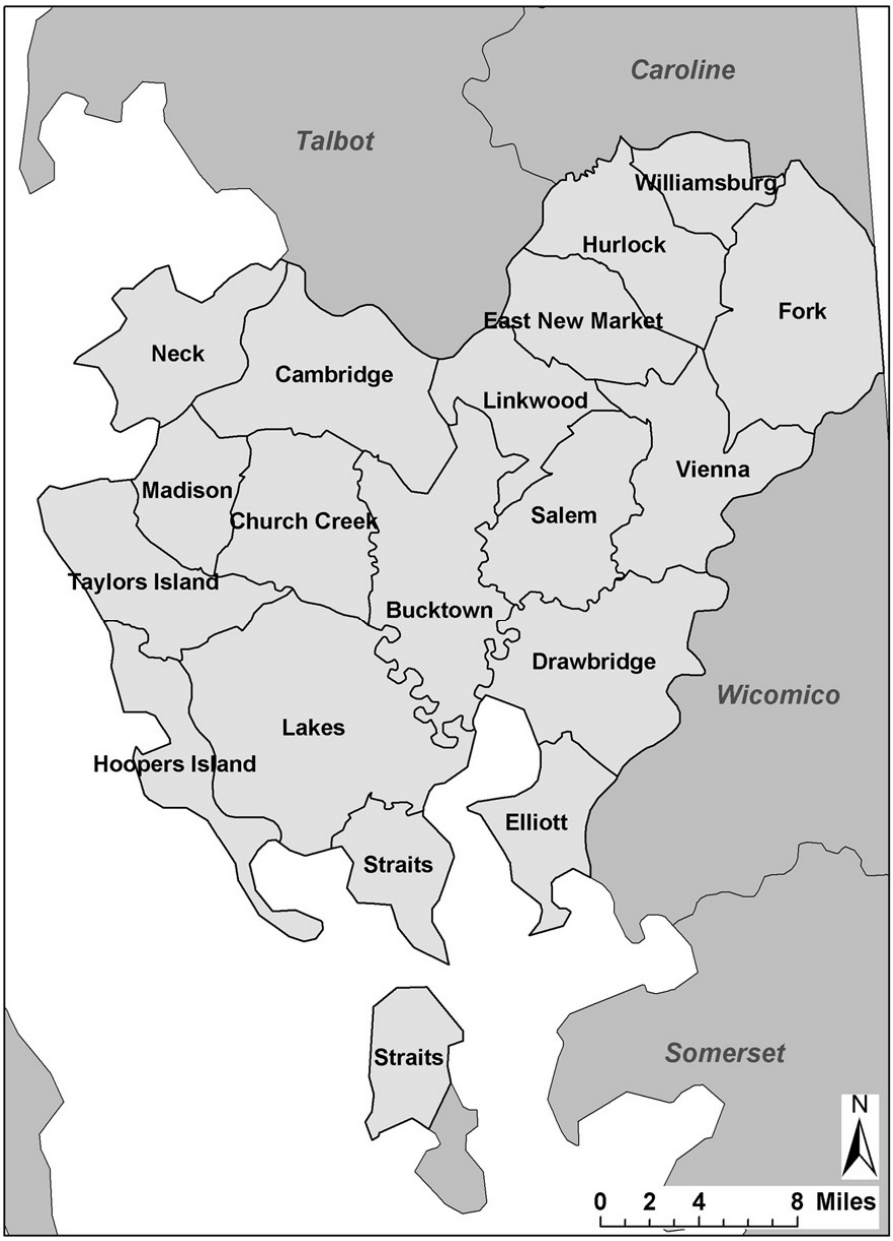

Figure 1-4. County subdivisions of Dorchester County. Source data from U.S. Census 2000

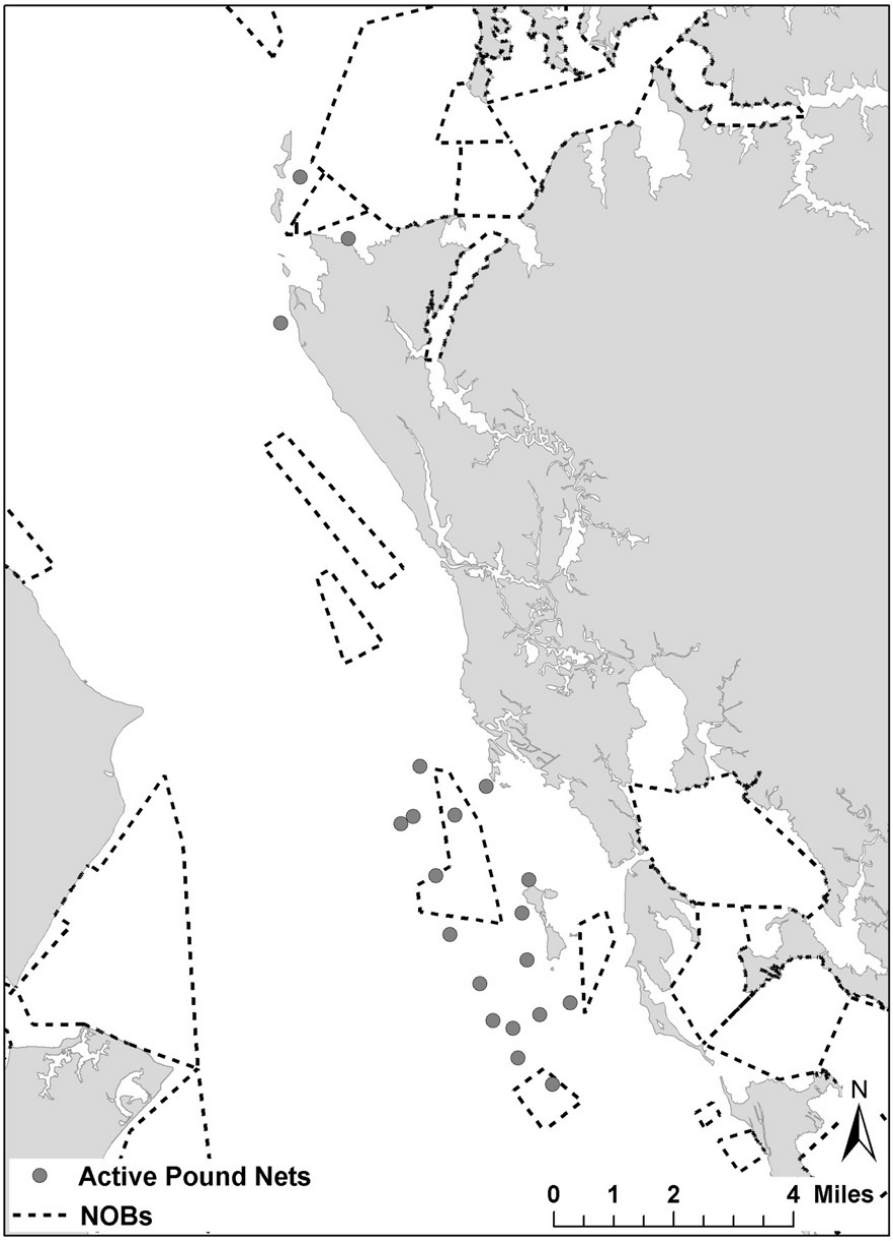

Figure 1-5. Natural Oyster Bars and pound nets in the vicinity of James and Barren islands. Pound net locations are approximate. Pound nets were active 1999-2003. Data drawn from Maryland DNR survey taken in February/March 2004.

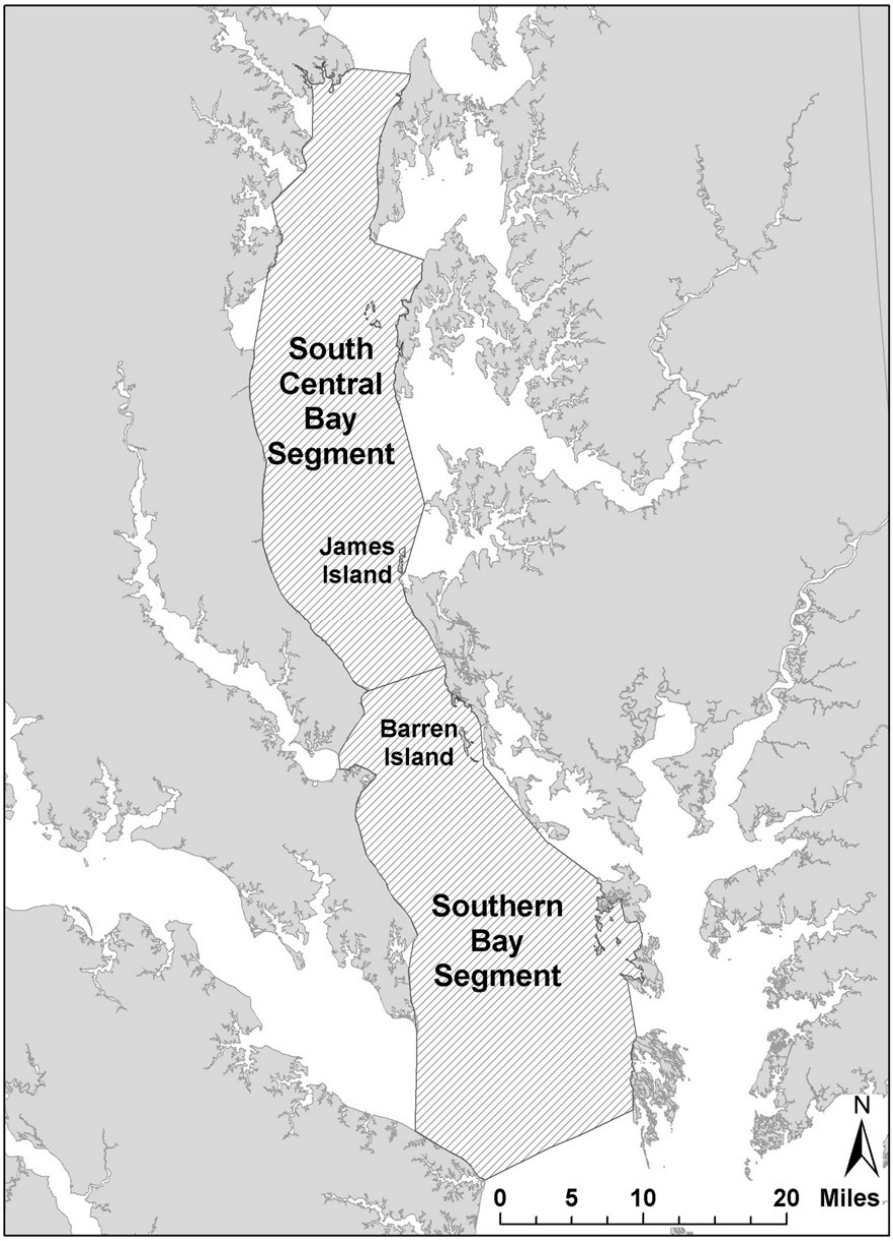

Figure 1-6. Water body reporting areas for fishery catch data. Source data from Maryland DNR.

1.2.2. Demographics

1.2.2.1 Regional Setting

James and Barren islands are located within Dorchester County on Maryland's Eastern Shore. The surrounding area is rural with very low population densities relative to the state average. Dorchester County's population accounts for roughly half of one percent of Maryland's population, and the population density is 55 persons per square mile compared to 541.9 for the state (Table 1-4).

In general, the county's demographics reflect those of the state except for a few characteristics (see Table 1-4). The population includes a slightly elevated proportion of seniors, with 17.7% of persons aged 65 years or older compared to a state average of 11.3%. The percent of Hispanic or Latino persons is 3% lower than the state average at 1.3%, and the percent of foreign-born individuals is 2.0% or 7.8% lower than the state average. The population is somewhat less mobile, with 64.6% of people living in the same house as five years ago compared to 55.7% for the state. A smaller proportion of residents hold Bachelor's degrees or higher degrees (12%), compared to Maryland's total population (31.4%), and the percent of high school graduates is also below the state average.

Table 1-4. Geographic and population characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

Geography	**Dorchester County**	**Maryland**
Land area, 2000 (square miles)	558	9,774
Persons per square mile, 2000	55.0	541.9
People	**Dorchester County**	**Maryland**
Population, 2000	30,674	5,296,486
Population, percent change, 1990 to 2000	1.4%	10.8%
Persons under 5 years old, percent, 2000	5.4%	6.7%
Persons 5-17, percent, 2000	17.9%	18.9%
Persons 18-24, percent, 2000	6.7%	8.5%
Persons, 25-64, percent, 2000	52.3%	54.6%
Persons 65 years old and over, percent, 2000	17.7%	11.3%
White persons, not of Hispanic/Latino origin, percent, 2000	69.4%	62.1%
Black or African American persons, percent, 2000 (a)	28.4%	27.9%
Persons of Hispanic or Latino origin, percent, 2000 (b)	1.3%	4.3%
Living in same house in 1995 and 2000, pct age 5+, 2000	64.6%	55.7%
Foreign born persons, percent, 2000	2.0%	9.8%
Language other than English spoken at home, pct age 5+, 2000	3.5%	12.6%
High school graduates, percent of persons age 25+, 2000	74.2%	83.8%
Bachelor's degree or higher, pct of persons age 25+, 2000	12.0%	31.4%
Persons with a disability, age 5+, 2000	6,532	854,345
Mean travel time to work, workers age 16+ (minutes), 2000	25.2	31.2

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

The county appears to have a relatively high proportion of low-income residents based on several statistics (Table 1-5). The per capita money income of $18,929 in 2000 was well below the state average ($25,614) and was just under 88% of the US average ($21,587). Median household money income of $34,077 was well below the median state level of $52,868 and the median US level of $41,994. The percent of persons living below poverty in 1999 was high at 13.8% and the percent of families in poverty was 3.1% higher than the state average. Despite these indicators of modest incomes, home ownership rates in the county are high at 70.1%.

Table 1-5. Housing and income characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

	Dorchester County	Maryland
Housing units, 2000	14,681	2,145,283
Homeownership rate, 2000	70.1%	67.7%
Housing units in multi-unit structures, percent, 2000	15.0%	25.8%
Median value of owner-occupied housing units, 2000	$92,300	$146,000
Households, 2000	12,706	1,980,859
Persons per household, 2000	2.36	2.61
Median household money income, 1999	$34,077	$52,868
Per capita money income, 1999	$18,929	$25,614
Persons below poverty, percent, 1999	13.8%	8.5%
Families below poverty, percent, 1999	9.2%	6.1%

1.2.2.2 Local Setting

The land areas immediately adjacent to James Island include the county subdivisions of Taylors Island, Madison and Neck (see Figure 1-4). Population densities in these subdivisions are 7.5, 36.3, and 43.9 persons per square mile, respectively, which is lower or much lower than the county average of 55 persons per square mile. The total population of these three county subdivisions was 1,761 persons in 2000 (Table 1-6). Since 1990, the population has remained fairly constant in Taylors Island and Neck, but Madison's population grew almost 40%.

In the land area near Barren Island, the Hooper Island county subdivision has a population density of 48.7 persons per square mile, which is fairly close to the county average. This relatively high population density for the region is driven by the narrowness of Hooper Island and the resulting small lot sizes and does not represent a large number of residences at high density. The population of this region declined 8.3% from 1990 to 2000.

Future development in the region appears to be concentrated outside of the county subdivisions closest to the proposed projects. Of the 17 new and planned major residential and commercial developments for the county, all but one was in Cambridge and the other was far inland away from James and Barren islands (per discussions with Kathy Miller, Dorchester County Economic Development Office). Some modest level of development in Madison seems likely given recent trends and the availability of agricultural land for development. Overall, the county's population is expected to grow 3% from 30,675 in 2000 to 31,600 people in 2010 and continue to grow another 1.7% to 32,150 by 2020 (Maryland Department of Planning).

Recent residential trends in the immediate vicinity of James and Barren islands (see Table 1-6) do not show high growth rates for either area. Much of the shoreline with views of the proposed projects is already developed, although some potential for infill or increased density of development is possible. In the Neck County Subdivision near James Island (Figure 1-4), some open agricultural areas have the potential to be converted to residential uses and growth in Madison shows homes are being added to that area.

Commercial areas on Hooper Island (near Barren Island) have the potential to be converted to residences or tourist destinations since some traditional fisheries are in decline and tourism is being promoted in the county. Fisheries activities are volatile, so future activity will not necessarily be reflected in current trends. Dorchester County's tourism-related tax revenue (hotel/motel taxes and amusement and admission taxes) increased markedly from 2002-2003, but tourism in Maryland overall has only been holding steady following the post-September 11, 2001 decline (Maryland Office of Tourism Development, FY2003 Tourism Report).

Table 1-6. Dorchester County regional population growth by county subdivision, 1990-2000. Source data from US Census Bureau

County Subdivision	1990 Census	% of county population	2000 Census	% of county population	1990-2000 % change
Near James					
Taylors Island	269	0.9%	270	0.9%	0.4%
Neck	916	3.0%	934	3.0%	2.0%
Madison	401	1.3%	557	1.8%	38.9%
Near Barren					
Hooper Island	640	2.1%	587	1.9%	-8.3%
Other					
Fork	1,825	6.0%	1,881	6.1%	3.1%
East New Market	2,023	6.7%	2,233	7.3%	10.4%
Vienna	929	3.1%	908	3.0%	-2.3%
Lakes	478	1.6%	402	1.3%	-15.9%
Cambridge	13,913	46.0%	13,261	43.2%	-4.7%
Church Creek	567	1.9%	615	2.0%	8.5%
Straits	521	1.7%	479	1.6%	-8.1%
Drawbridge	82	0.3%	85	0.3%	3.7%
Williamsburg	1,026	3.4%	1,180	3.8%	15.0%
Bucktown	482	1.6%	464	1.5%	-3.7%
Linkwood	2,591	8.6%	2,698	8.8%	4.1%
Hurlock	3,272	10.8%	3,806	12.4%	16.3%
Salem	222	0.7%	228	0.7%	2.7%
Elliott	79	0.3%	86	0.3%	8.9%

1.2.3 Employment and Industry

Consistent with the small population, Dorchester County's economy is also small accounting for less than half of one percent of all private non-farm employment in Maryland (Table 1-7). The 2003 annual unemployment rate was 9.4% compared to 4.5% for the state. Unemployment does not display a strong seasonal trend and has been consistently lower than the state level for 1994-2003. The economic sectors employing the largest number of people are Services, Manufacturing, and Wholesale and Retail Trade. The Services sector employs almost twice as many people as Wholesale and Retail, accounting for 29% of workers in the county compared to 15.5%. The majority of service workers are employed in Educational, Health and Social Services. The Manufacturing sector employed about 20% of workers in 2000, which was above the state average (Table 1-8).

