

SHELLFISH AQUACULTURE VULNERABILITY MODEL

FINAL REPORT TO

VIRGINIA COASTAL ZONE MANAGEMENT PROGRAM
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SUBMITTED BY

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The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies.

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ABSTRACT

Aquaculture is an environmentally sensitive industry which requires good water quality for successful growth and distribution for human consumption. Threats to water quality are caused largely by land use practices. In Virginia, development and agricultural practices present the greatest threats. In the future, the potential conversion of land uses through regulated zoning at the local level poses a significant risk to the future of aquaculture in Virginia. This is particularly true on the Eastern Shore of Virginia which boasts a multi-million dollar shellfish growing industry that surpasses all other on the eastern seaboard.

This study uses Geographic Information Systems (GIS) to model risks to shellfish aquaculture. The model first considers basic physical and biological conditions necessary for aquaculture success and second, the impacts that current land use and proposed local zoning has on suitable growing areas. The study uses data available from federal, state, and local government sources to derive salinity, bathymetry, submerged aquatic vegetation (SAV) distribution, water quality, land use, and local zoning. A vulnerability index is scaled to reflect current and projected conditions and the resulting impact to shellfish growing.

Introduction

Aquaculture is a multi-million dollar industry in Virginia. Presently, Virginia leads the nation in the production of clams grown in cultured environments and distributed in the seafood market. Most aquaculture in Virginia is located on the Eastern Shore; however, commercial operations are expanding on the western shore as well.

Aquaculture is an environmentally sensitive industry which requires good water quality for successful growth as well as distribution for human consumption. The latter is regulated through the State's Division of Shellfish Sanitation within the Virginia Department of Health. Threats to water quality are caused largely by land use practices, failing septic and animal waste. Currently development and agricultural practices present the greatest threats. In the future, the potential conversion of land uses through regulated zoning at the local level poses a significant risk to the future of aquaculture in Virginia.

Natural resource agencies in Virginia are aware and concerned about the future of aquaculture in the commonwealth. The largest shellfish growing operations exist in relatively rural communities, and the pressure for development has already elevated the water quality issue. Among the list of impacts that large scale housing developments pose include: point source discharge from sewage treatment facilities, non-point source discharge from surface runoff due to impervious surfaces, and the overall reduction in nutrient uptake due to clear cutting of riparian forest buffers.

While predicting future water quality conditions in the Chesapeake Bay and seaside of the eastern shore is extremely difficult, we can attempt to model where the risk of water quality degradation due to land use practices might occur based on existing and proposed land use. These data are available through a variety of federal, state, and local government data sources. This approach was the focus of the project objective and was applied in three localities: Gloucester, Accomack, and Northampton Counties.

Project Objective

Previous efforts to map suitability for aquaculture focused primarily on physical elements: salinity, water depth, existing water quality, and presence of SAV which under current state policy, is afforded preferential status over aquaculture. The objective of this project was to revise this earlier spatial model for aquaculture suitability such that land use practices and local zoning decisions would be considered. The degree to which land use and zoning could impact the aquaculture industry was ultimately based on best professional judgment from scientists and industry professionals.

Model Development and Criteria

Datasets for shoreline, salinity, bathymetry, shellfish condemnation zones (VA Department of Health, Division of Shellfish Sanitation) as an indicator of water quality, submerged aquatic vegetation from 2005 (VIMS, 2006), land use from the National Land Cover Dataset in 2001 (NLCD, 2001), and zoning were assembled for Gloucester,

Accomack, and Northampton Counties in Virginia. Data sets were clipped to the county boundaries obtained from Virginia Dept. of Conservation and Recreation (2004).

Processing for the aquaculture models took place using ArcInfo Workstation version 9.2. Three arc macro language (aml) programs (newmodels07.aml, nearprocess.aml, and point_anal.aml) were written to complete the analysis. An analytical buffer equal to 150 meters inland from the shoreline was developed for processing land use and zoning data. The dominant land use and zoning within the buffer was determined for indiscriminant segments along the water whose length was coincident with the extent of the land use or zoning patterns. The adjacent water body was coded to reflect these conditions and then overlaid with salinity, bathymetry, shellfish condemnation zones, and SAV for a final determination.

A simplified land use classification was developed which clustered similar classes together. The original NLCD classification was condensed as follows: pasture/hay and cultivated crops became 'agriculture'; developed open, developed low, developed medium, and developed high became 'developed'; evergreen forest, deciduous forest, and mixed forest were grouped as 'forest'; and the remaining land use categories were not changed.

For the model, land use was further simplified and treated agriculture and existing developed lands equally with regards to impacts to aquaculture. These land use designations are clustered in the model under "developed" lands. Users will note that zoning views agriculture as having a slightly higher risk to aquaculture than low density residential development. This distinction tries to account for improvements in sewer and waste treatment facilities that generally accompany planned development communities. The model also considers the benefit of riparian forest buffers and a new class was generated ("developed-fb") to include forest buffers along the margins of water and developed or agriculture lands. The buffer must be a minimum of 30 meters wide. "Natural" lands include forest lands, wetlands, scrub-shrub, and barren areas. Remaining land classes are water.

A new water coverage was created for the analysis by combining the tidal waters from the Virginia shoreline (SHL) coverage with the water land use from NLCD01. This coverage was converted to a grid (10m pixel size) and then converted to a point coverage. Points not associated with water were deleted.

The new water polygon coverage was buffered 2m, 30m, and 150m. The inland arc of the 2m buffer became the new shoreline used to access for dominant land use and dominant zoning adjacent to the water. Forest or woody wetlands classified along the 2m buffer line was coded as a forest buffer. Forest buffers are recognized as mitigating water quality impacts from upland land uses that typically have high nutrient discharges (e.g. agriculture and developed). The model "credits" these land uses if forest buffers are maintained. Arcs coded as water or having an empty land use value were deleted. The 150m buffer was combined with the land use and the new water coverages. The 150m

buffer provides the inland boundary for land use. The model does not consider land use beyond the 150m buffer.

The 150m buffer is also used to assess zoning for the study area. Zoning outside the 150m buffer was excluded. Since each locality has a unique zoning classification, a rating was assigned to each zoning classification based on best professional judgment of the zone's potential affect on water quality and subsequently the adjacent aquaculture (Table 1) . Consistency between similar zoning definitions was followed to the extent possible.