The economy has a significant component tied to commercial fisheries in the Chesapeake Bay. In the last economic census (1997), the manufacturing sector had the highest value of sales receipts of any economic sector in the county. This sector was dominated by food production, preparation and packaging and the largest number of establishments were in seafood processing. Recreational activities associated with the Bay and other natural areas clearly play an active part in the economy contributing to jobs and sales in the Accommodations and Foodservice sector.

Table 1-7. Business characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

	Dorchester County	**Maryland**
Private non-farm establishments, 2001	713	129,301
Private non-farm employment, 2001	10,099	2,091,198
Private non-farm employment, percent change 2000-2001	4.6%	1.6%
Nonemployer establishments, 2000	2,073	322,819
Manufacturers shipments, 1997 ($1000)	867,153	36,505,948
Retail sales, 1997 ($1000)	285,883	46,428,206
Retail sales per capita, 1997	$9,567	$9,116
Minority-owned firms, percent of total, 1997	11.0%	20.6%
Women-owned firms, percent of total, 1997	23.1%	28.9%
Housing units authorized by building permits, 2002	179	29,293
Federal funds and grants, 2002 ($1000)	195,113	49,537,440
Annual Unemployment, 2003	9.4%	4.5%

Table 1-8. Employment by sector for Dorchester County in 2000. Source data from U.S. Census Bureau

	Employed Civilian Population	Agriculture, Forestry, Mining, Fishing	Construction	Manufacturing	Wholesale & Retail Trade
United States	129,721,512	2,426,053 1.9%	8,801,507 6.8%	18,286,005 14.1%	19,888,473 15.3%
Maryland	2,608,457	16,178 0.6%	181,280 6.9%	189,327 7.3%	345,960 13.3%
Dorchester County	14,225	587 4.1%	1,335 9.4%	2,788 19.6%	2,206 15.5%

	Transportation & Utilities	Information & Finance	Services	Arts, Entertainment & Tourism	Public Administration
United States	6,740,102 5.2%	12,931,536 10.0%	44,225,526 34.1%	10,210,295 7.9%	6,212,015 4.8%
Maryland	127,294 4.9%	289,510 11.1%	1,007,608 38.6%	177,341 6.8%	273,959 10.5%
Dorchester County	715 5.0%	784 5.5%	4,177 29.4%	819 5.8%	814 5.7%

1.3 Aesthetics and Recreational Resources

Landscape character, or the visual setting of a project, is assessed to determine whether the proposed activities would contrast with the existing setting including natural or built features. Major recreational uses are identified to evaluate potential conflicts with or benefits of the proposed project.

1.3.1 Aesthetics

The existing James Island and proposed expansion lie within the mid-Chesapeake Bay mainstem, close to the Eastern Shore of Maryland. The landscape is characterized by low topographic relief, numerous areas of open water and extensive wetlands with tall grasses, shrubs or trees. Many peninsulas and islands mark the transition from land to water along the coastline. The area has an open feel due to the abundance of water views, open fields, grassed marshes and long vistas. The developed areas are dominated by one- to two-story buildings and commercial and industrial areas are small.

The current footprints of James and Barren islands represent only a portion of their extents in the mid-1800s, yet both remain widely visible features from the shoreline and surrounding water. James Island is surrounded by large expanses of water on all sides except to the south where Taylors Island is only ½ mile away. Barren Island lies less than 1½ miles off the shoreline of Hooper Island and roughly parallels the shore along its length. From a distance, vegetation on either island appears to consist primarily of tall trees (50-70 feet).

There are no National Scenic Byways or Wild and Scenic Rivers in Dorchester County, but a State Scenic Byway (Maryland 335, shown in Figure 1-3) runs along the shoreline near Barren Island and has views of the island in several places. The route is distinguished by its views of quaint fishing villages and tidal marshes.

1.3.2 Recreational Uses

The waters around James and Barren are used for a variety of recreational uses, but the dominant uses are boating and fishing. Other uses of the water and nearby lands include but are not limited to: sightseeing, wildlife viewing, swimming, hunting, walking, biking and outdoor social activities such as backyard picnics. Visitors to the county interested in outdoor recreation are drawn to the extensive wetlands of the area, which occur in and around Blackwater National Wildlife Refuge and in smaller refuge areas that provide numerous wildlife viewing opportunities by car, foot or bike.

1.3.2.1 Recreational Boating and Fishing

The waters around James and Barren islands are used by both sail and motorboats. To estimate the level of current recreational boating use in the vicinity of both projects, we used three techniques: 1) proximity of marinas and boat ramps, 2) number of registered motorboats within range of the area and 3) the number of boats observed in the area within ½ mile of either island during aerial surveys. The first two techniques indicated that James and Barren are not located near major populations of boat-users compared to other islands in the mid-Bay (i.e., islands situated from Lower Eastern Neck in the north to Holland Island in the south). Areas around these islands were estimated to have much lower usage than the more populated areas of

the upper Bay (Figure 1-7). However, the aerial survey showed the islands had among the highest boat usage of the mid-Bay islands surveyed (Figure 1-8). Therefore, the data indicate that despite being somewhat inconvenient to large numbers of boaters, these island areas nonetheless attract a large number of users for the mid-Bay.

The analysis of marinas and boat ramps indicates the potential for moderate recreational boat traffic near James and Barren islands. Based on a GIS analysis of the Maryland Department of Planning's 2004 Property View database, six marinas were within 10 miles of James Island and 12 were within 10 miles of Barren Island (Table 1-9). From the Maryland DNR public boat ramp database, we identified seven boat ramps within 10 miles of Barren and four ramps within 10 miles of James Island (Table 1-9).

Table 1-9. Marinas and public boat ramps near James and Barren islands in 2003. Source data from Maryland Department of Planning and Maryland DNR

	Marinas within 10 miles	Marinas within 5 miles	Marinas within 1 mile	Boat ramps within 10 miles	Boat ramps within 5 miles	Boat ramps within 1 mile
James Island	6	5	0	4	2	0
Barren Island	12	2	0	7	3	0

In a related analysis, marina locations and a database of registered motorboats by county were used to estimate the potential number of recreational motorboats being used within the waters near James and Barren islands. The analysis showed that a significant number of boaters have the potential to access areas near both islands, although the number was significantly lower than islands closer to more populated areas (see Figure 1-7). We estimated the total number of registered motorboats in the vicinity of James Island to be about 700. For Barren Island, the number was about 950 motorboats, or less than 1% of the state total (Table 1-10).

Based on the estimated number of registered motorboats and estimates of the number of annual user days for different types and sizes of boats, we calculated the annual number of recreational user days to be about 20,000 in the vicinity of James Island and about 25,000 in the vicinity of Barren Island. A survey of recreational boat owners demonstrated that 30% to 60% of motorboat outings were primarily for fishing, depending on whether the boat was in-water or trailered (Lipton, 2004). Using these results, annual recreational fishing days were estimated to be about 8,000 days in the vicinity of the James Island and about 11,000 days in the vicinity of Barren Island.

The estimates of motorboats by location were derived by selecting the portion of all motorboats registered in each county that were likely to have access to waters around either island. First, for a boat to be selected, it had to be of sufficient size to be likely to make a trip equal to at least 5, 10, or 15 miles. Next, the proportion of the county's marinas that fell within 5, 10, or 15 miles of the island was calculated. The total number of boats with access was then estimated by multiplying the number of boats in a given size class by the proportion of marinas in the appropriate distance zone. Marina locations were used as proxies for the location of all registered boats in the county, not just boats in marinas. The estimates of motorboats do not consider out-of-state recreational users, sailboats, non-motorized boats, or boaters traveling from counties farther than 15 miles away. Therefore, the figure is intended to give a sense of the size

of the pool of the most frequent recreational boaters and fishers of the areas near James and Barren islands, but will tend to underestimate total users.

Table 1-10. **Total registered motorboats by county in 2002 and estimated boats with access to waters near James and Barren islands**

County of Registration	Trailered Motor	In Water Motor	Boats near James Island	Boats near Barren Island
Calvert	5,870	1,028	220	601
Dorchester	2,565	1,171	396	263
St. Mary's	7,152	2,348	0	78
Talbot	3,383	1,900	95	0
Total	18,970	6,447	711	942

Based on an aerial survey of recreational boat usage in the Chesapeake Bay, the waters around James and Barren Islands have relatively high usage by both motor and sailboats compared to other mid-Bay Islands (UMCES 2004b). The aerial survey was conducted in the Maryland portion of the Chesapeake Bay during June through October 2000 and April through July 2001 and led by EA Engineering. A total of 211 boats were observed within a ½ mile of James in 25 observations. Of those boats, 103 were stationary motorboats, which were assumed to be fishing boats. Near Barren, 246 boats were observed within a ½ mile in 23 observations. Of those boats, 99 were likely fishing boats. When compared to other mid-Bay islands (from Lower Eastern Neck to Holland Island), Barren had the highest number of motorboats per observation at 10.7 boats per observation (Figure 1-8). This use rate was comparable to that of waters near Sharps Island, which had 10.5 boats per observation. The waters near James Island had the next highest average use rate of 8.4 boats per observation.

About 50% of the boats observed aerially near James and 40% of the boats near Barren are likely to have been engaged in fishing. Recreational fishers make moderate to heavy use of the waters to the west of James Island, particularly the waters deeper than 15 feet, and light use of shallow waters (M. Gary, Maryland DNR, pers. comm. May 2003). Croaker, striped bass and bluefish are the main species sought, although flounder and weakfish are also targeted. A map distributed by Maryland DNR shows recreational fishing areas near, but not adjacent to, James Island, indicating these areas are hotspots of local recreational fishing activity. No mapped areas were shown in or adjacent to Barren Island.

In summary, the aerial survey indicates that recreational boat usage in the vicinity of James and Barren islands appeared to be higher than for other mid-Bay islands, except Sharps Island. Model analyses based on proximity of registered boat users and availability of water access indicated that the waters around each island were likely to have lower usage than other mid-Bay islands for motorboat usage. Comparing the model and aerial survey results suggests that despite the fact that James and Barren islands are not convenient to large numbers of boaters, they nonetheless enjoy high use rates by all types of boaters for this segment of the Bay. The aerial survey data offer the most reliable information on usage because they capture actual

behavior rather than modeled behavior. Therefore, overall recreational boat usage of James and Barren is high for the mid-Bay, but these usage levels are still much lower than those for islands in the densely populated areas of the upper Bay according to both the aerial survey and models (data not shown).

1.3.2.2 Hunting

Maryland hosts over 145,000 hunters (resident and non-resident), the majority of whom are deer hunters (USFWS 2001). Dorchester County has many acres of wildlife management areas suitable for hunting, so hunting activity is undoubtedly high in the county. Deer and waterfowl are the main species of interest to Maryland hunters. Therefore, areas around the islands have the potential to support active waterfowl hunting, although hunting is not permitted on Barren Island.

1.3.2.3 Wildlife Viewing

Wildlife viewing is a popular activity in Maryland and enjoys special popularity in Dorchester County. Over 1,500,000 people in Maryland participated in all wildlife viewing activities in 2001 (USFWS 2001). Among the most popular wildlife viewing activities was bird watching, and waterfowl were the most watched species with 78% of birders reporting watching them (USFWS 2001). In addition, 56% of surveyed birders watched other waterbirds such as herons and shorebirds. These survey results indicate that both residents and non-residents of Dorchester County are likely to engage in wildlife viewing around James and Barren islands either as the main purpose of their trip or as part of other activities.

1.3.2.4 Educational Uses

Barren Island is available for use by researchers and an active restoration program has brought school groups and other volunteers to the island to assist with and learn about wetland restoration. Since James Island is privately owned, it is unlikely to serve any prominent educational uses.

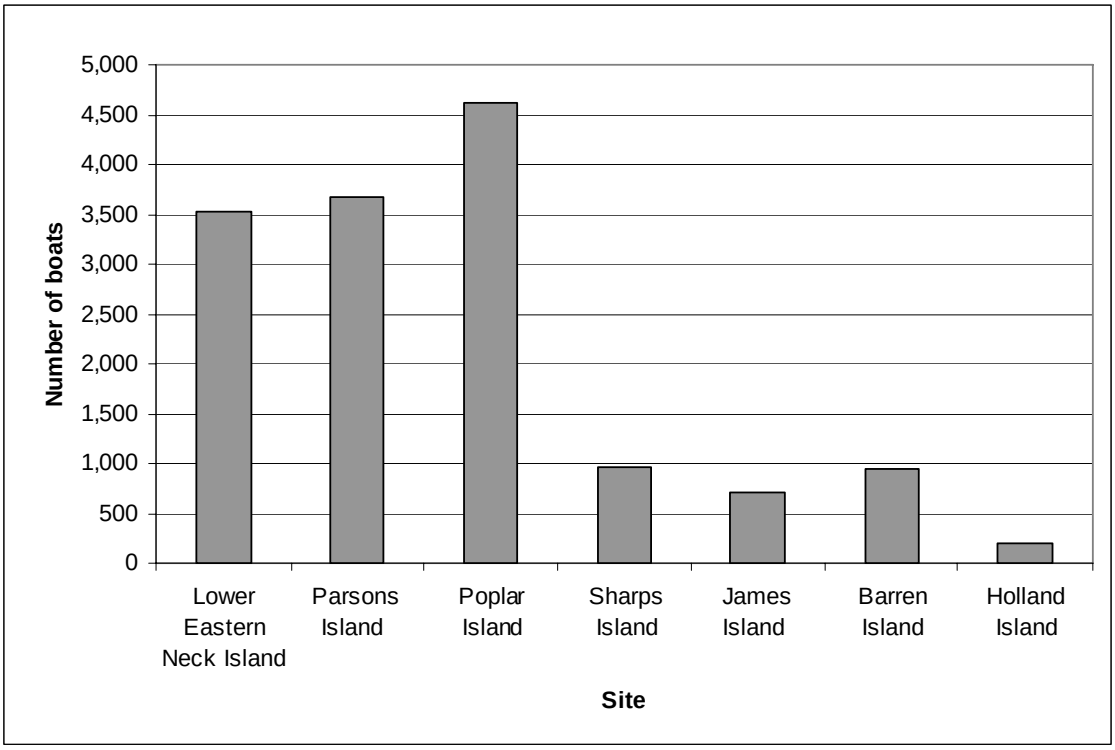

Figure 1-7. Comparison of registered motorboats in the vicinity of mid-Bay islands

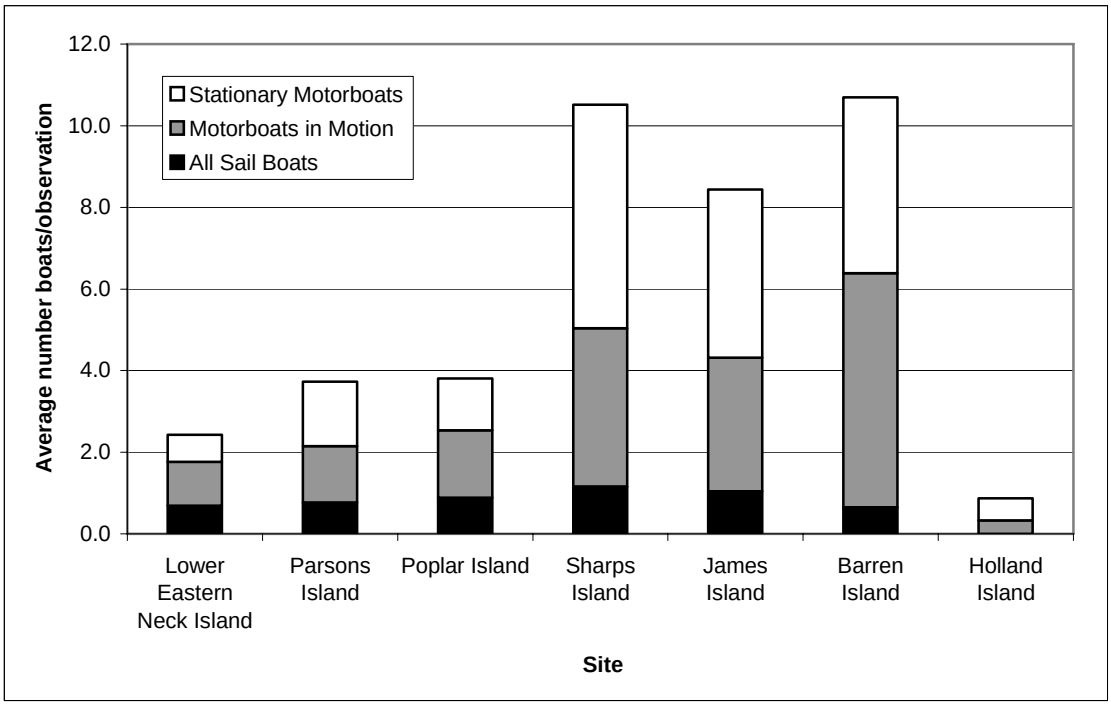

Figure 1-8. Comparison of aerial survey data of recreational boat usage within one-half mile of mid-Bay islands. Source data from EA Engineering.

Chapter 2: Potential Impacts of the Proposed Project

2.1 Short Term and Long Term Impacts to Environmental Resources

2.1.1 Noise

2.1.1.1 Regulatory Setting

The Dorchester County Code does not set forth any specific noise ordinances (i.e., maximum permitted sound level for various land uses) but does prohibit particular noises (e.g., operation of a vehicle without a muffler). The Code defines a noise disturbance as "sounds of sufficient volume, character and duration so as to be productive of actual physical discomfort or annoyance to persons of normal sensibilities." The use of commercial construction equipment that causes a noise disturbance is prohibited at nighttime, or more specifically, the period from ½ hour after sunset until 6 AM. Many activities are exempted from the ordinance including the sounding of safety signals.

2.1.1.2 Methods

Sounds associated with project construction and operations were evaluated to determine likely sound levels experienced by people or animals in the vicinity of the project. To conduct the analysis we first characterized the types of equipment likely to be used during different phases of the project and whether that equipment was likely to be used at night. Nighttime noise, in addition to being regulated in Dorchester County, is generally perceived as more bothersome than daytime noise and therefore is of particular concern. We evaluated the likely noise levels that would be associated with the equipment and identified the equipment that would tend to generate the loudest sounds or be perceived as the noisiest. We identified sensitive noise receptors including residential, recreational and commercial areas in the vicinity of the island projects using the most recent tax assessment database (Maryland Department of Planning) and other sources described in the evaluation of existing conditions. We incorporated all data in a GIS analysis to estimate the impacts of project noise to nearby residents and boaters.

Although sound transmission is a function of specific conditions between the sound source and receptor, for purposes of this analysis, we used techniques to model sound transmission that assumed typical or average conditions. We used commonly accepted rules of thumb to calculate the perceived sound levels after transmission of sound over land and water. We also followed standard assumptions regarding the additive effects of multiple sound sources. These assumptions will misrepresent sound transmission under atypical conditions, which may occur frequently. For example, temperature inversions will occur on most calm clear nights and will have the effect of amplifying sound levels heard around dawn.

Sound level attenuation between noise-generating activities and receptors was calculated by assuming that sounds originating from the island project traveled primarily over water, and therefore were attenuated 5 dBA with each doubling of distance (Blomberg 2004). Additional attenuation associated with molecular absorption and analogous excess absorption was also factored in. Molecular absorption refers to the linear attenuation of sound intensity as a result of its passage through air, and results in a 0.7 dBA decrease per 1,000 feet. Analogous excess attenuation is also linear, and is associated with other factors that reduce sound intensity such as humidity or ground cover, and was assumed to be a 1.0 dBA decrease per 1,000 feet.

When considering several sources producing sound simultaneously, sound levels cannot be added arithmetically since decibels are a logarithmic measure. Instead, the additive nature of sounds is such that the sound pressure level from two sources generating the same decibel level is approximately three dB greater than the sound pressure level of just one source (Table 2-1). Such rules were used in the analysis to calculate total sound levels associated with typical project conditions, such as the simultaneous, proximate operation of several pieces of heavy machinery.

Table 2-1. Addition of multiple sound sources. Source: Federal Highway Administration

Difference between sound level of 2 sources	Amount added to higher value
0 to 1 dBA	3
2 to 3 dBA	2
4 to 9 dBA	1
10 or more dBA	0

To quantify sound levels generated by equipment at each project, the Poplar Island Environmental Restoration Project (PIERP) was used as a model of typical conditions that could be expected during island restoration. Data on type and quantity of equipment used at PIERP, duration of each phase of that project, and timing of activities within each phase was gathered from the US Army Corps of Engineers, Maryland Environmental Service and other sources. Additionally, noise-related complaints at PIERP were considered when evaluating impacts associated with specific activities. The proposed projects at James and Barren islands are substantially different, so the probable sources and duration of noise were described separately (Tables 2-2 and 2-3).

Table 2-2. Estimated duration and timing of noise impacts at James Island during project development

	Construction – sand dredging	Construction – dike construction	Inflow	Crust Management	Habitat Development
Duration	2-3 months per phase	2-3 years[1]	Duration of project life	Duration of project life	Duration of project life
Time of Year		Year round	Seasonal (Sept – Mar)	Year round	Year round
Time of Day	Day and night	Day[2]	Day and night	Day only	Day only

[1] Construction at James Island may occur in two phases, thus duration of construction-related noise impacts would be doubled.
[2] Construction activities may start in the pre-dawn hours and end after dusk.

Table 2-3. Estimated duration and timing of noise impacts at Barren Island during project development

	Construction
Duration	1.5-2 years
Time of Year	Year round
Time of Day	Day

2.1.1.3 With-Project Noise Conditions – James Island

The highest *sustained* noise levels generated by the project are likely to be around 90 dBA at 50 feet. This sound level represents several pieces of heavy equipment (e.g., dump trucks, dozers, compactors) working simultaneously in close proximity to one another. Factoring attenuation over water, molecular absorption, and analogous excess attenuation, a 90 dBA sound will decrease to typical daytime background levels (55 dBA) within 3,200 feet of the noise source. The 55 dBA standard is a typical threshold level for noise regulation in rural areas (e.g., Talbot County Zoning Ordinance). From the GIS analysis, we determined that only the three privately-owned parcels on the James Island remnants and no improved residential or commercial mainland parcels fall within 3,200 feet of the proposed island perimeter, indicating that few if any people would notice these noises under typical conditions (Figure 2-1). However, given the rural character of the area adjacent to James Island, sound levels of 55 dBA may be greater than sound levels to which residents are accustomed. Sound levels of 90 dBA would attenuate to 45 dBA or half of the 55 dBA level within 6,400 feet of the proposed project. Eight parcels, three of which are improved, fall within this range. This noise zone does not extend into the recreational areas used by most boaters.

Back-up beepers create among the highest *periodic* sounds and their sound level can vary from 85-110 dBA at 50 ft. The placement of rock during construction will be in this sound range. Rock placement has been a source of noise-related complaints at PIERP, so these activities are likely to be judged as bothersome by neighbors that notice these sounds. Activities generating these loud, periodic sounds generally occur during daytime hours. A sound at the 110 dBA level typically attenuates to daytime background levels of 55 dBA within 10,000 feet of the source when traveling over water. The GIS analysis indicates that about 12 improved waterfront parcels and 17 improved non-waterfront parcels (agricultural, residential, and commercial) fall within 10,000 feet of the proposed project perimeter (see Figure 2-1). However, because sound is attenuated more rapidly over land by vegetation and structures, the sound levels may be attenuated below background levels before reaching some of the inland parcels. In sum, we estimate that 29 current residents, farmers and business owners/operators have the greatest potential to be affected by periodic noise levels. Tens more homes could be affected during certain weather conditions or if residents are sensitive to sounds quieter than 55 dBA.

In the future, some of the unimproved parcels in the area may be developed. Within the 10,000 foot periodic noise zone, there are 18 unimproved parcels, eight of which are waterfront. Several large (15-265 acres) unimproved parcels on the northern edge of Taylors Island have the potential to be developed into multiple residences, suggesting that the future population affected by noise could be marginally higher. This zone of periodically elevated noise levels extends west of the island over a major portion of the neighboring recreational fishing area.

Some sound-generating activities will occur day and night such as movement of tugs and barges and operation of pumps. These activities are associated with inflow and therefore will persist for the duration of the project development. Inflow occurs September to March, so these effects are expected to be seasonal. Sound levels associated with these activities would be in the range of 82 dBA for barges, 81 dBA for generators used to power lights, and 76 dBA for pumps. These sounds would combine into the equivalent of a single source generating 85 dBA at 50 feet.

That sound level would be attenuated to a nighttime background level of 40 dBA in about 6,000 feet. Three improved parcels on Taylors Island and 5 unimproved parcels are within this range of projected nighttime noise effects. Sound levels are likely to cross this threshold when activities occur on the southern or eastern edge of the island project (Figure 2-1).

Conclusions

Generally, noise impacts associated with the project at James are expected to be minimal and not interfere with activities, although nearby homes will experience elevated noise levels during certain phases of island development. The loudest sounds will be periodic or of relatively short duration. Rock placement has been a source of complaint at PIERP and is among the loudest sounds associated with the project. The sounds are likely to occur intermittently for several years. Occasionally, noise levels at about 20 nearby waterfront residences or businesses will likely exceed levels typical to quiet, suburban neighborhoods. When noise levels are high, affected residents will detect sounds louder than those to which they are accustomed. During times of the year when residents are primarily inside with windows closed, most noise levels will not be noticeable.

Significant effects will be experienced by recreational boaters, visitors to the existing James Island, and the three closest improved parcels on Taylors Island. Recreational boaters that typically use areas west of the island may be disturbed by the periodic noises, particularly during dike construction, which will exceed typical ambient noise levels. Recreational use of James Island by the three landowners or their guests is likely to be periodically disrupted by raised noise levels. Three residences on Taylors Island and 5 unimproved parcels will experience elevated nighttime noise levels (40-45 dBA). These noise levels will primarily be apparent when residents are outside their homes or have windows open and when project development occurs on the southern and southeastern sides of the island. The sounds heard at night, which are associated with material inflow, would not tend to vary greatly in pitch or volume and therefore would not be among the most annoying types of noises.

Sound levels associated with long-term sustained activities (e.g., operation of vehicles, pumping of dredged material) will not interfere with the activities of residents or boaters. Once the restoration project is complete, the occasional boat traffic that might be associated with limited visitation to the island will be consistent with pre-existing noise levels. Future waterfront land development could slightly increase the population affected by construction activities.

2.1.1.4 With-Project Noise Conditions – Barren Island

The proposed extension of the existing breakwater at Barren Island is a much smaller project than the island restoration project proposed at James Island. The project is expected to be constructed in less than 2 years and therefore will create short-term noise disturbances. However, more homes and businesses are located close to Barren Island than James Island, so noise impacts, while of a shorter duration, may affect more people.

Since the main noise-generating activities of the breakwater project are likely to be rock placement, we only evaluated one noise zone. As was done with the James Island analysis, we evaluated sensitive receptors within 10,000 feet to represent areas experiencing periodic noises above background levels of 55 dBA. The GIS analysis showed that 337 improved and 76

unimproved parcels were located within 10,000 feet of the proposed extension of the existing breakwater (Figure 2-2). Most of the affected parcels are residences, but a few restaurants, churches and other uses are present.

Construction activities are likely to take place only during the day, so noise levels associated with the project will not conflict with local nighttime noise ordinances. Noise levels are likely to be noticeable to most residents and visitors of the western waterfront area of Upper Hooper Island during rock placement. As with James Island, any recreational boaters choosing to fish within 10,000 feet of the island are likely to experience noticeable noises periodically. The Barren Island remnants are likely to experience periodic noise levels that would be perceived as moderately loud.

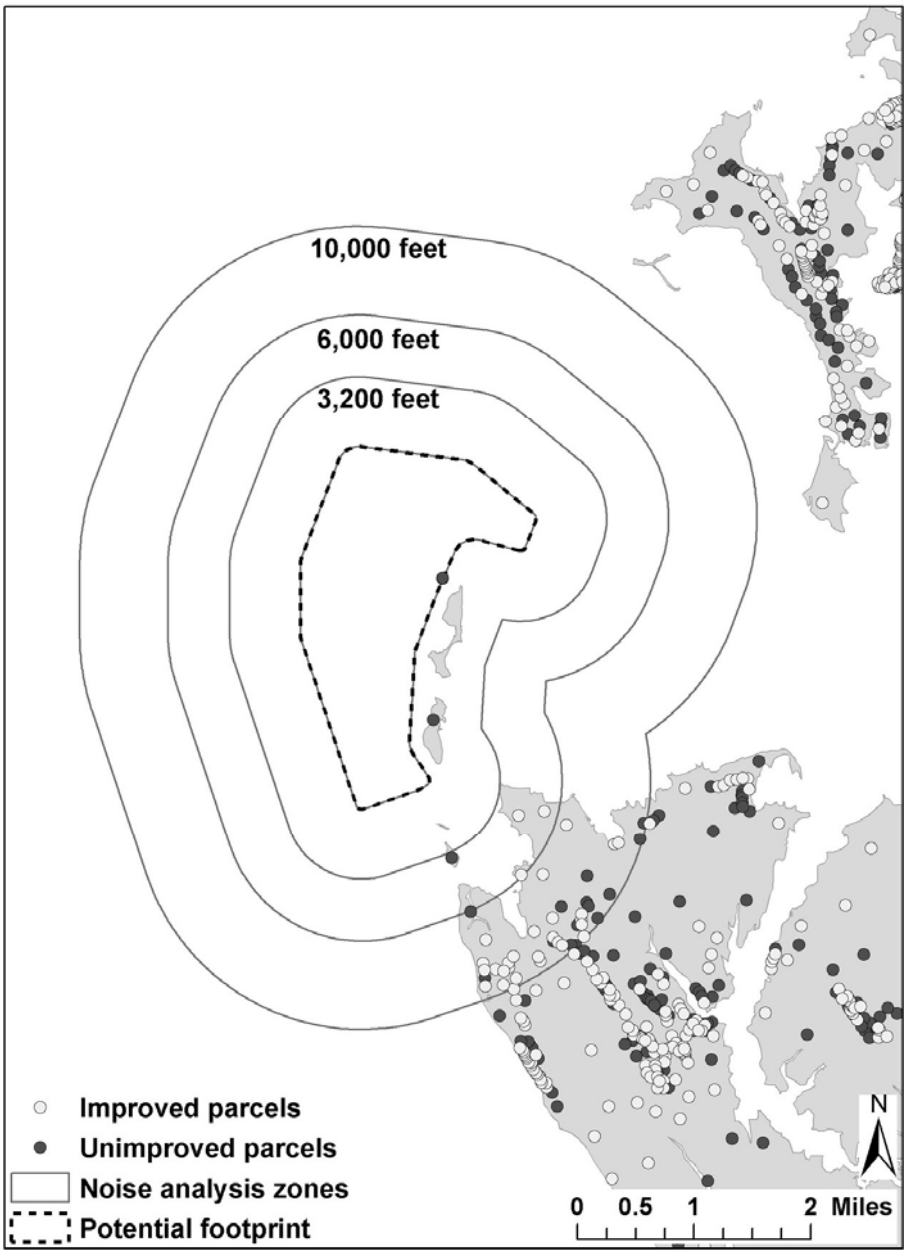

Figure 2-1. Zones used for noise impact analysis at James Island. Dots representing parcels show the centroid of the parcel.

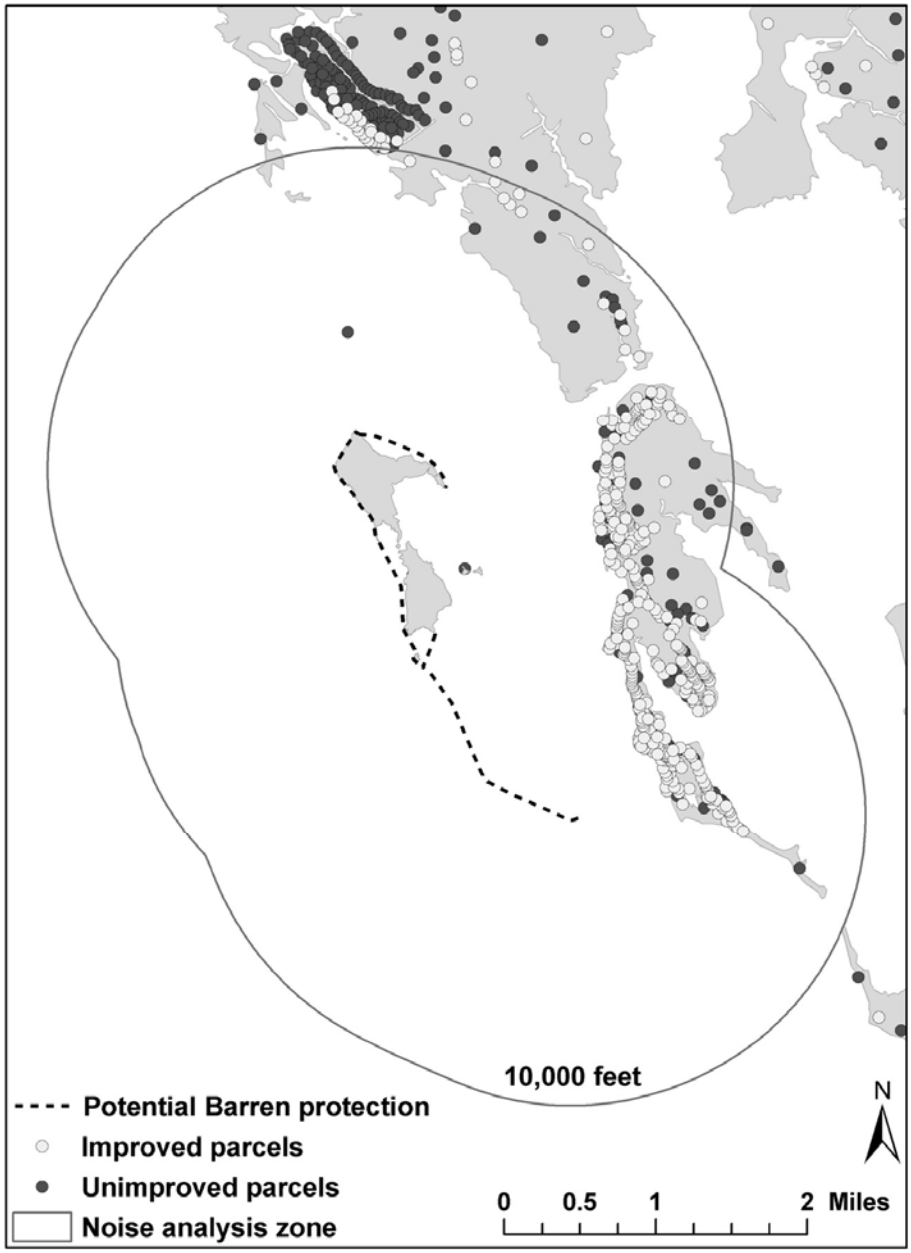

Figure 2-2. Zones used for noise impact analysis at Barren Island. Dots representing parcels show the centroid of the parcel.

2.1.2 Light

2.1.2.1 Regulatory Setting

Dorchester County has no light ordinance.

2.1.2.2 Methods

Although Dorchester County has no light restrictions, lighting is generally considered bothersome when it produces "excessive" illumination beyond the site boundary or creates glare that interferes with activities such as driving. To conduct the analysis of potential light impacts to residences and other areas, we first characterized the types of equipment and associated lighting likely to be used for different nighttime activities during different phases of the project. We evaluated potential light levels relative to existing light levels and evaluated the history of light complaints for the Poplar Island Environmental Restoration Project (PIERP) to judge potential impacts of light sources.