Since local governments used different base maps for their zoning, the shoreline was not well matched with the established base shoreline for the other datasets. This generated occasional gaps with no data in the buffer area. To fill the gaps, the polygon coverage was converted to a raster and the “nibble” command in ArcInfo GRID was used to replace the no data cells with the values of the nearest neighbor.

The study area was divided into small sections to quicken the processing time in the next steps. For each portion of the study area, the appropriate land use buffer, shoreline, land use and zoning coverages were clipped. An aml (nearprocess.aml) was prepared where the “near” command was used to associate the land use points within the 150m buffer to the new shoreline arcs described above. “NEAR” computes the distance from each point to the nearest arc, point, or node in another coverage. The distance and the internal number of the closest feature are saved as new items in the input coverage's feature attribute table (ESRI Help). The attributes of the shoreline arcs were joined to the land use points based on the near cover's internal number. The same process was performed for zoning.

Nearprocess.aml calls point_anal.aml to analyze the points tied to each arc segment and determine the primary land use or zoning for that arc segment. Land use values were lumped into two groups: natural (includes forest, wetlands, shrub-shrub, and barren) and developed (includes agriculture, grassland, and developed). “Developed” should more appropriately be viewed not as a group of land use categories associate with development, but rather a group of land use classes that all represent similar degrees of impact to aquaculture. Primary land use for each shoreline arc was determined by using frequencies and percentages. An arc segment with a predominant land use of ‘natural’ was coded dominant_lu = ‘natural’; a predominant land use of developed with a forest buffer was coded dominant_lu = ‘developed-fb’ (with forest buffer); and a predominant land use of developed but no forest buffer was coded dominant_lu = ‘developed’.

Since the aquaculture model is to address conditions in the water and not on the shoreline, the next step transfers the dominant_lu and dominant zoning attributes from the shoreline arcs to the water points. The “near” command followed by a “joinitem” command was used. The water points were then converted to a grid, then back to a polygon coverage. The smaller study area sections containing the newly coded water regions for zoning and dominant land use were joined together into one coverage for each.

Zoning Classification	Zone Rating	Rating Number
Gloucester County:		
Bayside Conservation	A	1
Conservation	A	1
Rural Conservation	A	1
Single Family	B	2
Suburban Countryside	B	2
Multi-family	C	3
Office Business	C	3
Planned Unit Development	C	3
Rural Countryside	C	3
Business	D	4
Accomack County:		
Barrier Island	A	1
Residential	B	2
Agricultural	C	3
Incorporated Town	D	4
General Business	D	4
Northampton County:		
C (conservation)	A	1
CD_R1 (single-family residential)	B	2
CD_RR (rural residential)	B	2
RV_R (rural village residential)	B	2
RV_RM (rural village mixed residential)	B	2
RV_RR (rural village rural residential)	B	2
A1 (agriculture)	C	3
RV_C (rural village commercial)	C	3
RWVA (waterfront village?)	C	3
RWVC (waterfront village commercial?)	C	3
RWVR (waterfront village residential?)	C	3
EB_CW (commercial waterfront)	D	4
TOWN ...	D	4

Table 1. Local Government Zoning Inputs

To prevent the occurrence of sliver polygons in these final steps of the aquaculture model (a result of combining an angular polygon coverage with a smooth polygon coverage), the water land use and water zoning coverages were unioned with the new water coverage. The labels from sliver polygons were selected and saved in a point coverage.

“Near” and “joinitem” commands were used to find the nearest zoning and dominant land use with which to label each sliver polygon.

The final clipped and processed datasets were combined (salinity, land use, bathymetry, condemned areas, SAV, and zoning) to produce coverages for hard clam aquaculture and oyster aquaculture.

Model Output

The conditional attributes used in the model development were integrated into a vulnerability classification that designates a degree of risk based on the combination of conditions present at the site. The discussion above describes the analytical process used to reach these conclusions using spatial analysis within a GIS framework. The valuation or “ranking” was reached using best professional judgment based on science, current policy, and industry specifications. In the end, the classification is simplified into 5 classes which 1) will permit easy dissemination by the varied stakeholder groups, and 2) reflects a wide and varied expert opinion base for qualifying conditions under which clam or oyster aquaculture “success” is achieved (Table 2).

Differences between the oyster aquaculture and the clam aquaculture model are slight. Presently the model only considers the different salinity regimes under which each type of growing operation requires. There are probably others. However, discussions with growers did not reveal any consistent pattern of choice for either operation and therefore other physical or environmental factors that may have been mapped (e.g. bottom type, exposure) were not considered. The model did restrict itself to waters less than 2 meters in depth. Even here, oyster growers indicated that oysters could be grown in waters as deep as 8 meters depending upon the technique used. Consideration of all possibilities was prohibitive so general conditions are assumed.

For each “class” there is a suite of conditions that can exist. These conditions result from combining different sets of attributes in a matrix and ranking the attribute set. The model output reflects conditions representative of the data used. For all data sets, the most recent data available was used. Table 3 lists the model criteria for hard clam and oyster aquaculture. The presence of submerged aquatic vegetation (SAV), salinity, shellfish condemnation areas, bathymetry (using -2m contour depth as a cutoff), and dominant land use drive the models. County zoning acts as a modifier that can lower the overall aquaculture vulnerability when certain conditions are present. The frequency and geographic extent of the attribute sets from the model output are included in Appendix 1 for each locality. Clam and oyster aquaculture are run separate.

Table 2. Vulnerability Index

Vulnerability Index

Description of Index

Risk Level = 0

No Threats

These areas represent regions where optimal growing conditions are present and use conflicts are generally absent. Current upland is unmanaged, natural lands such as scrub-shrub or forest cover, and the county’s current zoning plan will maintain this usage.

Risk Level = 1

Minimal Risk

These areas represent locations where optimal growing conditions exist (shellfish waters are “opened”) and ecological use conflicts are absent. Current land use will support aquaculture providing natural areas are maintained and/or existing forest buffers are maintained to moderate water quality impacts from agriculture and residential development that may exist. Areas designated as minimal risk are highly sensitive to future changes in land use patterns. Therefore, regions classified as minimal risk are highly vulnerable to allowable land use conversions through zoning that may reflect a desire on the part of the county to develop these lands in the future (Risk Level 3).

Risk Level = 2;

Existing Water Quality Issues are Present

Water quality in these areas are reduced due to one or both of the following factors: they do not meet current water quality standards for shellfish growing (condemned or seasonally condemned) and/or land use (residential or agriculture) on the adjacent upland could alter water quality conditions despite the fact that most recent water quality measurements published at the time of this report indicate water quality standards are sufficient to keep waters “opened” for shellfish growing. If areas are condemned or seasonally closed, growers would be required to mitigate for potential water quality impacts by moving animals to cleaner waters before going to market.

Risk Level = 3

Future Water Quality Issues Likely

County zoning reflects a desire on the part of the locality to convert the current land use to some designation which could significantly reduce current water quality. These areas may currently support aquaculture or maintain a level of water quality and other factors consistent with good shellfish growing. If future land use conversion adheres to planned zoning it is possible aquaculture would be impacted.

Risk Level 4

Significant Use Conflicts Exist

These areas represent locations where ecological conflicts are present. Water quality conditions may not support shellfish growing. As well, the area may support Submerged Aquatic Vegetation (SAV) which through regulation is afforded preferential use of the bottom over aquaculture.

TABLE. 3 SHELLFISH AQUACULTURE VULNERABILITY MODEL CRITERIA

AQUACULTURE		RISK LEVEL				
TYPE	ATTRIBUTE	Level 0	Level 1	Level 2	Level 3	Level 4
CLAM	SAV	absent	absent	absent	absent	present
	Avg. Salinity (ppt)	≥ 20	≥ 15	≥ 15	≥ 15	< 15
	Shellfish Closure	o	o	o, c, sc	o, c, sc	prohibited
	Bathymetry (m)	≤ 2	≤ 2	≤ 2	≤ 2	>2
	Dom. Land Use	n	n, d-fb	n, d-fb, d	n, d-fb, d	n/a
	Zoning	A	A	A, B	B, C, D	n/a
	Zoning Modifier	if B, RL=1 if Cor D RL=3	if B,C, or D, RL=3	if C or D, RL=3	none	n/a
OYSTER	SAV	absent	absent	absent	absent	present
	Avg. Salinity (ppt)	≥ 7	≥ 7	≥ 7	≥ 7	< 7
	Shellfish Closure	o	o	o, c, sc	o, c, sc	prohibited
	Bathymetry (m)	≤ 2	≤ 2	≤ 2	≤ 2	>2
	Dom. Land Use	n	n, d-fb	n, d-fb, d	n, d-fb, d	n/a
	Zoning	A	A	A,B	B, C, D	n/a
	Zoning Modifier	if B, RL=1 if Cor D RL=3	if B,C, or D, RL=3	if C or D, RL=3	none	n/a

Risk Level - RL

Shellfish Closure: "o" = opened, "c" = condemned, "sc" = seasonally condemned

Dominant Land Use: "n" = natural, "d-fb" = developed or agriculture with forest buffers, "d" = developed or agriculture

Zoning: see Table 1

The Aquaculture Vulnerability Model is illustrated in a series of maps shown in Appendix 2. The maps and the associated GIS files can also be downloaded from a website: http://ccrm.vims.edu/gis_data_maps/data/aquaculture_vulnerability_model.html. The metadata is included with the GIS files. This website will be maintained by the Center for Coastal Resources Management, and will periodically be updated as new information becomes available.

MODEL VALIDATION

Spatial models of this nature are difficult to validate. Due to the physical complexity of the environments within which aquaculture occurs, there is great uncertainty in predicting water quality responses to land use and land use changes. We can, however, test some elements of the models sensitivity through a simple review of current aquaculture. To do this we collaborated with the Virginia Marine Resources Commission (VMRC) to acquire data pertaining to private leases known to have active aquaculture operations ongoing. This information is reported to the VMRC on a monthly basis by shellfish growers. We used data from the Eastern Shore of Virginia to map leases where clam and oyster aquaculture has been reported.

The results of the model validation indicated the active leases appeared to be located in areas currently with Risk Levels = 0, or Risk Level = 3. Those within areas designated as Risk=3 most likely have no current water quality or land use impediments. However, the county zoning suggests the county will permit and/or encourage development in the future. This is particularly true in Accomack County. The exception to this generalized summary is noted in the area outside of Hungars Creek where active clam culture appears to be occurring in areas where SAV dominate. Addressing this potential use conflict is beyond the scope of this study. A sample of this analysis is shown in figure 1.