Lighting at PIERP was used as a model for analyzing potential light impacts associated with the proposed projects at James and Barren islands (Tables 2-4 and 2-5). Many light levels are specified by Occupational Safety and Health Administration (OSHA) regulations and are, therefore, not flexible. The brightest lights used at PIERP are shielded to direct light downwards or toward operations, so glare does not typically reach nearby residences or affect boaters. Brightness of navigation lights are mandated by the Coast Guard and are typically designed to be visible for 2 miles. Lights on barges must be visible for 3-5 miles depending on size and mast lights should be visible from 360° when boats are at anchor (US Coast Guard Navigation Rules and Regulations), such as when offloading dredged material.

Table 2-4. Lights used during operations at PIERP

Location	# lights	Wattage	Type	Height	Shielded?
Personnel pier	6	300 W	Incandescent	10 ft above dock	Yes, Down
Welcome marquis	2	300 W	Incandescent	12 ft	Yes, Down
Transformer at trailer complex	2	300 W	Incandescent	12 ft	Yes, Down
Building complex	6	60 W	Incandescent	7-8 ft	Yes
Transfer switch	1	60 W	Incandescent	5 ft	Yes
Navigation lights – buoys	2	2-4 candela	Incandescent		No
Navigation lights – Cell 6	2	2-4 candela	Incandescent		No

Table 2-5. Lights used during inflow at PIERP

Location	# lights	Wattage	Type	Height	Shielded
Spillway 1	4	1000 W	Mercury vapor	~12 ft	Yes
Spillway 3	4	1000 W	Mercury vapor	~12 ft	Yes
Spillway 4	4	1000 W	Mercury vapor	~12 ft	Yes

The main group affected by increased light levels is waterfront homeowners on shoreline adjacent to the projects. Light trespass from PIERP has been a source of a few complaints by neighboring residences. The primary complaint is a loss of the darkness that residents are accustomed to seeing. Most waterfront homes near James and Barren islands are at least as far from the proposed projects as the adjacent waterfront homes are from Poplar Island, so light

impacts are not likely to exceed those for Poplar. Only three parcels on Taylors Island are closer to the James Island project than homes at Poplar.

Similar to PIERP, a noticeable increase in nighttime light can be expected at James Island when work occurs 24 hours a day. Specifically, nighttime activities occur during the sand dredging portion of the construction phase and during the material inflow. Light from these activities is likely to be visible for many miles but will not necessarily be perceived as bothersome over that range. The inflow activities use the highest power bulbs of any project activity and these lights are raised to roughly 30 feet above sea level and have the potential to be seen over 10 miles away by an observer at 15 feet above sea level, under very clear atmospheric conditions.

The duration of nighttime activities varies. Sand dredging is continuous over the first several months of the project while inflow activities occur seasonally once initial construction is complete. Therefore, light impacts associated with these phases of activity will be temporary and seasonal, respectively. These operations use lights that are shielded, so glare should be minimal and not reach residences. Similarly, the protection project at Barren Island may have short-lived nighttime operations related to sand dredging, introducing temporary increases in lighting levels.

A minor increase in nighttime light associated with illumination of any permanent facilities at James Island (Table 2-4 above) is likely to occur over the long-term. Structures (docks, piers, breakwaters, channels) are required to be lit temporarily during construction either by floodlight and/or by federally maintained aids to navigation. Any structures remaining after construction are likely to be permanently lit by aids to navigation or low-intensity lighting (e.g., for piers). Additionally, marking the uncharted, restored James Island with aids to navigation would be a courtesy to watermen and recreational boaters in the area. These navigation lights may be visible at nearby residences, but will be consistent with existing lights in the waterway. Long-term impacts at Barren Island will be minimal since there will not be permanent facilities (i.e., buildings) at the project. Lights on breakwaters at Barren Island would be permanent after construction, and these lights would be characteristic of other navigation lights in the area.

In summary, implementation of the proposed project will introduce additional nighttime light to the project areas primarily during the initial construction and seasonal inflow phases. The main group affected by this increased lighting will be the waterfront homes in close proximity to the project, and any impacts will depend on homeowner perceptions of these increased light levels. Evidence from Poplar Island suggests that lighting will be considered tolerable to those in support of the project, but some residents are likely to notice and object to increased light levels. Permanent lighting of structures on James Island or aids to navigation used to mark James or Barren islands will be compatible with existing lighting in the area. Therefore, long-term lighting impacts are expected to be minimal.

2.2 Socioeconomic Resources

2.2.1 Future Land and Water Use

In considering the effect of future construction on an area, a baseline of likely future land conditions and probable uses in the absence of new projects should be evaluated to establish a baseline from which to compare changes. This section covers effects of the project on the economy of the region and changes to aesthetic and recreational resources. Changes in residential land use, commercial use, or recreational uses of the project areas could affect the level of perceived impact of the island restoration projects.

2.2.2 Fishery-related Economic Impacts

The impacts of island restoration projects on commercial fisheries are associated with:

- potential changes in resource conditions as reflected by changes in the abundance, availability, or catch per unit effort, of fish; and
- potential effects on fishing operations as reflected by project-imposed changes in travel time (e.g., distance to fishing areas), searching time (e.g., difficulty of locating productive fishing areas), or fishing time (e.g., difficulty operating fishing gear).

2.2.2.1 Types of Fishery Impacts

Using dredged material to restore a mid-Bay island is expected to have both negative and positive impacts on commercial fisheries. Negative impacts are associated with any: 1) loss of bottom fish habitat, 2) loss of fishing area, 3) any reduced productivity of adjacent areas due to changes in hydrodynamics or increased sedimentation, and 4) space-use conflicts between fishing and dredging/material placement equipment. Positive impacts are associated with: (1) reef habitat from the rip-rap construction of the island perimeter, (2) fishery-related improvements associated with the wetlands that will be created on the restored island, and (3) expected improvement in nearby bottom habitat associated with reduced sedimentation around the island.

2.2.2.2 Pattern of Fishery Impacts

The island restoration project at James Island would be expected to result in a pattern of impacts on fisheries that includes some short-term economic losses, followed by the potential for long-term economic gains. During initial site development, a period of five years or so, the placement of rip-rap and other construction activities may disturb bottom sediments and water quality and, at some sites, may cause small, but unavoidable space/use conflicts between equipment and barge operators involved in site construction and fishermen as they travel to and from fishing areas, set gear, and so on. These temporary adverse impacts will subside once construction ends, and will largely be offset by long-term beneficial impacts as the island matures and provides improved fish habitat and fishing areas, and reduces turbidity in nearby fish habitat areas.

Restoration of James Island will primarily reduce the quantity of fine sands and mud bottom, which have relatively low value for fish habitat. However, the loss of this 2000-acre area is considered too small to result in any significant decline in fish abundance since most affected fish populations are expected to find suitable alternative habitat nearby. This loss in the

quantity of fish habitat is expected to be offset to some extent since the restoration of the island is also expected to improve the quality of nearby fish habitat by reducing turbidity and providing underwater structure in the form of rock reefs. In addition to the potential benefits of rock reefs, some recreational species may become more abundant as a result of the potential expansion of SAV beds due to the wave and surge protection and erosion control that is expected to be provided by the restoration projects. Proximity to the high quality habitat afforded by SAV beds would also be expected to enhance commercial catch rates for some species.

2.2.2.3 Research Approach

The impact of mid-Bay island restoration on commercial fisheries was assessed by focusing on: a) expected changes in the abundance, availability, and catchability of fish; b) expected changes in travel, searching, and fishing time; and c) any "congestion externalities" that are expected to result from fishermen shifting effort from the island restoration site to locations that are already being fished.

2.2.2.4 Clam Fishery

The soft-shell clam (*Mya arenaria*) and the razor clam (*Tagelus plebius*) are the commercially important clam species in the Bay. However, the soft clam has shown dramatic declines in catch and value, in the vicinity of James and Barren islands and baywide, over the past seven years (Table 1-2). Dredging studies near James and Barren islands show the density of soft clams within either footprint is well below commercially-harvestable levels[1], and neither DNR Fisheries Service nor Natural Resource Police knew of any significant clamming activity in the vicinity of James Island. Some clamming a mile or more to the south of Barren Island was reported by DNR Natural Resource Police (Barren Island Consolidated Report FINAL August 29, 2002, p.33) but would be unlikely to be impacted by the project.

Razor clams were found to have densities approaching, but still well below, commercially productive beds at James Island (Harms, Final James Island Supplemental, October 2004, p. 13) and densities were very low at Barren Island (BBL, Final Barren Island Supplemental October 2004, pp. 3-12 to 3-13). At James Island, the most productive razor clam areas of those surveyed were within the project's proposed footprint, although these areas are not known to be used by clammers. The trends in razor clam catches are unknown because they are typically used for bait and are not tracked in the commercial catch database. Clammers reported that the dockside price of razor clams in October of 2004 was about $20/bushel.

At current clam densities, neither the James nor the Barren Island projects would significantly affect the abundance or catch of either type of clam. The only effect of the James Island project on this fishery would be the removal of beds with the potential to be productive in the future. Some potential for a razor clam fishery near James would be lost if future conditions led to increased clam densities. In summary, due to the lack of commercially productive beds and the low value of the potential catch, effects on the commercial clam fisheries appear to be minor.

[1] The MD DNR defines a productive natural clam bar as having an existing or potential harvesting rate of 1/2 bushel soft-shell clams (*Mya arenaria*) per hour, or 1.5 bushels of razor clams (*Tagelus plebius*) per hour (Code of Maryland Regulations, 2004).

2.2.2.5 Oyster Fishery

The American oyster (*Crassostrea virginica*) has historically been a commercially important species in the Bay. The areas around James and Barren are not currently productive for oysters although they have been productive in the recent past (Table 1-2). No NOBs are within either of the project footprints, so if productivity were to increase in these nearby beds in the future, the project would not be expected to have negative long-term impacts on oyster abundance. Some higher levels of turbidity associated with project construction have the potential to disrupt the oyster beds at James Island in the near term, however, time of year restrictions would be expected to minimize any impacts. In the long term, the effects of the project are unknown but it is possible the completed project will reduce sediment loads to nearby oyster beds and improve habitat quality.

The James and Barren Island restoration projects lie in shallow water and do not affect any typical boat navigation routes. Therefore, neither project is expected to increase travel time of commercial fishers to the NOBs.

2.2.2.6 Blue Crabs

The waters around James and Barren are used extensively for setting crab pots and the crab fishery is currently the most valuable fishery in the Bay. The James Island project options will cover roughly 2,000 acres of Bay bottom. The area of the project footprint that overlaps with areas of observed crab pot usage differs by month. In the three observations taken in July, August and September of 2003, the proposed footprint displaced 1,900, 1,900 and 1,400 acres corresponding to 40%, 50%, and 80% of local areas in use (Table 2-6). The high proportion of displacement in September demonstrates the importance of shallow water areas to crab fishers during times of high water temperatures. Although the surveys of crab pot usage were only spot checks, it seems clear that most if not all of the footprint area serves as productive commercial crabbing area. Therefore, 1,900 acres of displacement is a reasonable estimate of lost crabbing area since it roughly represents the area of the footprint that falls within waters four feet or deeper, which is the legal minimum depth for crab pots. The degree of the effect on catches will depend on the ability of crabbers to shift pots to new locations and the productivity of the lost area.

Abundance impacts on crabs are not expected due to the lack of projected impacts on spawning or significant habitat areas at James Island. The project has the potential to increase crab abundance if SAV beds expand. Precluding blue crabs and blue crab fishers from the island footprint area will result in both crab and crab fishers relocating to nearby areas. This shift should have a minimal effect on catch rates and expected economic returns from crab fishing overall. The higher concentration of crabs in these nearby areas may marginally increase catch rates per unit area (crab catch per acre). However, increased fishing congestion in these areas (pots per acre) may offset these positive effects. Based on evidence that the project will not affect crab abundance, therefore, it is reasonable to expect that the economic impacts of the project on crab fisheries will be minimal. However, there may be temporary impacts to individual crabbers who are displaced by the project as they search for new productive areas to set pots and some minor long-term impacts for any fishers who must travel farther to set pots.

Table 2-6. Overlap of 2003 crabbing areas with James Island footprint.

Month	Area crabbed (acres)	Area of intersection with footprint (acres)	Percent of area crabbed covered by footprint
July	4,516	1,933	43%
August	3,754	1,929	51%
September	1,651	1,358	82%

The Barren Island breakwater project will be built in shallow water and would not remove a significant amount of available area for crabbing. If we assume the information collected regarding docking areas and boat routes for pound net fishers holds for crab fishers, effects on travel time to place, tend, and collect pots are likely to be minimal (see Finfish section). Therefore, the proposed project at Barren should have no significant effect on crabbing in that area.

2.2.2.7 Finfish

Pound net, gill net, and hook and line fishing areas exist near both islands, but fishing activity is much heavier near Barren Island (M. Luisi, Maryland DNR, pers. comm. Oct. 2004). According to landings data aggregated for the region, finfish are a valuable resource in this area of the Bay. The value of finfish catches in the Southern Bay Segment, which includes waters near Barren Island, has been increasing in recent years (Table 1-3). Catches in the South Central Bay segment, which includes areas near James Island, have fluctuated but have remained fairly steady overall (Table 1-2).

A survey of commercial watermen with registered pound net locations was conducted to determine the nature of fish catches close to James and Barren islands. Pound net locations are recorded as a particular point, but pound nets may be set anywhere in the general vicinity of that point. Near James Island, 3 pound nets are actively set according to the survey, but only 1 waterman (using two nets) has reported catches to the State within the past five years (Table 2-7). At Barren Island, 14 watermen have 23 registered pound net locations in the vicinity of Barren Island, of which 17 are actively being fished. Eight of the 14 pound net fishermen reported conducting fishing activities on a daily basis from March or May through November or December each year. Catch data for the past 5 years were available for 4 of the 14 license-holders near Barren (Table 2-7).

Table 2-7. Total reported pound net catches from survey of commercial watermen near James and Barren islands, 1999-2003

	James (lbs) (1 of 2 active pound nets)	**Barren (lbs)** (4 of 14 active pound nets)
1999	10,411	382,986
2000	2,350	348,909
2001	49,948	414,665
2002	34,673	402,424
2003	23,519	292,667

In both island areas, fishers reported that their largest catches consisted of Atlantic menhaden, striped bass and Atlantic croaker. Other species caught in lower volumes included summer flounder, bluefish and white perch (Tables 2-8 and 2-9). Near Barren, fishers use the eastern edge of the deep channel to catch migratory species such as striped bass and red and black drum. Local landings data (Tables 2-8 and 2-9) and data that were aggregated for the regional water bodies encompassing James and Barren islands (Tables 1-2 and 1-3) show that striped bass, menhaden and croaker have provided the bulk of the value of the finfish catch for the past five years.

Table 2-8. Volume and value of reported pound net catches near James Island (1 of 2 active licenses reported)

Species	Total catch (lbs) 1999-2003	Total Value* 1999-2003
Striped Bass	17,273	$28,595
Croaker/Hardhead	26,996	$9,770
Menhaden	67,541	$5,821
Summer Flounder	3,704	$5,617
Bluefish	2,211	$1,242
White Perch	1,901	$1,032
Gray Sea Trout/Weakfish	502	$324
Spot	428	$253
Terrapins	87	$133
Spotted Sea Trout	65	$84
Spanish Mackerel	44	$49
Drum-Red	44	$25
Carp	97	$22
Channel Catfish	4	$2
Catfish-Other	2	$1
Bullhead Catfish	1	$0
Amberjack	3	$0

*Value was calculated by multiplying catch by average annual value per pound by species for each year.

Table 2-9. Volume and value of reported pound net catches near Barren Island (4 of 14 active licenses reported)

Species	Total Catch (lbs) 1999-2003	Total Value* 1999-2003
Striped Bass	81,959	$137,115
Menhaden	1,203,834	$108,084
Croaker	104,518	$32,915
Summer Flounder	12,710	$23,591
Bluefish	61,306	$19,663
Spanish Mackerel	19,759	$19,425
Gizzard Shad	78,561	$15,411
Spade Fish	22,846	$11,695
River Herring	71,513	$10,409
Sea Trout	14,759	$9,409
Spot	18,302	$8,905
White Perch	18,044	$8,200
Spotted Sea Trout	8,132	$7,424
Mullet	981	$731
Red Drum	363	$241
Cobia	127	$168
Winter Flounder	121	$155
Butterfish	184	$91
Atlantic Mackerel	160	$54
Channel Catfish	91	$36
Sea Herring	204	$25
Sheepshead	9	$5
Catfish-Other	12	$4
Tautog	1	$1
Shad - Unclassified	3	$1
Striped Bass - Released	123,124	$0
Amberjack	7	$0

*Value was calculated by multiplying catch by average annual value per pound by species for each year.

Potential Impacts on Fish Catch at James Island

All pound net fishers, active and inactive, have pound net locations registered outside the footprint of the proposed project and are generally well to the east of the existing island (see Figure 1-5) although this does not ensure that the area of the footprint is not used by fishers. Winter gillnet locations are typically well outside the proposed footprint in deeper water (M. Gary, MD DNR, pers. comm. May 2003). Since effort appears to be concentrated away from the project footprint, commercial fishing should not be negatively impacted by the project. Rock reefs have the potential to attract fish and increase catch rates.

Travel-time Impacts at James Island

The two active fishers setting pound nets near James Island report traveling between 8-10 ½ miles one-way to their pound net sites. For fishers traveling from the Little Choptank River, it is not expected that the project would have any significant effect on travel times to

pound net areas. Any fishers traveling out of the Little Choptank to the south should not be affected by the project because the proposed footprint does not affect the shallow, unmarked channel to the south of existing James Island. For any fishers traveling from the Choptank River, the project footprint, as currently envisioned, protrudes about 1,500 feet east of the island into the Little Choptank River causing a negligible increase in travel distances to most pound net areas (see Figure 1-5). All the inactive licensed pound net locations are on the east side of the island. Therefore, if fishing in these areas were revived, travel times to those areas would not be affected.