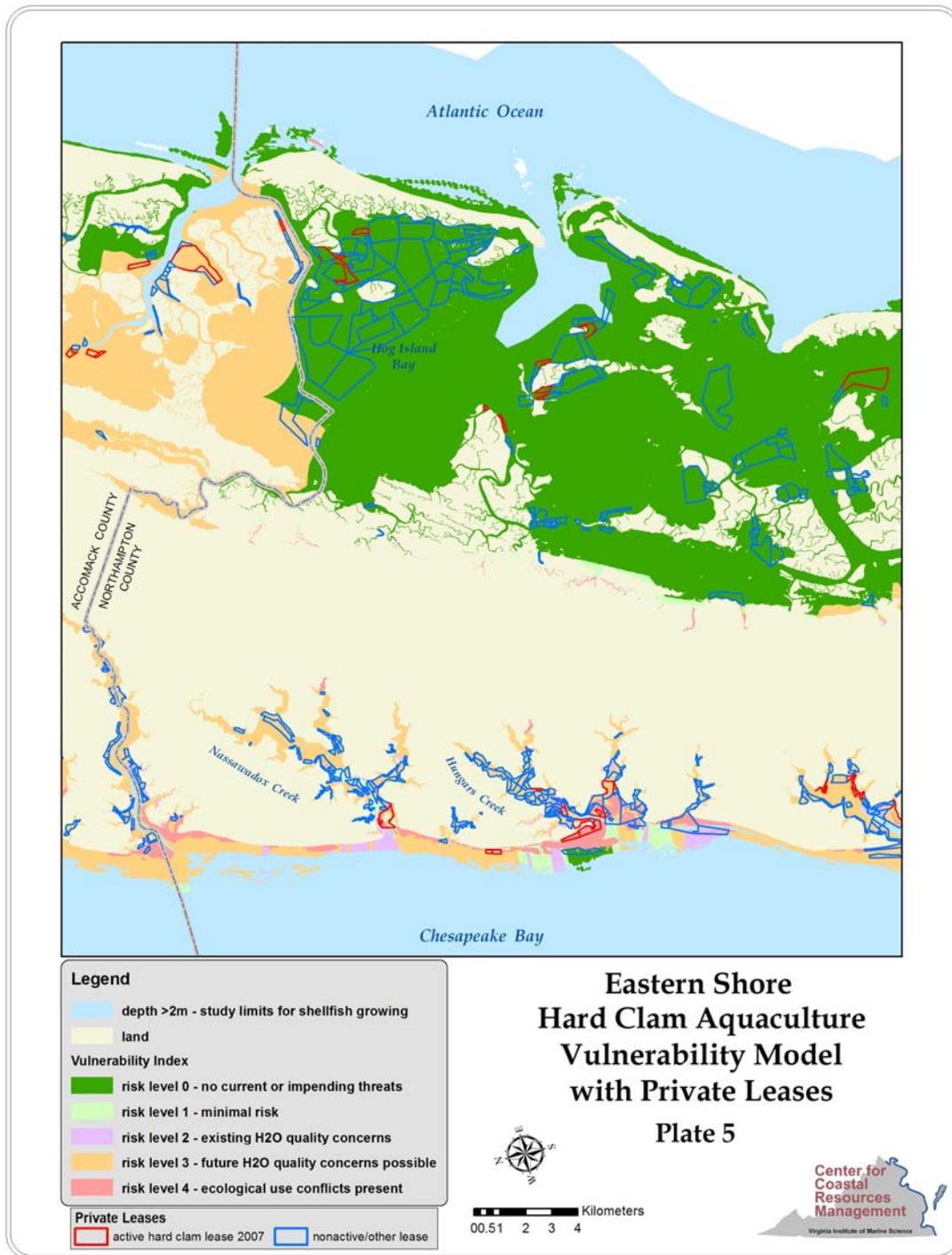


Figure 1. Sample model review for the Eastern Shore on Virginia

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APPENDIX 1.

SHELLFISH AQUACULTURE VULNERABILITY SCORES

Eastern Shore Vulnerability Scores
Hard Clam Aquaculture
Oyster Aquaculture

Gloucester County Vulnerability Scores
Hard Clam Aquaculture
Oyster Aquaculture

Eastern Shore Hard Clam Aquaculture Vulnerability Scores

BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>20ppt		natural	A	risk level 0	1022999.91
1m	0	>20ppt		natural	A	risk level 0	621442.86
2m	0	>20ppt		natural		risk level 0	695213.89
2m	0	>20ppt		natural	A	risk level 0	378109839.54
2m	0	>20ppt	Open	natural		risk level 0	0.07
2m	0	>20ppt	Open	natural	A	risk level 0	36009.77
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>15ppt		natural		risk level 1	55296.37
0.5m	0	>15ppt		natural	A	risk level 1	56032.97
0.5m	0	>15ppt	Open	natural		risk level 1	0.05
0.5m	0	>15ppt	Open	natural	A	risk level 1	519244.49
0.5m	0	>20ppt		developed-fb	A	risk level 1	319.79
0.5m	0	>20ppt		natural	B	risk level 1	867538.37
0.5m	0	>20ppt	Open	natural	B	risk level 1	48886.76
1m	0	>15ppt		natural		risk level 1	9491305.42
1m	0	>15ppt		natural	A	risk level 1	175958.73
1m	0	>15ppt	Open	natural	A	risk level 1	172066.26
1m	0	>20ppt		natural	B	risk level 1	308935.85
1m	0	>20ppt	Open	natural	B	risk level 1	26464.20
2m	0	>15ppt		natural		risk level 1	33396554.61
2m	0	>15ppt		natural	A	risk level 1	1710233.32
2m	0	>15ppt	Open	natural	A	risk level 1	232124.01
2m	0	>20ppt		natural	B	risk level 1	3123998.50
2m	0	>20ppt	Open	natural	B	risk level 1	16694323.01
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>15ppt		developed		risk level 2	0.07
0.5m	0	>15ppt		developed	A	risk level 2	990.16
0.5m	0	>15ppt		developed	B	risk level 2	770573.53
0.5m	0	>15ppt	Condemned	developed		risk level 2	161.93
0.5m	0	>15ppt	Condemned	developed	B	risk level 2	296435.05
0.5m	0	>15ppt	Open	developed	A	risk level 2	10863.77
0.5m	0	>15ppt	Open	developed	B	risk level 2	730040.06
0.5m	0	>15ppt	Seasonally Condemned	developed	B	risk level 2	5902.73
0.5m	0	>15ppt	Condemned	developed-fb	B	risk level 2	14656.79
0.5m	0	>15ppt	Condemned	natural		risk level 2	57.56
0.5m	0	>15ppt	Condemned	natural	A	risk level 2	9369.95
0.5m	0	>15ppt	Condemned	natural	B	risk level 2	284829.69
0.5m	0	>15ppt	Seasonally Condemned	natural	B	risk level 2	7823.53
0.5m	0	>20ppt		developed	A	risk level 2	333609.68
0.5m	0	>20ppt		developed	B	risk level 2	430187.55
0.5m	0	>20ppt	Condemned	developed	B	risk level 2	76551.30
0.5m	0	>20ppt	Open	developed	B	risk level 2	86118.14

0.5m	0	>15ppt	Open	developed-fb	B	risk level 3	27106.72
0.5m	0	>15ppt	Open	developed-fb	C	risk level 3	241124.24
0.5m	0	>15ppt		natural	B	risk level 3	595508.35
0.5m	0	>15ppt		natural	C	risk level 3	26868648.59
0.5m	0	>15ppt		natural	D	risk level 3	745486.41
0.5m	0	>15ppt	Condemned	natural	C	risk level 3	8409551.96
0.5m	0	>15ppt	Condemned	natural	D	risk level 3	389415.84
0.5m	0	>15ppt	Open	natural	B	risk level 3	807038.24
0.5m	0	>15ppt	Open	natural	C	risk level 3	5459127.84
0.5m	0	>15ppt	Seasonally Condemned	natural	C	risk level 3	27842.00
0.5m	0	>20ppt		developed	C	risk level 3	912912.80
0.5m	0	>20ppt		developed	D	risk level 3	573330.39
0.5m	0	>20ppt	Condemned	developed	C	risk level 3	133079.80
0.5m	0	>20ppt	Condemned	developed	D	risk level 3	129868.71
0.5m	0	>20ppt	Open	developed	C	risk level 3	741801.90
0.5m	0	>20ppt	Open	developed	D	risk level 3	11105.61
0.5m	0	>20ppt	Seasonally Condemned	developed	C	risk level 3	11967.82
0.5m	0	>20ppt	Seasonally Condemned	developed	D	risk level 3	42672.57
0.5m	0	>20ppt		developed-fb	B	risk level 3	2423.13
0.5m	0	>20ppt		developed-fb	C	risk level 3	58013.24
0.5m	0	>20ppt		developed-fb	D	risk level 3	16402.64
0.5m	0	>20ppt	Condemned	developed-fb	C	risk level 3	25587.95
0.5m	0	>20ppt	Open	developed-fb	B	risk level 3	13090.33
0.5m	0	>20ppt	Open	developed-fb	C	risk level 3	48632.31
0.5m	0	>20ppt		natural	C	risk level 3	2063977.29
0.5m	0	>20ppt		natural	D	risk level 3	1174215.01
0.5m	0	>20ppt	Condemned	natural	C	risk level 3	710889.27
0.5m	0	>20ppt	Condemned	natural	D	risk level 3	134496.08
0.5m	0	>20ppt	Open	natural	C	risk level 3	1086314.53
0.5m	0	>20ppt	Open	natural	D	risk level 3	10738.45
0.5m	0	>20ppt	Seasonally Condemned	natural	C	risk level 3	30990.58
0.5m	0	>20ppt	Seasonally Condemned	natural	D	risk level 3	55847.02
1m	0	>15ppt		developed	C	risk level 3	929077.57
1m	0	>15ppt		developed	D	risk level 3	326427.59
1m	0	>15ppt	Condemned	developed	C	risk level 3	967253.86
1m	0	>15ppt	Condemned	developed	D	risk level 3	40860.98
1m	0	>15ppt	Open	developed	C	risk level 3	961740.33
1m	0	>15ppt	Seasonally Condemned	developed	C	risk level 3	11198.89
1m	0	>15ppt		developed-fb	B	risk level 3	793.16
1m	0	>15ppt		developed-fb	C	risk level 3	48.46
1m	0	>15ppt	Condemned	developed-fb	C	risk level 3	22407.14
1m	0	>15ppt	Open	developed-fb	B	risk level 3	4461.26
1m	0	>15ppt	Open	developed-fb	C	risk level 3	114534.36
1m	0	>15ppt		natural	B	risk level 3	556863.22
1m	0	>15ppt		natural	C	risk level 3	59002619.91
1m	0	>15ppt		natural	D	risk level 3	1565836.40
1m	0	>15ppt	Condemned	natural	C	risk level 3	2996302.27
1m	0	>15ppt	Condemned	natural	D	risk level 3	178399.12
1m	0	>15ppt	Open	natural	B	risk level 3	371159.33
1m	0	>15ppt	Open	natural	C	risk level 3	3545247.51
1m	0	>15ppt	Seasonally Condemned	natural	C	risk level 3	8910.97

1m	0	>20ppt		developed	C	risk level 3	613807.38
1m	0	>20ppt		developed	D	risk level 3	1078542.09
1m	0	>20ppt	Condemned	developed	C	risk level 3	13082.42
1m	0	>20ppt	Condemned	developed	D	risk level 3	80302.51
1m	0	>20ppt	Open	developed	C	risk level 3	702274.18
1m	0	>20ppt	Open	developed	D	risk level 3	3974.56
1m	0	>20ppt	Seasonally Condemned	developed	C	risk level 3	825.76
1m	0	>20ppt	Seasonally Condemned	developed	D	risk level 3	11745.29
1m	0	>20ppt		developed-fb	D	risk level 3	16680.20
1m	0	>20ppt	Open	developed-fb	B	risk level 3	17186.29
1m	0	>20ppt	Open	developed-fb	C	risk level 3	14627.10
1m	0	>20ppt		natural	C	risk level 3	2218986.43
1m	0	>20ppt		natural	D	risk level 3	856640.44
1m	0	>20ppt	Condemned	natural	C	risk level 3	31394.15
1m	0	>20ppt	Condemned	natural	D	risk level 3	16355.61
1m	0	>20ppt	Open	natural	C	risk level 3	646652.41
1m	0	>20ppt	Open	natural	D	risk level 3	41581.28
1m	0	>20ppt	Seasonally Condemned	natural	C	risk level 3	21053.46
1m	0	>20ppt	Seasonally Condemned	natural	D	risk level 3	21451.50
2m	0	>15ppt		developed	C	risk level 3	1852465.71
2m	0	>15ppt		developed	D	risk level 3	73753.67
2m	0	>15ppt	Condemned	developed	C	risk level 3	441985.32
2m	0	>15ppt	Condemned	developed	D	risk level 3	29013.30
2m	0	>15ppt	Open	developed	C	risk level 3	1466900.37
2m	0	>15ppt	Seasonally Condemned	developed	C	risk level 3	23551.83
2m	0	>15ppt		developed-fb	B	risk level 3	1604.78
2m	0	>15ppt		developed-fb	C	risk level 3	4497.09
2m	0	>15ppt	Condemned	developed-fb	C	risk level 3	1787.39
2m	0	>15ppt	Open	developed-fb	B	risk level 3	18824.73
2m	0	>15ppt	Open	developed-fb	C	risk level 3	226928.38
2m	0	>15ppt		natural	B	risk level 3	535610.75
2m	0	>15ppt		natural	C	risk level 3	80084326.47
2m	0	>15ppt		natural	D	risk level 3	2541945.95
2m	0	>15ppt	Condemned	natural	C	risk level 3	2182941.07
2m	0	>15ppt	Condemned	natural	D	risk level 3	204802.28
2m	0	>15ppt	Open	natural	B	risk level 3	344478.35
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2m	0	>15ppt	Seasonally Condemned	natural	C	risk level 3	58974.08
2m	0	>20ppt		developed	C	risk level 3	3302552.42
2m	0	>20ppt		developed	D	risk level 3	2327093.32
2m	0	>20ppt	Condemned	developed	C	risk level 3	386248.86
2m	0	>20ppt	Condemned	developed	D	risk level 3	663053.51
2m	0	>20ppt	Open	developed	C	risk level 3	2063280.06
2m	0	>20ppt	Open	developed	D	risk level 3	301826.43
2m	0	>20ppt	Seasonally Condemned	developed	C	risk level 3	147483.74
2m	0	>20ppt	Seasonally Condemned	developed	D	risk level 3	21353.55
2m	0	>20ppt		developed-fb	B	risk level 3	35.43
2m	0	>20ppt		developed-fb	C	risk level 3	51900.02
2m	0	>20ppt		developed-fb	D	risk level 3	24693.90
2m	0	>20ppt	Condemned	developed-fb	C	risk level 3	8599.39
2m	0	>20ppt	Open	developed-fb	B	risk level 3	15706.50