Potential Impacts on Fish Catch at Barren Island

At Barren Island, the footprint of the planned breakwater would not remove a significant amount of fishing area from use. The plan to place the breakwater in shallow waters ensures that the project will not overlap with areas used for pound net placement or gill net use. Some evidence suggests that the rocks used to build the seawall will act to attract fish and potentially increase abundance of certain species (e.g., striped bass) in the vicinity of the island and potentially increase catches.

Travel time Impacts at Barren Island

Fishers in the vicinity of Barren Island report traveling approximately 4-10 miles from their home ports to reach pound net locations. Several fishers reported docking at Jones Marina, so we assumed fishers were coming from this marina or nearby areas in our evaluation of the potential effects of the project on travel times. Fishers docked at Jones Marina or other major docks on Hooper Island use Fishing Creek, at the north end of Upper Hooper Island, to access waters near Barren Island. Licensed pound net locations show that nets are set both east and west of the island (see Figure 1-5).

The proposed breakwater will prevent boats from traveling east to west in the area south of the southern Barren Island remnant for a length of around one and a half miles. It is unlikely that many boats would attempt this route due to the shallow water in this area that was formerly part of Barren Island. If boats did use this approach to fishing areas, an alternative route to the south of the breakwater would increase travel distance by around two miles. However, since most boats are likely to use the northern route, the overall effect on fishers' travel time will be negligible.

2.2.3 Employment and Industry

2.2.3.1 Background

The regional economic impacts of spending on any new project, such as the restoration of James and Barren islands, are typically measured in terms of the jobs, incomes, business sales, and tax revenues that result. Spending on restoration creates direct impacts associated with the project itself, but this spending also generates indirect impacts or *multiplier effects* that are associated with purchases and sales by businesses that supply inputs to businesses that are directly impacted by project spending. Businesses unrelated to dredging may also benefit as increases in household incomes that result from direct and indirect economic impacts generate additional consumer spending and *induced multiplier effects*.

The analysis described in this section was designed to trace and measure direct, indirect, and induced economic impacts in the vicinity of the proposed James and Barren Island projects (Dorchester County, MD) and for the larger economic area of the state of Maryland. We estimated separate pathways of economic impacts associated with various stages of the project including planning, site development, dredging, transport, placement, habitat restoration, and site management and monitoring. This section outlines how the analysis was performed and summarizes results.

2.2.3.2 Methods

Our assessment of the economic impacts of dredging and island restoration involved five steps:

1) Estimate out-of-state, in-state, and local Dorchester County spending associated with various phases of planning, site development, dredging, material placement, island restoration, and site management and monitoring for each project;
2) Develop an economic input-output model of Maryland and Dorchester County; and characterize spending on various activities in terms of inputs purchased from various industrial and household sectors for each project;
3) Generate statewide and county-level economic multipliers for each industrial sector expected to experience direct impacts;
4) Use spending estimates and sector-level state and county economic multipliers to estimate direct, indirect, and induced impacts over the life of each project; and
5) Estimate the average annual economic impacts over the project period and the approximate pattern of annual economic impacts over that period for each project.

Estimates of direct spending on the tasks associated with the James and Barren Island projects were derived from cost data provided by the US Army Corps of Engineers. For James Island, the number of years of spending in each cost category varied from 4 years to 43 years. Therefore, average annual spending was calculated in each cost category by dividing total spending by the number of years of spending in that category. This average was then used to establish annual direct economic impacts associated with each major task. These direct spending estimates were then used as the basis for generating estimates of state and local direct, indirect, and induced economic impacts using the IMPLAN (IMpact PLANning) regional economic modeling system. (IMPLAN, 2002)

2.2.3.3 Approach

Expected spending on each project task was allocated to specific industrial sectors (e.g., purchases of fuel, stone, plant material) and to primary (or household) sectors (e.g., employee compensation, proprietor income) to generate estimates of direct impacts on various measures of economic performance including: job creation, employee compensation, other household income, business sales and tax revenues generated. Direct spending in each statewide and local industrial sector was then used within state and county IMPLAN models to generate total direct, indirect, and induced economic impact estimates for both economic areas for each project. Impacts at the county-level are based on estimated local spending and the existing (2004) economic structure of the county. Impacts estimated at the state level are based on statewide inter-industry linkages and patterns of in-state and out-of-state purchases and sales during 2004.

All impacts were developed based on average annual spending per activity over the duration of each phase. Because actual spending patterns vary over the life of the project, using average annual spending to reflect spending in each year will result in overestimates and underestimates of the impacts of some activities during some years. The following sections present and describe empirical results associated with average annual economic impacts for each phase, and provide a general description of the pattern of these impacts over time by showing the years in which overall spending (on all tasks) is expected to be above or below average.

2.2.3.4 General Results

Maryland Statewide Economic Impacts

The statewide economic impacts of dredging, material transport and placement, island restoration, and site management and monitoring at James Island are summarized in Table 2-10. The expected level of total spending is approximately $1.1 billion over 43 years. This direct spending is expected to generate over 8,000 direct person-years of employment (FTEs) over the life of the project. After multiplier effects are considered, this spending is expected to generate approximately 18,500 total person-years of employment (FTEs) in Maryland over the 43-year life of the project. The direct business sales in Maryland are expected to generate total (direct, indirect, and induced) statewide business sales of nearly $2 billion over the life of the project.

The statewide economic impacts of a smaller scale restoration project at Barren Island are summarized in Table 2-11. The expected level of total spending on this project is approximately $36 million over 3 years. This direct spending is expected to generate more than 300 direct person-years of employment (FTEs) over the life of the project. After multiplier effects are considered, direct spending is expected to generate approximately 690 total person-years of employment (FTEs) over the life of the project. The direct business sales in Maryland are expected to generate total (direct, indirect, and induced) statewide business sales of nearly $65 million over the life of the project.

Analytical results show that the use of dredged material to restore a mid-Bay island will generate economic impacts that will last approximately 40 years from the time of initial site selection, through site development and construction, material placement, and site finishing and restoration. Economic impacts will persist beyond 40 years as a result of long-term commitments to site monitoring and maintenance. Positive statewide economic impacts tend to accrue in the vicinity of dredging activities (primarily Baltimore County), but also accrue in the vicinity of material placement and restoration activities (Dorchester County in the case of James or Barren Island restorations). However, about half of the positive economic impacts associated with spending on dredging and material placement in Maryland leak outside the state because of imported inputs and labor. The following section summarizes the economic impacts that can be expected in Dorchester County as a result of the restoration of James and Barren islands.

Dorchester County Economic Impacts

The James Island project will result in limited direct economic impacts associated with dredging and material transport in Dorchester County because these activities involve purchases of labor and inputs from elsewhere in the state and from out-of-state. However, some job creation and local business purchases are expected as a result of work crews being stationed at James Island during material placement activities, and activities conducted as part of habitat

restoration work and site management and monitoring. These economic impacts are summarized in Table 2-12.

The analysis shows that of the $1.1 billion in overall project spending over 43 years, a total of approximately $549 million will be spent in the vicinity of the island restoration/placement site on site construction, habitat development, and site management and monitoring. This spending excludes direct spending on dredging, transport, and placement, which takes place primarily elsewhere. A significant amount of the indirect and induced economic impacts of local spending will leak outside the region because of the need to import labor and material to the restoration site. However, direct spending on the project is expected to generate nearly 3,000 person-years of employment (FTEs) in Dorchester County over the life of the project. After multiplier effects are considered, the total number of Dorchester County jobs created by spending on the project, including new jobs for existing county residents or those who will relocate to Dorchester County, is estimated to be approximately 6,000 total person-years of employment (FTEs) in Dorchester County over the 43 year life of the project. These projections assume that the entire site construction, restoration and maintenance budget would be spent within the county. If spending is spread over a larger economic area, a portion of these jobs would shift to other counties within the area. Local multiplier effects of direct spending on the James Island project are expected to result in expected total changes in business sales (direct, indirect, and induced) of approximately $750 million over the life of the project.

The smaller-scale Barren Island restoration project does not include spending on dredging, transport and placement of dredged materials from Chesapeake Bay shipping channels. Therefore, much of the spending on this project may be local. A significant amount of the indirect and induced economic impacts of local spending will leak outside the region because of the need to import labor and material to the restoration site. However, direct spending on the project is expected to generate nearly 90 person-years of employment (FTEs) in Dorchester County over the life of the project (Table 2-13). After multiplier effects are considered, the total number of Dorchester County jobs created by spending on the project, including new jobs for existing county residents and people who will relocate to Dorchester County, is estimated to be nearly 300 total person-years of employment (FTEs) in Dorchester county over the 3 year life of the project, if the entire amount is spent within the county. If spending is spread over a larger economic area, a portion of these jobs would shift to other counties in the region. Local multiplier effects of direct spending on the Barren Island project are expected to generate total business sales (direct, indirect, and induced) of approximately $50 million over the 3 year life of the project.

Table 2-10. Summary of state economic impacts of James Island restoration

STATE-WIDE ECONOMIC IMPACTS

JAMES ISLAND RESTORATION
(over 40+ year site development)

	Planning, Engineering, and Design	Site Development	Dredging	Transport	Placement	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]								
Year of spending in category	43	4	30	30	30	20	41	NA
Total Spending[2]	$51,996,674	$307,351,699	$177,320,777	$251,828,802	$100,731,521	$81,426,571	$108,390,609	$1,079,046,653
Average Annual Spending[3]	$1,209,225	$76,837,925	$5,910,693	$8,394,293	$3,357,717	$4,071,329	$2,643,673	NA
Average Annual Direct Employment[4]	16	470.4	9.8	41.4	4.4	110.5	41	NA
Total Direct Person-years of Employment	688	1,882	294	1,242	132	2,210	1,681	8,129
II. Average Annual Economic Impacts[5]								
Impact Category								
Annual Jobs (FTEs)[6]	29	1,229	61	130	34	143	67	NA
Annual Labor Income	$1,158,421	$53,467,399	$3,658,416	$4,848,019	$2,075,470	$2,779,627	$2,059,038	NA
Annual Employee Compensation	$1,060,840	$46,551,920	$3,065,953	$4,316,985	$1,741,908	$2,388,109	$1,823,872	NA
Annual Proprietors Income	$97,581	$6,915,479	$592,463	$531,034	$333,562	$391,518	$235,166	NA
Annual Indirect Business Taxes	$70,251	$3,891,233	$321,259	$524,713	$182,491	$255,803	$151,190	NA
Annual Other Property Type Income	$204,256	$13,511,612	$851,186	$1,861,149	$483,542	$1,230,770	$570,207	NA
Annual Value Added	$1,432,928	$70,870,244	$4,830,861	$7,233,881	$2,741,503	$4,266,200	$2,780,435	NA
Annual Business Sales	$2,285,903	$139,134,556	$10,691,139	$16,180,508	$6,074,247	$6,769,795	$4,726,831	NA
III. Total Economic Impacts[7]								
Impact Category								
Person-years per spending category	1,264	4,916	1,842	3,909	1,011	2,862	2,727	18,531
Total Labor Income	$49,812,103	$213,869,596	$109,752,480	$145,440,570	$62,264,100	$55,592,540	$84,420,558	$721,151,947
Total Employee Compensation	$45,616,120	$186,207,680	$91,978,590	$129,509,550	$52,257,240	$47,762,180	$74,778,752	$628,110,112
Total Proprietors Income	$4,195,983	$27,661,916	$17,773,890	$15,931,020	$10,006,860	$7,830,360	$9,641,806	$93,041,835
Total Indirect Business Taxes	$3,020,793	$15,564,932	$9,637,770	$15,741,390	$5,474,730	$5,116,060	$6,198,790	$60,754,465
Total Other Property Type Income	$8,783,008	$54,046,448	$25,535,580	$55,834,470	$14,506,260	$24,615,400	$23,378,487	$206,699,653
Total Value Added	$61,615,904	$283,480,976	$144,925,830	$217,016,430	$82,245,090	$85,324,000	$113,997,835	$988,606,065
Total Business Sales	$98,293,829	$556,538,224	$320,734,170	$485,415,240	$182,227,410	$135,395,900	$193,800,071	$1,972,404,844

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 40+ year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the total impacts over the life of the project, calculated by multiplying the average annual jobs or spending in each category by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-11. Summary of state economic impacts of Barren Island restoration

STATE-WIDE ECONOMIC IMPACTS

BARREN ISLAND RESTORATION
(over 3 year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	3	2	1	2	NA
Total Spending[2]	$531,300	$29,508,926	$5,157,251	$1,048,344	$36,245,821
Average Annual Spending[3]	$177,100	$14,754,463	$5,157,251	$524,172	NA
Average Annual Direct Employment[4]	2.3	90.3	139.9	8.1	NA
Total Direct Person-years of Employment	7	181	140	16	344
II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	4	236	183	13	NA
Annual Labor Income	$169,659	$10,266,840	$3,521,021	$408,254	NA
Annual Employee Compensation	$155,368	$8,938,926	$3,025,076	$361,627	NA
Annual Proprietors Income	$14,291	$1,327,914	$495,945	$46,627	NA
Annual Indirect Business Taxes	$10,289	$747,197	$324,032	$29,977	NA
Annual Other Property Type Income	$29,915	$2,594,507	$1,559,046	$113,057	NA
Annual Value Added	$209,863	$13,608,544	$5,404,099	$551,288	NA
Annual Business Sales	$334,788	$26,716,697	$8,575,463	$937,209	NA
III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	13	472	183	26	694
Total Labor Income	$508,977	$20,533,680	$3,521,021	$816,508	$25,380,186
Total Employee Compensation	$466,104	$17,877,852	$3,025,076	$723,254	$22,092,286
Total Proprietors Income	$42,873	$2,655,828	$495,945	$93,254	$3,287,900
Total Indirect Business Taxes	$30,867	$1,494,394	$324,032	$59,954	$1,909,247
Total Other Property Type Income	$89,745	$5,189,014	$1,559,046	$226,114	$7,063,919
Total Value Added	$629,589	$27,217,088	$5,404,099	$1,102,576	$34,353,352
Total Business Sales	$1,004,364	$53,433,394	$8,575,463	$1,874,418	$64,887,639

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-12. Summary of local economic impacts of James Island restoration

LOCAL (DORCHESTER COUNTY) ECONOMIC IMPACTS

JAMES ISLAND RESTORATION
(over 40+ year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	43	4	20	41	NA
Total Spending[2]	$51,996,674	$307,351,699	$81,426,571	$108,390,609	$549,165,553
Average Annual Spending[3]	$1,209,225	$76,837,925	$4,071,329	$2,643,673	NA
Average Annual Direct Employment[4]	8.9	128.3	13.3	44.0	NA
Total Direct Person-years of Employment	383	513	266	1,804	2,966

II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	15	553	38	59	NA
Annual Labor Income	$497,833	$21,866,143	$1,200,066	$1,323,022	NA
Annual Employee Compensation	$359,119	$14,716,632	$1,010,449	$1,093,782	NA
Annual Proprietors Income	$138,714	$7,149,511	$189,617	$229,240	NA
Annual Indirect Business Taxes	$29,073	$2,051,238	$100,129	$95,129	NA
Annual Other Property Type Income	$278,738	$7,795,198	$448,308	$459,321	NA
Annual Value Added	$805,644	$31,712,579	$1,748,503	$1,877,472	NA
Annual Business Sales	$1,707,124	$104,478,145	$5,878,827	$3,602,449	NA

III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	645	2,210	764	2,419	6,038
Total Labor Income	$21,406,819	$87,464,572	$24,001,320	$54,243,902	$187,116,613
Total Employee Compensation	$15,442,117	$58,866,528	$20,208,980	$44,845,062	$139,362,687
Total Proprietors Income	$5,964,702	$28,598,044	$3,792,340	$9,398,840	$47,753,926
Total Indirect Business Taxes	$1,250,139	$8,204,952	$2,002,580	$3,900,289	$15,357,960
Total Other Property Type Income	$11,985,734	$31,180,792	$8,966,160	$18,832,161	$70,964,847
Total Value Added	$34,642,692	$126,850,316	$34,970,060	$76,976,352	$273,439,420
Total Business Sales	$73,406,332	$417,912,580	$117,576,540	$147,700,409	$756,595,861

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-13. Summary of local economic impacts of Barren Island restoration

LOCAL (DORCHESTER COUNTY) ECONOMIC IMPACTS

BARREN ISLAND RESTORATION
(over 3 year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	3	2	1	2	NA
Total Spending[2]	$531,300	$29,508,926	$5,157,251	$1,048,344	$36,245,821
Average Annual Spending[3]	$177,100	$14,754,463	$5,157,251	$524,172	NA
Average Annual Direct Employment[4]	1.3	24.6	16.8	8.7	NA
Total Direct Person-years of Employment	4	49	17	17	87
II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	2	106	48	12	NA
Annual Labor Income	$72,912	$4,198,749	$1,520,153	$262,321	NA
Annual Employee Compensation	$52,596	$2,825,896	$1,279,960	$216,869	NA
Annual Proprietors Income	$20,316	$1,372,853	$240,193	$45,452	NA
Annual Indirect Business Taxes	$4,258	$393,880	$126,835	$18,862	NA
Annual Other Property Type Income	$40,823	$1,496,838	$567,883	$91,072	NA
Annual Value Added	$117,993	$6,089,467	$2,214,871	$372,255	NA
Annual Business Sales	$250,021	$20,061,953	$7,446,853	$714,273	NA
III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	7	212	48	23	291
Annual Labor Income	$218,736	$8,397,498	$1,520,153	$524,642	$10,661,029
Annual Employee Compensation	$157,788	$5,651,792	$1,279,960	$433,738	$7,523,278
Annual Proprietors Income	$60,948	$2,745,706	$240,193	$90,904	$3,137,751
Annual Indirect Business Taxes	$12,774	$787,760	$126,835	$37,724	$965,093
Annual Other Property Type Income	$122,469	$2,993,676	$567,883	$182,144	$3,866,172
Annual Value Added	$353,979	$12,178,934	$2,214,871	$744,510	$15,492,294
Annual Business Sales	$750,063	$40,123,906	$7,446,853	$1,428,546	$49,749,368

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

2.2.4 Environmental Justice

2.2.4.1 Definition

The EPA Office of Environmental Justice defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Fair treatment means that no group of people including a racial, ethnic, or socio-economic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (U.S. EPA 1996). Additionally, Maryland's definition, which builds on EPA's definition, specifically notes that all citizens of the State should expect (1) to be protected from public health hazards and (2) to have access to the socio-economic resources necessary to address concerns about their livelihood and health. (Commission on Environmental Justice & Sustainable Communities**,** *Annual Report 2002*).