2m	0	>20ppt	Open	developed-fb	C	risk level 3	16558.08
2m	0	>20ppt	Seasonally Condemned	developed-fb	C	risk level 3	99.90
2m	0	>20ppt		natural	C	risk level 3	126332759.57
2m	0	>20ppt		natural	D	risk level 3	2870546.98
2m	0	>20ppt	Condemned	natural	C	risk level 3	1466284.70
2m	0	>20ppt	Condemned	natural	D	risk level 3	637958.12
2m	0	>20ppt	Open	natural	C	risk level 3	57934559.90
2m	0	>20ppt	Open	natural	D	risk level 3	34467754.75
2m	0	>20ppt	Seasonally Condemned	natural	C	risk level 3	611001.89
2m	0	>20ppt	Seasonally Condemned	natural	D	risk level 3	28080.64
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
>2m	0	0		natural		risk level 4	465175.13
>2m	0	0		natural	C	risk level 4	57.49
>2m	0	0				risk level 4	980.93
>2m	0	>15ppt		developed	B	risk level 4	2958162.78
>2m	0	>15ppt		developed	C	risk level 4	4822310.74
>2m	0	>15ppt		developed	D	risk level 4	768527.11
>2m	0	>15ppt	Condemned	developed	B	risk level 4	45736.17
>2m	0	>15ppt	Condemned	developed	C	risk level 4	119554.84
>2m	0	>15ppt	Condemned	developed	D	risk level 4	11984.72
>2m	0	>15ppt	Open	developed	A	risk level 4	1595.26
>2m	0	>15ppt	Open	developed	B	risk level 4	349345.79
>2m	0	>15ppt	Open	developed	C	risk level 4	400688.68
>2m	0	>15ppt	Prohibited	developed	C	risk level 4	2453.99
>2m	0	>15ppt	Prohibited	developed	D	risk level 4	8229.95
>2m	1	>15ppt	Open	developed	B	risk level 4	933.52
>2m	1	>15ppt	Open	developed	C	risk level 4	116.60
>2m	2	>15ppt		developed	B	risk level 4	1589.13
>2m	2	>15ppt	Open	developed	B	risk level 4	2944.02
>2m	3	>15ppt	Open	developed	B	risk level 4	15.68
>2m	4	>15ppt		developed	B	risk level 4	726.12
>2m	0	>15ppt	Open	developed-fb	B	risk level 4	0.75
>2m	0	>15ppt	Open	developed-fb	C	risk level 4	8612.58
>2m	0	>15ppt		natural		risk level 4	468483557.10
>2m	0	>15ppt		natural	A	risk level 4	140226.49
>2m	0	>15ppt		natural	B	risk level 4	1423959.32
>2m	0	>15ppt		natural	C	risk level 4	103548347.23
>2m	0	>15ppt		natural	D	risk level 4	13198198.45
>2m	0	>15ppt	Condemned	natural	B	risk level 4	3646.02
>2m	0	>15ppt	Condemned	natural	C	risk level 4	305094.72
>2m	0	>15ppt	Condemned	natural	D	risk level 4	1315840.40
>2m	0	>15ppt	Open	natural	A	risk level 4	104819.97
>2m	0	>15ppt	Open	natural	B	risk level 4	212194.09
>2m	0	>15ppt	Open	natural	C	risk level 4	2330874.19
>2m	0	>15ppt	Prohibited	natural	C	risk level 4	2279.03
>2m	0	>15ppt	Prohibited	natural	D	risk level 4	101333.21
>2m	0	>15ppt	Seasonally Condemned	natural	C	risk level 4	1293.39
>2m	1	>15ppt		natural	A	risk level 4	7558.46

>2m	1	>15ppt		natural	B	risk level 4	1749.58
>2m	1	>15ppt		natural	C	risk level 4	28995.34
>2m	1	>15ppt	Open	natural	C	risk level 4	1182.62
>2m	2	>15ppt		natural	A	risk level 4	2986.60
>2m	2	>15ppt		natural	B	risk level 4	9857.46
>2m	2	>15ppt		natural	C	risk level 4	13820.26
>2m	2	>15ppt	Open	natural	A	risk level 4	5994.07
>2m	2	>15ppt	Open	natural	B	risk level 4	55.93
>2m	2	>15ppt	Open	natural	C	risk level 4	9117.28
>2m	3	>15ppt		natural	C	risk level 4	1087.18
>2m	4	>15ppt		natural	C	risk level 4	1060.38
>2m	4	>15ppt	Open	natural	A	risk level 4	12.13
>2m	0	>15ppt				risk level 4	50736.99
>2m	0	>20ppt		developed		risk level 4	58003.30
>2m	0	>20ppt		developed	A	risk level 4	4158345.69
>2m	0	>20ppt		developed	B	risk level 4	4032171.74
>2m	0	>20ppt		developed	C	risk level 4	10540158.62
>2m	0	>20ppt		developed	D	risk level 4	2872115.59
>2m	0	>20ppt	Condemned	developed	D	risk level 4	472219.36
>2m	0	>20ppt	Open	developed	B	risk level 4	54503.27
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>2m	0	>20ppt	Open	developed	D	risk level 4	494666.37
>2m	0	>20ppt	Prohibited	developed	D	risk level 4	95449.49
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>2m	1	>20ppt		developed	C	risk level 4	1759.49
>2m	2	>20ppt		developed	B	risk level 4	97.64
>2m	2	>20ppt	Condemned	developed	D	risk level 4	77.24
>2m	3	>20ppt	Open	developed	D	risk level 4	322.54
>2m	0	>20ppt		developed-fb	C	risk level 4	82709.05
>2m	0	>20ppt		developed-fb	D	risk level 4	202519.69
>2m	0	>20ppt		natural		risk level 4	923101427.97
>2m	0	>20ppt		natural	A	risk level 4	145782207.43
>2m	0	>20ppt		natural	B	risk level 4	3015884.86
>2m	0	>20ppt		natural	C	risk level 4	119427438.69
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>2m	0	>20ppt	Condemned	natural	D	risk level 4	318506.44
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>2m	0	>20ppt	Prohibited	natural	D	risk level 4	19844.06
>2m	0	>20ppt	Seasonally Condemned	natural	C	risk level 4	7016.39
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>2m	3	>20ppt	Open	natural	D	risk level 4	76.17
>2m	0	>20ppt				risk level 4	66141.91
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0.5m	0	0	Condemned	natural	C	risk level 4	885.47
0.5m	2	0		natural	C	risk level 4	0.40
0.5m	0	0				risk level 4	312.20
0.5m	0	0	Condemned			risk level 4	122.75
0.5m	0	<15ppt		developed	C	risk level 4	13642.14

0.5m	0	<15ppt	Condemned	developed	C	risk level 4	22557.32
0.5m	0	<15ppt		developed-fb	C	risk level 4	6573.23
0.5m	0	<15ppt	Condemned	developed-fb	C	risk level 4	10020.84
0.5m	0	<15ppt		natural	C	risk level 4	221187.25
0.5m	0	<15ppt	Condemned	natural	C	risk level 4	808513.26
0.5m	0	<15ppt				risk level 4	112897.12
0.5m	0	<15ppt			C	risk level 4	51.86
0.5m	0	<15ppt	Condemned			risk level 4	48647.54
0.5m	0	<15ppt	Condemned		C	risk level 4	24.55
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0.5m	0	>15ppt	Prohibited	developed	D	risk level 4	11825.27
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0.5m	4	>15ppt	Open	developed	C	risk level 4	161583.67
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0.5m	2	>15ppt		developed-fb	C	risk level 4	2872.82
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0.5m	1	>15ppt		natural	C	risk level 4	2449363.11
0.5m	1	>15ppt		natural	D	risk level 4	3119.52
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0.5m	4	>20ppt		developed-fb	A	risk level 4	15463.40
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1m	0	<15ppt	Condemned	developed	C	risk level 4	3370.11
1m	0	<15ppt	Condemned	developed-fb	C	risk level 4	37.44
1m	0	<15ppt		natural	C	risk level 4	8151.94
1m	0	<15ppt	Condemned	natural	C	risk level 4	1754030.66
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1m	0	>15ppt	Prohibited	developed	C	risk level 4	1565.96
1m	0	>15ppt	Prohibited	developed	D	risk level 4	1004.29
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1m	1	>15ppt		developed	C	risk level 4	6230.13
1m	1	>15ppt	Open	developed	B	risk level 4	16348.06

1m	1	>15ppt	Open	developed	C	risk level 4	16247.87
1m	2	>15ppt		developed	A	risk level 4	90.00
1m	2	>15ppt		developed	B	risk level 4	61393.98
1m	2	>15ppt		developed	C	risk level 4	67010.80
1m	2	>15ppt	Condemned	developed	C	risk level 4	1390.02
1m	2	>15ppt	Open	developed	B	risk level 4	11342.75
1m	2	>15ppt	Open	developed	C	risk level 4	14346.46
1m	3	>15ppt		developed	C	risk level 4	20169.57
1m	3	>15ppt	Condemned	developed	C	risk level 4	1805.89
1m	3	>15ppt	Open	developed	B	risk level 4	15333.77
1m	3	>15ppt	Open	developed	C	risk level 4	563.39
1m	4	>15ppt		developed	A	risk level 4	45326.23
1m	4	>15ppt		developed	B	risk level 4	34566.79
1m	4	>15ppt		developed	C	risk level 4	345.39
1m	4	>15ppt	Open	developed	C	risk level 4	58620.03
1m	2	>15ppt	Open	developed-fb	C	risk level 4	277.01
1m	3	>15ppt	Open	developed-fb	B	risk level 4	324.44
1m	4	>15ppt	Open	developed-fb	C	risk level 4	19928.30
1m	0	>15ppt	Prohibited	natural	C	risk level 4	2035.85
1m	1	>15ppt		natural	A	risk level 4	5177.38
1m	1	>15ppt		natural	B	risk level 4	24422.52
1m	1	>15ppt		natural	C	risk level 4	1673166.20
1m	1	>15ppt		natural	D	risk level 4	27296.32
1m	1	>15ppt	Condemned	natural	B	risk level 4	372.54
1m	1	>15ppt	Condemned	natural	C	risk level 4	7449.74
1m	1	>15ppt	Condemned	natural	D	risk level 4	1842.91
1m	1	>15ppt	Open	natural	A	risk level 4	6893.42
1m	1	>15ppt	Open	natural	B	risk level 4	35877.00
1m	1	>15ppt	Open	natural	C	risk level 4	38825.25
1m	2	>15ppt		natural	A	risk level 4	30881.76
1m	2	>15ppt		natural	B	risk level 4	73249.57
1m	2	>15ppt		natural	C	risk level 4	5351778.92
1m	2	>15ppt		natural	D	risk level 4	139030.37
1m	2	>15ppt	Condemned	natural	C	risk level 4	30718.40
1m	2	>15ppt	Condemned	natural	D	risk level 4	32838.01
1m	2	>15ppt	Open	natural	A	risk level 4	30848.25
1m	2	>15ppt	Open	natural	B	risk level 4	57517.91
1m	2	>15ppt	Open	natural	C	risk level 4	132639.98
1m	3	>15ppt		natural		risk level 4	524922.75
1m	3	>15ppt		natural	B	risk level 4	7888.82
1m	3	>15ppt		natural	C	risk level 4	5028300.53
1m	3	>15ppt		natural	D	risk level 4	24883.50
1m	3	>15ppt	Condemned	natural	C	risk level 4	24385.95
1m	3	>15ppt	Condemned	natural	D	risk level 4	2185.52
1m	3	>15ppt	Open	natural	A	risk level 4	842.19
1m	3	>15ppt	Open	natural	B	risk level 4	3428.49
1m	3	>15ppt	Open	natural	C	risk level 4	146257.97
1m	4	>15ppt		natural	A	risk level 4	334171.36
1m	4	>15ppt		natural	C	risk level 4	3036362.68
1m	4	>15ppt	Condemned	natural	C	risk level 4	1170.10
1m	4	>15ppt	Open	natural	A	risk level 4	44245.09