2.2.4.2 Analysis

Environmental justice concerns arise only if a project is expected to generate negative environmental or economic consequences. Results of the air quality and water quality analyses suggest that sediments placed at this site will be free of contaminants and will not generate health risks to people within the area. The economic effects of the project are expected to be largely positive, so negative economic impacts are not a concern. However, temporary noise and light effects, visual impacts and recreational boater disruptions during the construction period could potentially be seen as undesirable impacts. For this reason, the presence of any vulnerable racial, ethnic, or socio-economic group in the vicinity of the projects was reviewed.

The demographics of the area around the project were evaluated using county subdivision data from the 2000 US Census. Variables on race and household income were assessed to determine whether areas near the projects contained a disproportionate share of any vulnerable group. Vulnerable groups were defined as:

- African-Americans
- Hispanics (non-white)
- All minorities (all non-white)
- Households below the federal poverty level

In addition, we evaluated whether the median household and per capita income levels were below the county or state level to further inform the evaluation of socio-economic groups.

For the county subdivisions around James and Barren islands, the only area potentially containing any vulnerable group was Taylors Island (see Figure 1-4). This subdivision contained a high proportion (20%) of persons living below the federal poverty level and an above average proportion (6.6%) received Supplemental Security Income (Table 2-14). On the other hand, the Neck subdivision, the closest area to the northeast of the project, was a fairly prosperous area of the county judging by the relatively high income levels and the low poverty level relative to both the county and the state (Table 2-14). Since the two subdivisions closest to the project cover a range of socio-economic groups, no particular group is being targeted by this project.

Table 2-14. Demographic statistics for area near James Island. Source: US Census 2000

	Taylors Island	Neck	Dorchester County	Maryland
Total Population	270	934	30,674	5,296,486
% White, not of Hispanic/Latino origin	87.8%	96.9%	69.4%	62.1%
% Black or African American, not of Hispanic/Latino origin	10.4%	1.9%	28.4%	27.9%
% Persons of Hispanic or Latino origin	0.0%	0.4%	1.3%	4.3%
Median household income	$23,750	$49,250	$34,077	$52,868
Per capita income	$36,290	$25,691	$18,929	$25,614
% Households With Supplemental Security Income (SSI)	6.6%	3.4%	4.7%	3.4%
% Persons with income below poverty level	20.1%	5.5%	13.8%	8.5%

Near Barren Island, the Hooper Island subdivision had a low median household income relative to the county and state, but no other statistics suggested high poverty levels in this area (Table 2-15). None of the county subdivisions contained a high proportion of minorities.

Table 2-15. Demographic statistics for area near Barren Island. Source: US Census 2000

	Hooper Island	Dorchester County	Maryland
Total Population	587	30,674	5,296,486
% White, not of Hispanic/Latino origin	98.3%	69.4%	62.1%
% Black or African American, not of Hispanic/Latino origin	0.5%	28.4%	27.9%
% Persons of Hispanic or Latino origin	2.6%	1.3%	4.3%
Median household income	$26,793	$34,077	$52,868
Per capita income	$24,656	$18,929	$25,614
% Households With Supplemental Security Income (SSI)	3.0%	4.7%	3.4%
% Persons with income below poverty level	4.6%	13.8%	8.5%

2.2.5 Safety to Children

2.2.5.1 Definition

"A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks… Therefore, …each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." (Executive Order 13045, April 21, 1997).

2.2.5.2 Analysis

No health or safety risks to children associated with the project have been identified. The types of activities associated with island restoration at James Island and island protection at Barren Island will not generate chemical constituents that may pose health risks to children. Additionally, as this project is located offshore, safety to children will not be an issue because children will not have access.

2.3 Aesthetic and Recreational Resources

2.3.1 Aesthetics

2.3.1.1 Methods of Visual Impact Assessment

The approach for this visual assessment is an adaptation of the Visual Resources Assessment Procedure (VRAP) developed for the US Army Corps of Engineers (Smardon et al. 1988) and the Forest Service Scenery Management System (USDA Forest Service 1995). Both procedures are intended to be used as general guidelines rather than rigid processes to inform analysis of visual effects of projects.

Evaluating project-related potential aesthetic impacts to a region begins with an inventory of the visual features of the landscape to establish a baseline of the region's visual character. This process includes assessing the quality of visual resources relative to the regional characteristics and identifying the area from which the project can be seen and the viewers affected. With this baseline, a proposed project can be systematically evaluated for its level of impact. The level of impact depends on the magnitude of change in the visual resource and the concern of viewers for those changes.

The steps followed for this analysis were:

1. Assess existing landscape character and visual resources
2. Assess scenic attractiveness of project location
3. Assess project visibility and visual sensitivity of observers
4. Simulate landscape with and without project
5. Evaluate change in view characteristics with project
6. Describe overall impact of project on visual resources

Visual resources were described by considering the following characteristics described by Smardon et al. 1988 (VRAP):

1. Landform
2. Water Resources
3. Land use and use intensity
4. Vegetation distribution

Landform is typically described in terms of elevation, range of elevation and distinct land elements such as mountains, rivers or streams. Water resources are described in terms of the proportion of a landscape in water and how water elements are incorporated in views. Land use and use intensity includes a description of land cover types, particularly how much of the land is developed vs. in a natural state, the density of development, types of buildings and other cultural features. Vegetation distribution is a description of the proportion of land in different types of vegetation and the pattern and fragmentation of elements. These characteristics combine to describe the regional character and the sensitivity of the existing landscape to change.

Elements of the landscape that contribute to quality of views can be described through a variety of variables (Table 2-16). People's preferences can vary greatly, but some elements are fairly common to visual appeal (Smardon 1983, Zube et al. 1975). Diversity of land uses, elevations, heights of dominant elements and patch sizes within views generally contribute to scenic attractiveness. Particular value is placed by viewers on water views and long views in

most contexts. The amount of natural land overall, is strongly correlated with increased public preferences, although the amount of natural land vs. agricultural or developed land seen as desirable varies by dominant land use and characteristics of the natural area (Hunziker and Kienast 1999).

Table 2-16. Landscape characteristics contributing to aesthetic quality. Adapted from Craik 1975

Landform
Range of vertical elevation
Drainage density
Mean slope
Land use
Land use diversity
Percent tree cover
Proportion of natural land use
Edges
Land use edge density
Variety across edges
Land use compatibility across edges
Contrast
Height contrast between dominant elements
Proportion of elements in height classes
Grain contrast/evenness: difference in land use patch sizes and their distribution
Water
Water edge density
Percentage area water
View
Area of view
Length of view
Relative vertical position of the viewer to the view

Scenic attractiveness and impact on attractiveness may be assessed using measures of view characteristics and results of visual preference research. However, the final test of impact of a project is the public perception of any change in visual quality, which is subjective and may be specific to the population being affected. Public opinion on attractiveness may be judged by determining whether areas are designated scenic areas or by conducting surveys. Since surveys were not conducted for this EIS, we have combined scenic designations with recognized preferences to evaluate scenic quality.

To evaluate impacts on visual resources, the measure of change in quality of a view was combined with the visibility of the project and the sensitivity of viewers to changes. Visibility of the project was assessed through a combination of GIS analysis and field reconnaissance. GIS viewshed analysis was used to delineate areas in Dorchester County that had views of the existing islands and proposed projects. Then surveys were conducted by boat and by car to assess which of the identified houses, commercial areas and road segments had views of the existing islands and adjacent waters.

Viewer sensitivity or level of concern was measured by considering the visibility of the project, the proximity of viewers, the number of viewers, the duration of views and the type of the viewer and associated expectations (e.g., recreationist, commuter, resident). Distance zones were used to describe the relative importance of changes to the viewer. Specifically, the view was divided into foreground (up to ½ mile from viewer), middleground (up to 4 miles from the foreground) and background (4 miles from viewer to the horizon) (USDA FS). Because changes that occur farther from the viewer are less apparent, changes were given less weight with increasing distance zone.

Views of the landscape with and without the project were simulated using GIS analysis. Both map views and 3-D visualizations of the viewer perspective of the projects were investigated. The with-project conditions were simulated using elevation, land cover and land use maps. The most recent conceptual diagram of the island footprint was used to evaluate with-project conditions, but it is likely that the final footprint will be different from the one evaluated. Specific layout of upland and wetland areas will affect the visual perceptions of the island, but were not available at this stage of analysis.

The effect of a change in view was evaluated using the visual impact modifiers of *spatial dominance*, *scale contrast* and *compatibility*, as defined in the VRAP (Table 2-17). To provide input into this assessment, the GIS analysis was used to calculate the change in appropriate landscape characteristics from Table 2-16. Several viewpoints were used to assess quantitative changes in the views. Locations of roads, homes, commercial property, sightseeing areas and public lands were all evaluated for applicable viewer locations. Finally, these quantitative measures were used in a qualitative assessment of the impact of the project relative to existing visual resources.

Table 2-17. Rating system used to assess visual impact. From Smardon et al. 1988

Modifier	Definition	Rating
Spatial dominance	The prevalent occupation of a space in a landscape by an object(s) or landscape element. Spatial dominance can be described in terms of being Dominant, Co-dominant, or Subordinate.	Dominant – the modification is the major object or area in a confined setting and occupies a large part of the setting. Co-dominant – the modification is one of the major objects or areas in a confined setting, and its features are of equal visual importance. Subordinate – the modification is insignificant and occupies a minor part of the setting.
Scale contrast	The difference in absolute or relative scale in relation to other distance objects or areas in the landscape. Scale contrast can be described in terms of being Severe, Moderate, or Minimal.	Severe – the modification is much larger than the surrounding objects. Moderate – the modification is slightly larger than the surrounding objects. Minimal – the modification is much smaller than the surrounding objects.
Compatibility	The degree to which landscape elements and characteristics are still unified within their setting. Compatibility can be described in terms of being Compatible, Somewhat Compatible, or Not Compatible.	Compatible – the modification is harmonious within the setting. Somewhat Compatible – the modification is more or less harmonious within the setting. Not Compatible – the modification is not harmonious within the setting.

2.3.1.2 Analysis

Regional Landscape

The general character of the region's visual resources was discussed under the existing conditions section. Some important aspects of the landscape for evaluating visual impacts are the characteristically long views enjoyed by observers on the water or shoreline, the low and relatively flat elevation of the region, and the lack of public access points to the waterfront (Figures 1-1-1 and 1-2). Due to these characteristic features, the islands in this region are highly visible for viewers on or near the water, but, because of the flat terrain, are not generally visible from inland areas. Little of the shoreline in this region is publicly owned or accessible and therefore, visual effects on the shoreline primarily affect a relatively small number of residents and the local water users.

Existing Aesthetic Quality

The aesthetic quality of the Barren Island region is easily characterized since Dorchester County tourism materials promote Hooper Island as a picturesque town and Route 335, which runs along the island, is designated as a State Scenic Road. James Island is not in view of any scenic roads, but the waterway is clearly an important visual resource for the region. The mid-Bay islands are part of a rich history of the region (e.g., Horton 1994) and add to land use diversity of views from the mainland and along the Bay mainstem.

Affected Area and Viewers

For purposes of the visual aesthetic analysis, the affected area includes 1) land areas where residents and transient visitors would be able to view the proposed island and 2) waterways where boaters would be able to view the proposed island. Residential areas will have extended periods of viewing and are therefore considered to have among the highest visual sensitivity. Views from scenic roads, businesses catering to tourists (e.g., restaurants with water views), and natural recreational areas (including water areas) are also considered to have high visual sensitivity. Other business areas and commuters or non-recreational travelers on roads, are not thought to focus on views and therefore have low visual sensitivity.

The affected land area for James Island includes primarily residential and agricultural areas along the Little Choptank River and Bay mainstem (Figures 2-3, 2-4, and 2-5). For Barren Island, the affected land areas are residences, commercial areas and roads on Upper Hooper Island (Figures 2-6, 2-7, and 2-8). The types of non-residential areas with views of the island include boat launches (Figure 2-9), churches, and a waterfront restaurant. Transient views of the islands may be seen from secondary roads where the roads are close to the shoreline.

Water users can be considered to operate anywhere in the vicinity of either project, but the greatest number of boats with views of the islands will be passing through the area along the Bay mainstem channel and channels leading to the Choptank River. Transient boaters would have lower visual sensitivity than boaters using the waters around the island. All boaters using the areas near James Island would have a clear view of the restored island. Boaters near Barren Island will be able to see the existing island, but will only see the new proposed breakwater from the western and southern sides of the island. Visual effects are likely to be noticeable only by those within a half mile of the island (i.e., those with foreground views).

Near James Island, 79 land parcels are likely to have a view of the project. Of these, 20 are agricultural (12 are improved), 1 is tax-exempt (owned by The Nature Conservancy), and the remaining 58 are residential parcels, although only 31 of those parcels currently contain houses or other structures indicating regular use. The Nature Conservancy (TNC) parcel, located at the northwest tip of Taylors Island, was previously the O'Donnell Island preserve, but the island is completely under water and the parcel is no longer managed as a preserve. The level of aesthetic impact that parcel should be minimal because the proposed footprint is north of the parcel and will not occupy a significant portion of the view.

Near Barren Island, 155 parcels will likely have a view of the island, and depending on final configuration of the protection project, a few parcels may have a view of the breakwater that extends south of the existing remnants. Of these parcels, most are residential but 2 are agricultural (1 is improved), 2 are commercial (1 store, 1 restaurant), 2 are exempt commercial (fire department and post office), 2 are tax-exempt (churches), 4 are marshland (all unimproved). The remaining 141 parcels are residential, 118 of which contain houses or other structures.

GIS Analysis of James Island

The variables that best captured the changes in views in this waterfront environment were measures of change in the proportion of long views and change in the proportion of view that was water. Views were assessed for several points in the landscape to represent concentrations

of viewers. Since no public areas had views of the project, points were selected to represent distinct residential areas (Figure 2-10).

In the GIS analysis of James Island, three areas were evaluated for changes in the foreground, middleground, and background views (see Figure 2-10). A variety of landscape features were compared for the adjacent shoreline and the proposed island and we present the variables that were quantified to judge spatial dominance of the project. Other variables examined in the GIS are considered in the following summary of impacts.

The total field of view from a particular point was first characterized for each distance zone by measuring the total angle of the field of view that reached the specified distance. For example, the total view for the middleground represents the angle of the view in which an observer can see at least ½ mile. Next, the change in the proportion of the field of view that was land or water was measured for each distance zone. Using three different distances allows the effect of changes in length of view and proportion of view that is water to be characterized.

The proposed project does not fall in the foreground of any viewpoint. Therefore, foreground views were not affected by the project.

For the middleground (½ – 4 miles), the view was assessed in terms of the angles of total view, land view, and water view with and without the project (Figures 2-11 and 2-12). The percentage change in the proportion of middleground view (at 4 miles) that is land or water with the project is shown in Table 2-18. The analysis shows that from viewer locations 1 and 3, 26% and 21% of middleground views that were water without the project became land views with the project. In addition, the proportion of the middleground view that consisted of land increased 30% and 113%. At viewer location 2, on the north side of the Little Choptank River, homes were far enough away that their middleground views were not affected.

Table 2-18. Changes to middleground views associated with project (½ to 4 miles)

	Viewpoint 1	**Viewpoint 2**	**Viewpoint 3**
Total Middleground View (width of view in degrees)	156°	172°	122°
% change in water view with project	-26%	0%	-21%
% change in land view with project	30%	0%	113%

To calculate impacts on background views, we measured total angle of background view and proportion of background view occupied by the proposed project. To make the latter measurement, we measured the total angle of the project and subtracted the angle occupied by existing James Island (Figure 2-13). Additionally, to document the potential change in long water views, we measured the with-project change in water views greater than 6 miles (Figure 2-14; Table 2-19). The results show that for the longest views from the viewer locations, between 30% and 62% of long views over water are lost with the project. From all locations, the project occupies about ¼ of the long views.

Table 2-19. Changes to background views associated with project (4+ miles)

	Viewpoint 1	Viewpoint 2	Viewpoint 3
Total Background View	82°	64°	102°
Background view occupied by project	26%	25%	21%
Change in waterview > 6 miles	-62%	-34%	-30%

2.3.1.3 Overall Impacts – James Island

Spatial Dominance

From the results of the quantitative GIS analysis, it is evident that the James Island restoration project has the potential to be a significant element in the landscape for sensitive viewpoints (e.g., nearby residential areas, waterfront businesses, fishing areas), but for the majority of viewers who will see the island as part of a background view, it is anticipated that the island will blend into the existing landscape when completed. The perceived level of dominance in the landscape will depend on the final acreage of the footprint, and the observer's sight line and distance to the project.

The new island will be a prevalent feature in the landscape when seen from residences on the adjacent shoreline or when viewed by boaters in the adjacent waters. From about 20 homes, the middleground views will be significantly changed by the project, yet no homes will have the island in their foreground views. When viewed from the water, the island is particularly visible to boaters since it sits at the mouth of the Little Choptank River, perpendicular to river flow. The island will be visible for miles upriver and out into the Bay mainstem as part of the background view for most observers. Fishers using recreational fishing grounds near James will see the island as a dominant feature of the foreground and middleground view.

Scale Contrast

The scale contrast of the restored island will be moderate for the previously described set of sensitive viewers (primarily nearby residents and local water users) since the island is much larger than the existing James Island remnant. However, the scale of the existing and proposed project is consistent with other islands along the eastern shore and is designed to be close to the size of the historical footprint. Therefore, viewers seeing the island as part of a background view will not perceive a significant scale contrast. When vegetation on the restored island is mature, the height of the restored island will be 5-10 feet higher than the highest features of the adjacent mainland shoreline and the stone-faced dikes will be a more prominent feature above the waterline than the existing shoreline in the foreground and middleground views.

Compatibility

In the long term, the modification is generally harmonious within the setting to the extent that it is a restoration of the island to the scale of its historical footprint. However, in the short term, the bare ground that will be apparent until vegetation gets established will contrast with the adjacent vegetated shoreline. In addition, the shoreline of the island is more regular than the natural shoreline and thus will contrast with existing shoreline even after vegetation has established. The degree of this incompatibility cannot be determined until the final island configuration is designed. The presence of low dikes and breached dikes associated with wetland cells has the potential to minimize this contrasting effect from some views.

2.3.1.4 Overall Impacts – Barren Island

The breakwater at Barren is an extension of an existing breakwater and a significant portion of the breakwater is out of view of the residences on the adjacent shoreline. For these reasons, the breakwater itself is expected to have minimal aesthetic impacts. Boaters using areas close to the site may notice some level of incompatibility between the natural shoreline and the breakwater.

Any adverse impacts of the breakwater would be expected to be offset by the aesthetic enhancements of preserving the existing island. Barren Island introduces an element of natural land cover to views of the region that are otherwise dominated by residential and commercial uses. By preventing erosion of the island, the project improves many measures of the quality of the view (Table 2-16) including land use diversity, percent of tree cover, proportion of natural land use in view, and range of vertical elevation.

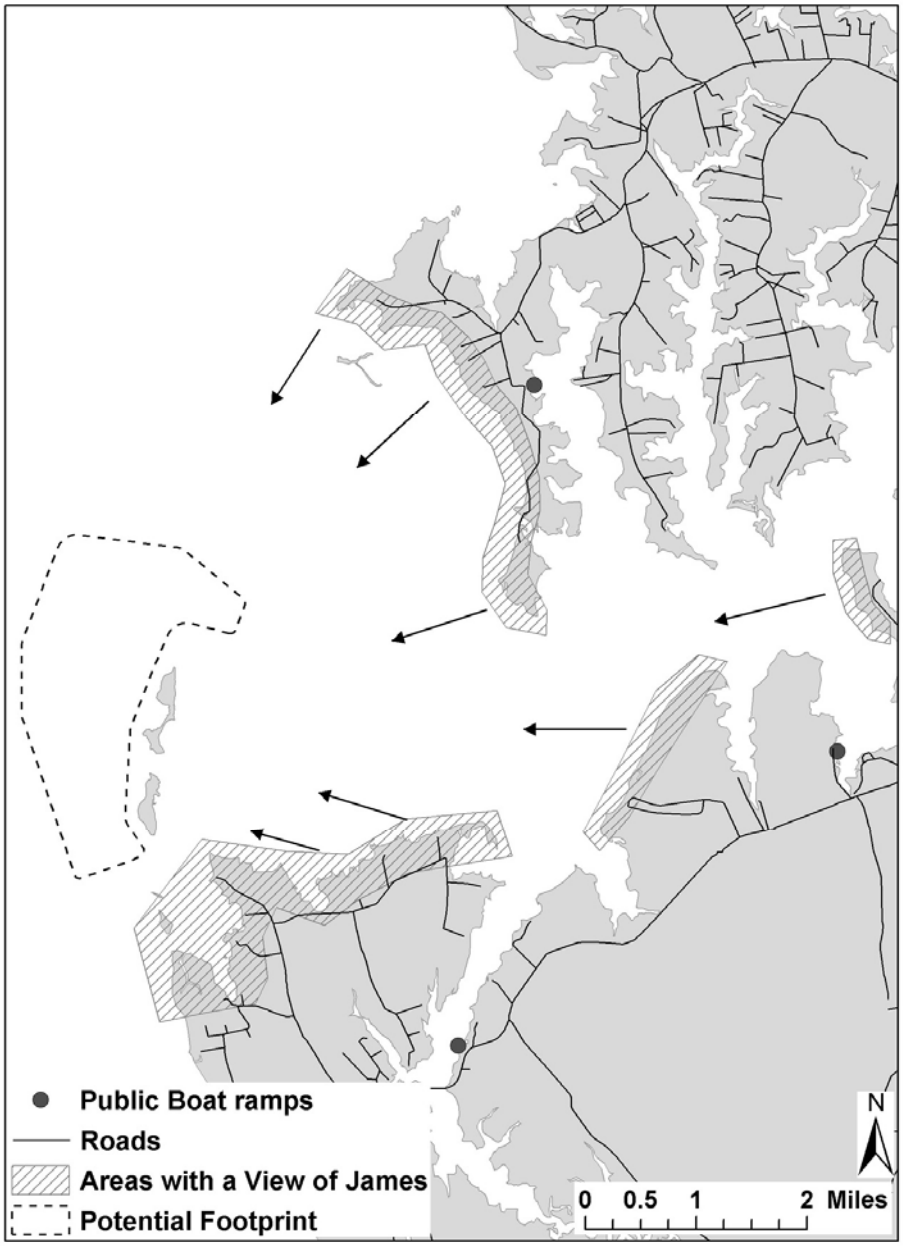

Figure 2-3. Area of potential visual impacts near James Island. Boat ramp source: Maryland DNR.

Figure 2-4. Characteristic shoreline area near James Island

Figure 2-5. Shoreline area near James Island

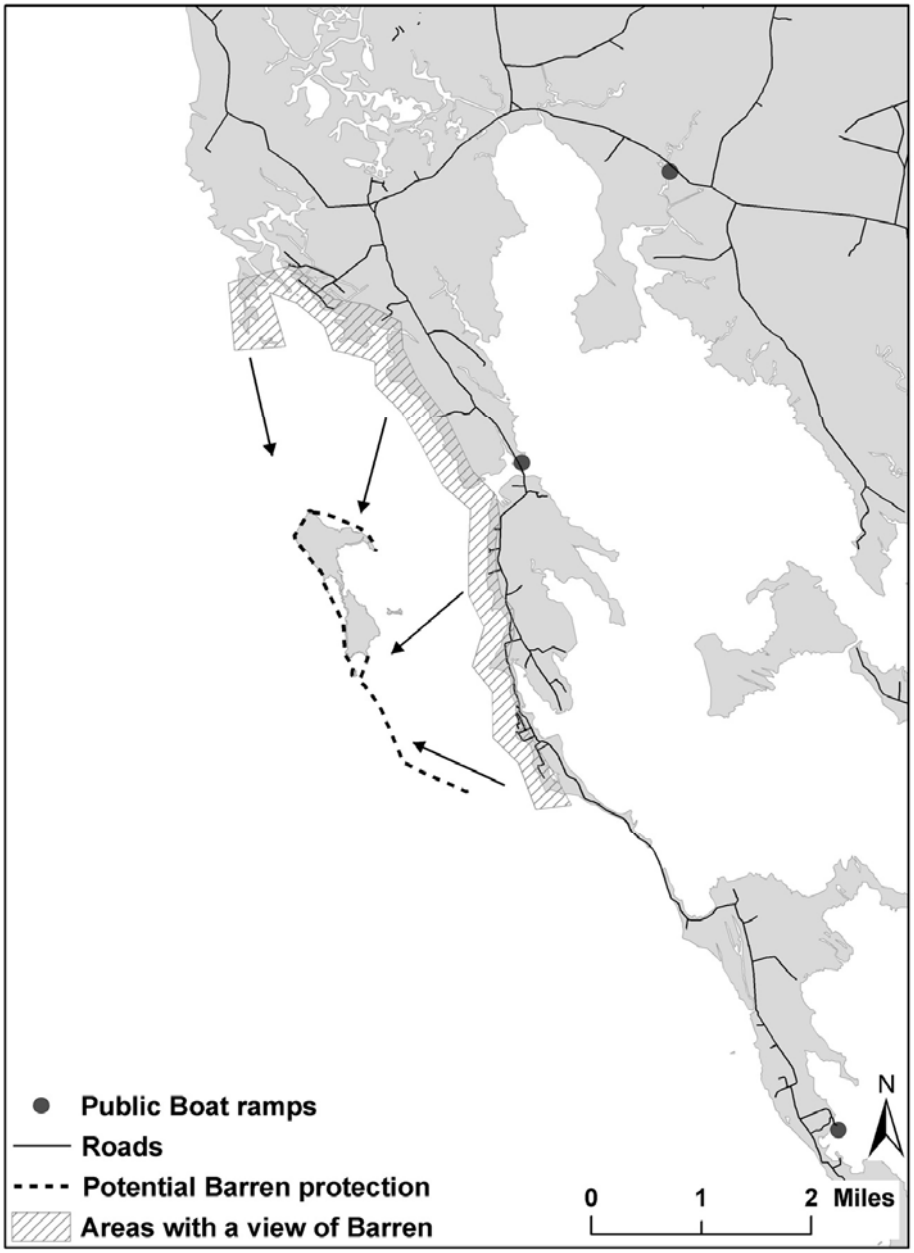

Figure 2-6. Area of potential visual impacts near Barren Island. Boat ramp data source: Maryland DNR.

Figure 2-7. Shoreline area east of Barren Island.

Figure 2-8. Characteristic shoreline area near Barren Island.

Figure 2-9. View of Barren Island from boat launch on Fishing Creek.

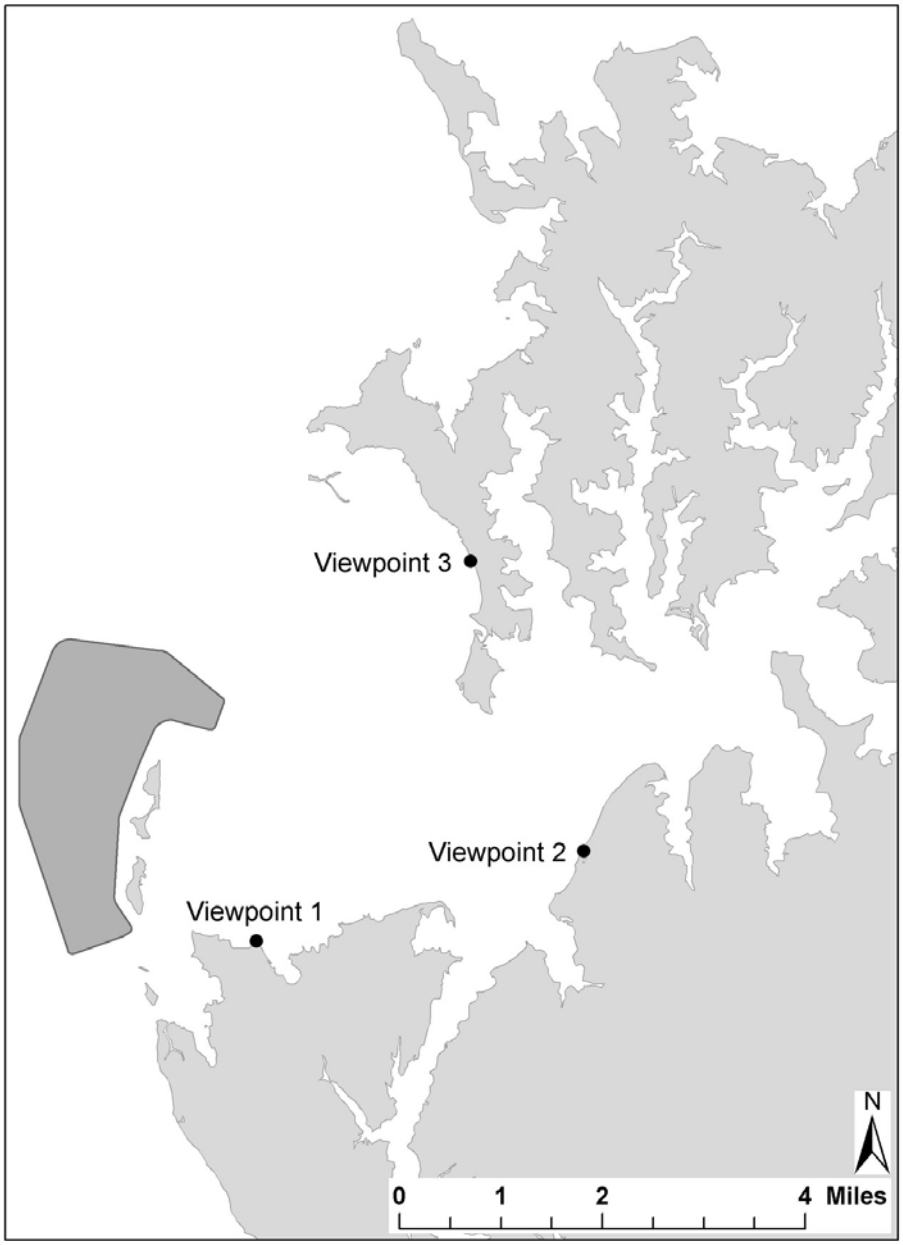

Figure 2-10. Viewpoints used for aesthetic analysis.

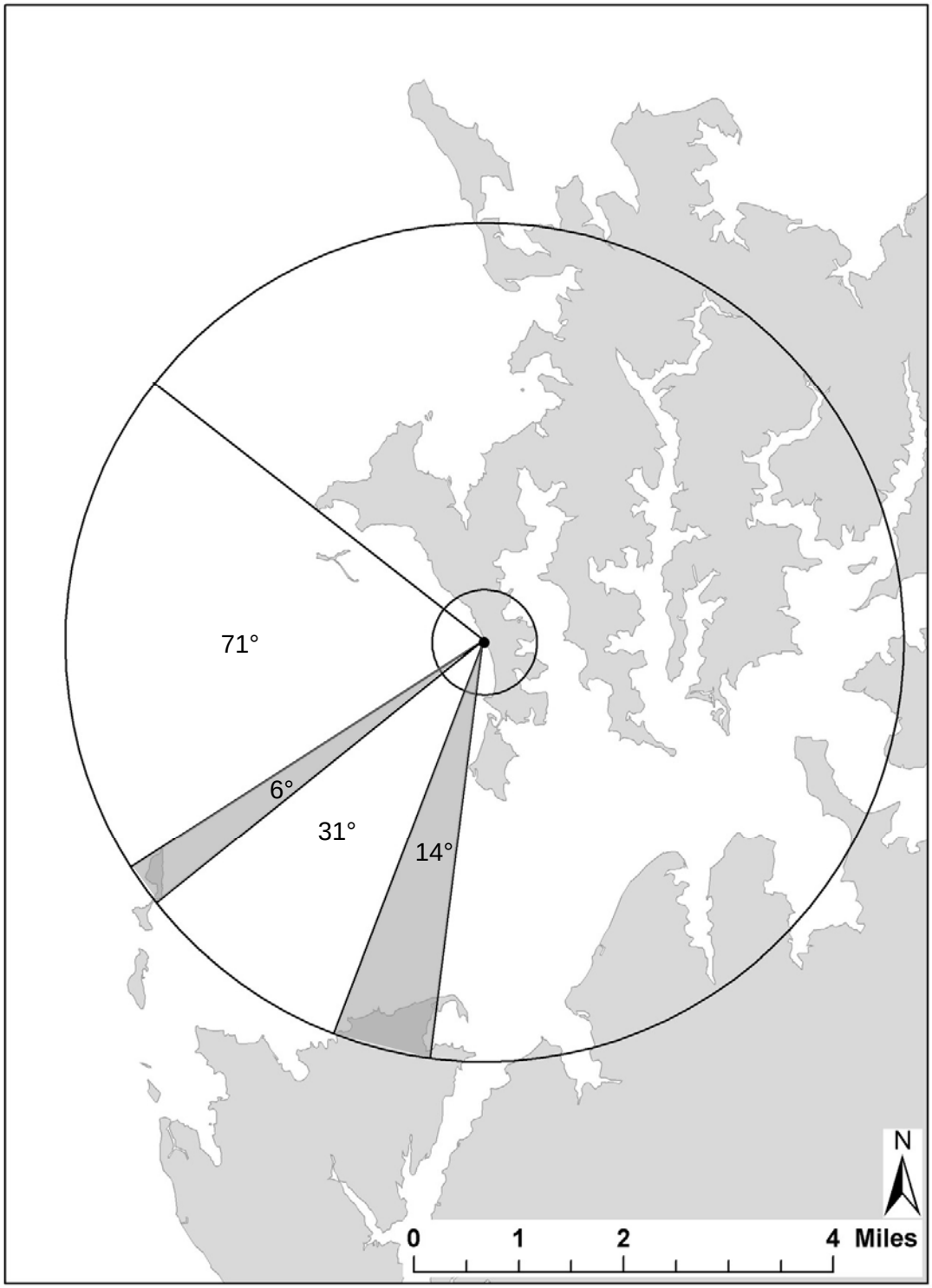

Figure 2-11. Existing middleground views. The area between the circles represents the middleground. The smaller circle has a ½ mile radius and represents the foreground. Total middleground view at Viewpoint 3 is 122° (71° + 6° + 31° + 14°). Total water view in the middleground is 102° (71° + 31°). The total land view (shaded) is 20° (6° + 14°).

Figure 2-12. Middleground view with project. The total middleground view remains 122° with project (50° + 21° + 6° + 31° + 14°). The project occupies 21° of the view (hatched area). Total water view is now 81° (50° + 31°). This represents a -21% change from without project conditions.

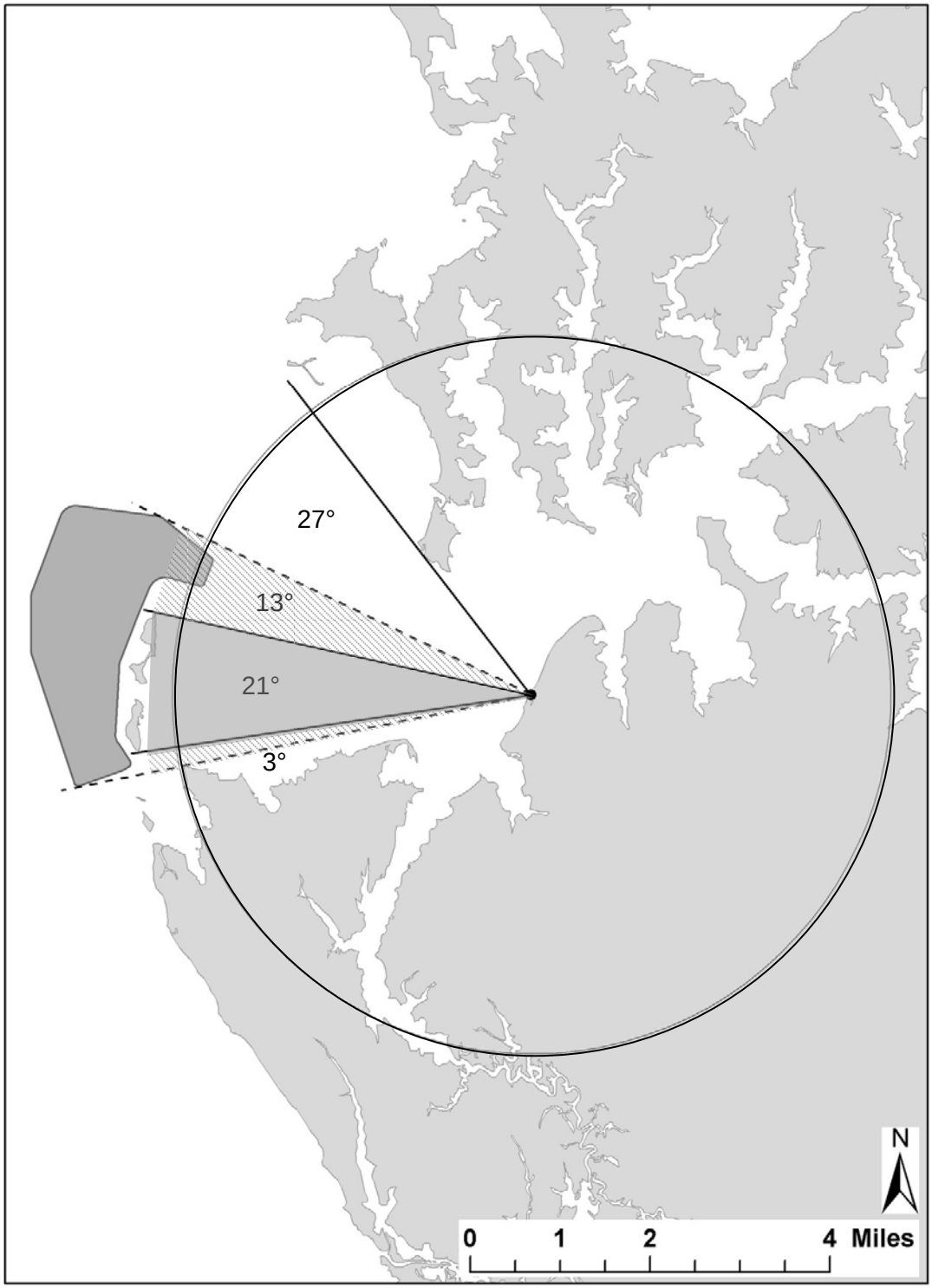

Figure 2-13. Background view. The area outside the circle represents background view (greater than 4 miles). The total background view at Viewpoint 3 is 64° (27° + 13° + 21° + 3°). Although the total angle of the project is 37°, the change associated with the proposed project is 16° (25% of total view) since existing James Island occupies 21°.

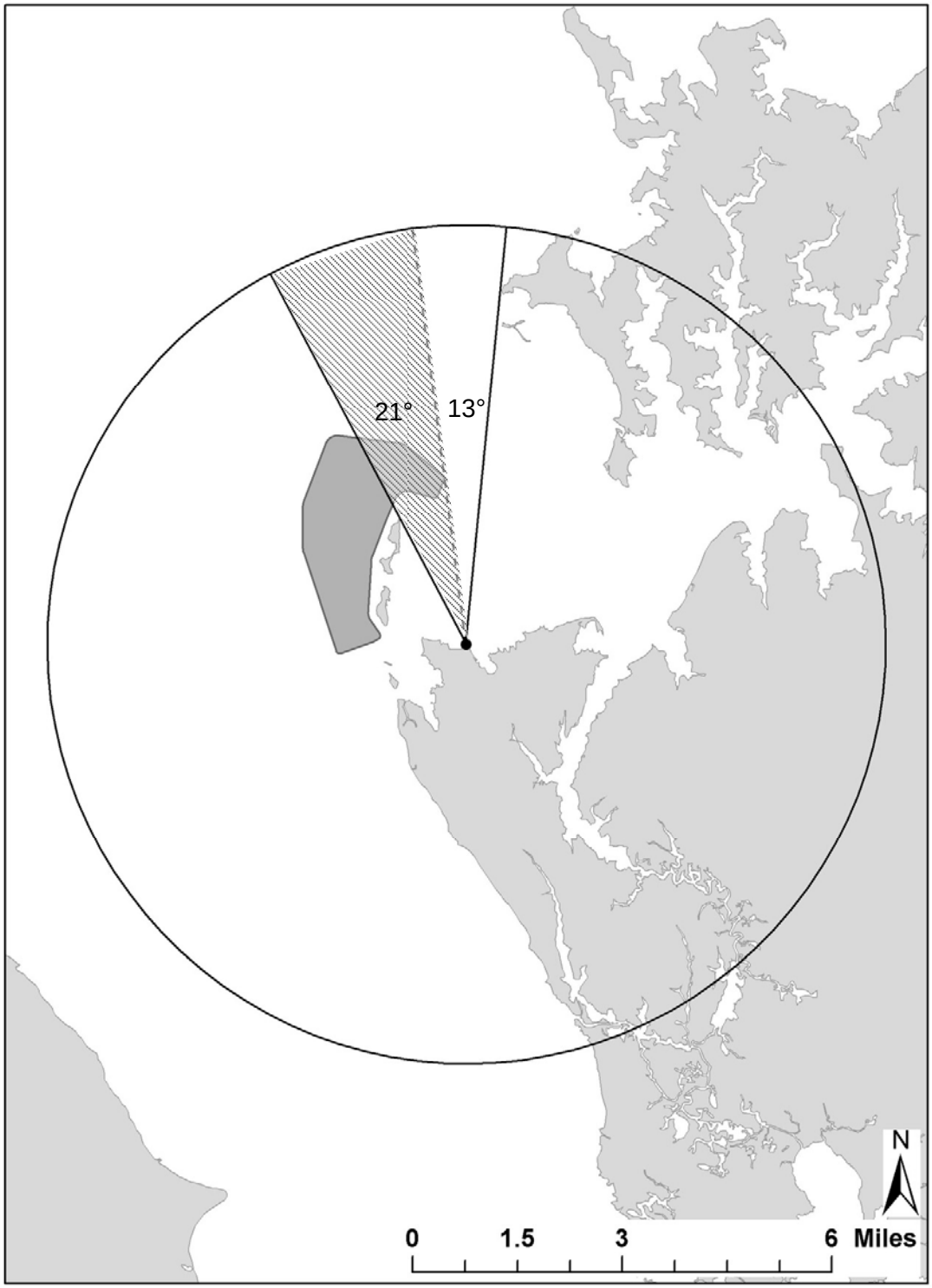

Figure 2-14. Long water views. The area outside the circle represents long views (>6 miles). The total without-project long-view at Viewpoint 1 is 34° (21° + 13°). The long-view occupied by the project is 21°, or 62%.

2.3.2 Recreation

2.3.2.1 Recreational Boating

Methods

To evaluate potential impacts of the projects on recreational boaters, we considered how recreational boating trips involving various classes of vessels could be affected by the island restoration projects. To distinguish recreational boaters from those primarily fishing, we assumed recreational boaters would be passing through the waters near James and Barren islands on their way to typical boating destinations. We considered the likely boating destinations and the typical routes that sail and motorboats would be likely to take in the vicinity of the islands. We then evaluated whether the island placement would affect passages along these routes. We also considered visual or other disruptions to commercial or recreational boaters, which were described in previous impact sections. These impacts are summarized here.

Analysis

Although boaters do not necessarily follow shipping channels or designated routes, the majority of recreational boaters that use the Bay use navigational markers of charted locations to set courses. Recreational boat use of waters in the vicinity of James Island is high for the mid-Bay, and a large portion of transient boaters would be likely to pass by James Island on their way in or out of port locations in the Choptank River. Boats navigating from the Bay mainstem channel to the river would tend to avoid the shallow water (3-8 feet) in the footprint of the project. Boats that plot courses using navigational markers would also be unaffected since the nearest navigational marker is 1.6 miles away from the project footprint. Even the small boats that choose to use the shallow waters adjacent to the channels will not typically be required to change course to avoid the island. Non-powered boats (e.g., kayaks and canoes) are not major users of this area and are typically directed by tourism literature to inland destinations (Dorchester County Dept. of Tourism, Water Trails of Dorchester County).

The breakwater project at Barren Island is in water too shallow for most boats (1-3 feet) and will have no influence on navigation or movements of transient recreational boaters. Because Barren Island is a wildlife preserve, it serves as a destination for small motor or sail boats and non-powered boats. The project will not prevent these small boats from reaching areas near the island, or prevent access to the island itself since the eastern side of the island, which is the most convenient access point for many small boaters, will not be hardened. In the long term, the project will tend to enhance this area as a destination for small boats since without the project, erosion is expected to reduce the size and the biological productivity and diversity of the island.

Boaters in the vicinity of either island during construction will be exposed to an increase in barge traffic as well as temporary noise and visual disturbances. Boats that are not fishing or lingering in the area will experience these effects for a short duration only. Boaters that wish to avoid the areas immediately around the project have many alternative boating areas and will not be prevented from reaching common boating destinations in the Choptank River. Some impact to small recreational boats approaching Barren Island should be expected during construction. Boaters will likely avoid the immediate area of Barren Island during the relatively short period when heavy equipment is in use. However, recreational boating areas that are similar to those

near Barren Island and equally accessible are abundant in the area, so these temporary disruptions should not result in significant adverse impacts on local recreational boaters.

2.3.2.2 Recreational Fishing

Methods

The economic value that recreational fishers place on a fishing site depends on factors that include: the abundance, availability, and size of fish at the site; the distance to and accessibility of the site, fishing congestion at the site, non-fish related characteristics of the site (e.g., sheltered vs. open water), and the availability of alternative fishing sites. Island restoration activities that change recreational fishing opportunities or affect fishing success at sites for which there are few comparable substitutes have far greater impacts than activities at sites that are near many other potential fishing sites.

Effects on recreational fishing were considered in three categories: 1) potential impact on boat access, 2) potential impact on fish catches 3) potential effect on quality of the recreational experience. To address the first concern, we considered routes local boaters would be likely to take and evaluated whether the projects would interfere with navigation along these routes. For the second concern, we evaluated conclusions from the aquatic biology analyses, conducted interviews with personnel knowledgeable about recreational fishers' activities near the island, and evaluated research on the potential effect of underwater rock placement on recreational fish species. For the third concern, we evaluated potential aesthetic and congestion effects during construction and in the long term.

Boat Access to Fishing Areas

The areas of primary interest to recreational fishers in the vicinity of James Island are areas deeper than 15 feet. A moderate number of fishers use intermediate depths of roughly 5-15 feet and a small number of enthusiasts use the very shallow areas primarily to fish for red drum and spotted sea trout (M. Gary, MD DNR, pers. comm. May 2003). Recreational fishers using the waters near James Island will arrive from a variety of starting points but will tend to use the same boat access channels and routes as commercial fishers. Following the analysis done for commercial fishers, we would expect only negligible effects on the time it takes most boaters to reach fishing destinations at either project location. Some minor disruption can be expected from the need to avoid barge traffic during some periods of island development.

During and after project construction, fishers wishing to access shallow waters and that approach James Island from the east might need to travel a mile or so farther west to reach open water, but this group represents a small proportion of fishers. Most fishers would already be traveling this distance to access the more popular deep-water fishing areas. In general, boats approaching the island from the east, north and south sides of the island will not change their routes significantly because island remnants and shallow water already prevent passage of most boats directly through the zone of the proposed footprint. The passage from the south of James, between James Island and Taylors Island, into the Little Choptank River will remain accessible during and after island restoration.

As discussed under recreational boating, it is unlikely that the project at Barren will alter access to waters since the breakwater is in water too shallow for most boats (1-3 feet). Temporary disruptions to fishers who will seek to avoid barges are likely to occur.

Fish Abundance and Catches

Because the James Island project will take up area of shallow Bay bottom, some shallow-water recreational fishing areas will be lost. Up to 2,000 acres of soft sands and mud and the overlying water will be converted to upland at James. Because the number of recreational fishers who seek out these soft-bottom areas is small, they should be able to shift to the abundant shallow areas adjacent to or near the site with no significant effect on congestion levels or catch rates.

For fishers targeting areas with hard bottom, dike construction has the potential to increase local fish abundance and catch rates of some recreational species in nearby fishing areas. Few studies have been done to quantify the effects on fish abundance of the "rock reefs" that are created by dike construction, but evidence suggests that the rocks serve to attract fish to an area. Observations from Poplar Island and other artificial reefs indicate that fish make use of the rocks at the base of dikes for feeding and shelter. Striped bass, in particular, have been observed in the vicinity of rock dikes around Poplar Island and thus appear to be among the fish attracted to the artificial reef created through rock placement (K. Paynter, University of Maryland, pers. comm. Dec. 2003).

Fishers near James Island often seek the types of fish attracted to hard substrate. The fishing area to the west of the proposed footprint is valued for its firm substrate and rock piles, which fishers think are responsible for attracting certain fish to the area (M. Gary, MD DNR pers. comm. May 2003). The addition of new rock piles associated with dike construction of the island is therefore expected to increase catch rates of the same types of fish currently targeted at James and Barren islands.

In addition to the potential benefits of rock reefs, some recreational species may become more abundant if the wave and surge protection and erosion-control that is expected to be provided by the restoration projects results in expanded SAV beds. Proximity to the high quality habitat afforded by SAV beds would also be expected to enhance recreational catch rates for some species.

The value of improved fishing will depend on many factors including how catch rates increase and how higher catch rates affect the total number of trips taken, trip lengths, searching time, and so on. However, economic studies have shown that increasing the probability of catching fish creates measurable economic benefits to fishers. Such studies show that even if a Chesapeake Bay rockfish angler would be expected to catch only half a striped bass extra per trip (i.e., one additional fish for every two trips) the value to that fisher, on average, would be $4.95 per trip (Lipton and Hicks 1999). Others have calculated a value of $9.53 per each additional fish caught per fisher per trip (Norton et al. 1983).

Therefore, based on the estimate of 8,000 recreational fishing days estimated for James Island (see section 1.3.2.1), if every fisher seeking striped bass could expect to catch an

additional striped bass every other trip as a result of the island restoration project, the value of increased catch rates in the striped bass recreational fishery might be on the order of $40,000 per year. For waters around Barren Island, our estimate of 11,000 recreational fishing days would generate an estimated value on the order of $55,000 annually to recreational fishers if catches were enhanced by one fish every other trip. This value only represents part of the value of any enhancements in the fishery since it does not account for any increase in the number of trips taken due to increased expected catch or other factors affecting the value of each additional fish to fishers. The true value to fishers will depend on which fish they are seeking, the importance of catch rate in making fishing decisions, actually change in catch rate, and the relative quality of the fishing grounds.

Quality of Fishing Experience

The overall recreational usage rate of waters near James Island is high for the mid-Bay and peaks during the height of croaker season (mid July to the first week of August). Typically, several hundred boats will use the waters near the site during that period of peak use. This high usage of the waters around James Island suggests there may be some potential for increased "fishing congestion" as the island restoration project displaces some fishing activity to other fishing areas that are already heavily used. However, because the project footprint primarily takes up the shallow waters that are not prime fishing areas, and is not along the route between most fishing ports and most fishing areas, the project's impact on the spatial allocation of fishing effort appears to be small. The presence of the island will force small boats that might have used the area of the footprint for passage to the fishing areas to navigate through slightly deeper waters. GIS analysis indicates that the shoreline of the new James Island segment will be closer to the prime fishing areas in the vicinity of James Island than the existing island shoreline which may make the fishing area feel more congested. However, while some open water vistas may be reduced in size, an assessment of actual fishing areas indicate that little of the prime fishing areas in the vicinity of James Island will be lost.

The quality of the fishing experience at Barren Island is not expected to be negatively affected by the breakwater, which would not increase fishing congestion. In the long run, the project is likely to enhance the quality of an outdoor experience by preserving the natural land uses on the island.

2.3.2.3 Hunting

Because the James Island restoration is likely to attract a variety of waterfowl to the area, hunting opportunities are expected to increase. Similarly, at Barren Island, preservation of the island will increase waterfowl hunting potential in the vicinity of the island. While hunting may not be permitted on either island, the waters near the islands have the potential to support hunting from boats or from adjacent shoreline. Waterfowl hunting is a popular type of hunting in the region and trends indicate that it will continue into the future (USFWS 2001).

2.3.2.4 Wildlife viewing

Wildlife viewing opportunities are likely to increase with the James and Barren islands restoration projects. If James Island is developed in a manner similar to that for Poplar Island, we expect that a comparable level of trips to view wildlife will be generated as a result. The

project at Barren will directly protect the ability to view the diverse wildlife living on the island by preventing loss of island area and thus of species available for viewing.

Birding is likely to be the largest component of wildlife viewing trips to the islands. Roughly 22% of Maryland residents participate in birding (USFWS 2001). Continued interest in viewing waterbirds and shorebirds is likely to drive interest in viewing birds at both island locations into the future.

2.3.2.5 Educational Uses

Similar to wildlife viewing, educational opportunities would be expected to increase with the development of a publicly accessible island at James Island and by preserving educational opportunities at Barren Island.

2.3.2.6 Other Uses

The areas adjacent to James and Barren islands are promoted as scenic destinations by both state and county promotional materials. During construction, the project may detract from some types of sightseeing in the area, but may also draw different kinds of sightseers. Noise during rock placement may have an impact on outdoor social activities of residents and tourists such as outdoor dining and backyard picnics by introducing higher than normal background noise levels.

The long-term impact of the James Island restoration on sightseeing would be expected to be positive, using the experiences at PIERP as a model. The project at Barren will be preserving part of the diversity of views in the vista and is expected to enhance sightseeing in the long run.

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