1m	4	>15ppt	Open	natural	B	risk level 4	8538.40
1m	4	>15ppt	Open	natural	C	risk level 4	311519.07
1m	2	>15ppt				risk level 4	0.08
1m	0	>20ppt	Prohibited	developed	D	risk level 4	3907.76
1m	1	>20ppt		developed	A	risk level 4	4168.69
1m	1	>20ppt		developed	B	risk level 4	11672.96
1m	1	>20ppt		developed	C	risk level 4	29351.35
1m	1	>20ppt		developed	D	risk level 4	9151.95
1m	1	>20ppt	Condemned	developed	D	risk level 4	520.66
1m	1	>20ppt	Open	developed	C	risk level 4	3979.60
1m	2	>20ppt		developed	A	risk level 4	290.56
1m	2	>20ppt		developed	B	risk level 4	1742.58
1m	2	>20ppt		developed	D	risk level 4	7.22
1m	2	>20ppt	Condemned	developed	D	risk level 4	114.36
1m	3	>20ppt		developed	A	risk level 4	13088.68
1m	3	>20ppt		developed	D	risk level 4	62.08
1m	3	>20ppt	Open	developed	D	risk level 4	394.41
1m	4	>20ppt		developed	A	risk level 4	10863.72
1m	4	>20ppt	Open	developed	C	risk level 4	14315.97
1m	1	>20ppt		developed-fb	D	risk level 4	37.79
1m	0	>20ppt	Prohibited	natural	D	risk level 4	903.89
1m	1	>20ppt		natural	A	risk level 4	37539.55
1m	1	>20ppt		natural	B	risk level 4	34506.49
1m	1	>20ppt		natural	C	risk level 4	66910.49
1m	1	>20ppt		natural	D	risk level 4	26334.57
1m	1	>20ppt	Open	natural	B	risk level 4	892.10
1m	1	>20ppt	Open	natural	C	risk level 4	789.25
1m	2	>20ppt		natural	A	risk level 4	29078.90
1m	2	>20ppt		natural	B	risk level 4	28.86
1m	2	>20ppt		natural	C	risk level 4	1172.23
1m	2	>20ppt		natural	D	risk level 4	19019.19
1m	2	>20ppt	Condemned	natural	D	risk level 4	171.48
1m	2	>20ppt	Open	natural	C	risk level 4	804.92
1m	3	>20ppt		natural	A	risk level 4	6557.26
1m	3	>20ppt		natural	C	risk level 4	6477.97
1m	3	>20ppt		natural	D	risk level 4	2968.40
1m	3	>20ppt	Open	natural	D	risk level 4	4358.13
1m	4	>20ppt		natural	A	risk level 4	48755.65
1m	4	>20ppt		natural	B	risk level 4	7475.17
1m	4	>20ppt		natural	C	risk level 4	3822.87
1m	4	>20ppt	Open	natural	B	risk level 4	8096.13
1m	4	>20ppt	Open	natural	C	risk level 4	7472.71
1m	4	>20ppt	Open	natural	D	risk level 4	9599.75
1m	4	>20ppt	Seasonally Condemned	natural	D	risk level 4	29.37
2m	0	0		developed	C	risk level 4	321.56
2m	0	0	Condemned	developed	C	risk level 4	129.47
2m	0	0		natural	A	risk level 4	59763.56
2m	0	0		natural	C	risk level 4	842965.56
2m	0	0	Condemned	natural	B	risk level 4	27.10
2m	0	0	Condemned	natural	C	risk level 4	10395.57
2m	0	0			C	risk level 4	73.12

2m	0	<15ppt		developed	A	risk level 4	1954.42
2m	0	<15ppt		developed	B	risk level 4	14860.71
2m	0	<15ppt		developed	C	risk level 4	91406.86
2m	0	<15ppt	Condemned	developed	B	risk level 4	41347.43
2m	0	<15ppt	Condemned	developed	C	risk level 4	204013.04
2m	0	<15ppt	Prohibited	developed	B	risk level 4	137.73
2m	0	<15ppt	Prohibited	developed	C	risk level 4	20998.70
2m	0	<15ppt		developed-fb	C	risk level 4	20244.73
2m	0	<15ppt	Condemned	developed-fb	C	risk level 4	39479.60
2m	0	<15ppt	Prohibited	developed-fb	C	risk level 4	5028.17
2m	0	<15ppt		natural	A	risk level 4	344635.08
2m	0	<15ppt		natural	B	risk level 4	43090.64
2m	0	<15ppt		natural	C	risk level 4	585495.59
2m	0	<15ppt	Condemned	natural	B	risk level 4	93987.59
2m	0	<15ppt	Condemned	natural	C	risk level 4	2678705.90
2m	0	<15ppt	Prohibited	natural	B	risk level 4	6056.29
2m	0	<15ppt	Prohibited	natural	C	risk level 4	164266.80
2m	0	>15ppt	Prohibited	developed	C	risk level 4	2051.29
2m	0	>15ppt	Prohibited	developed	D	risk level 4	3225.79
2m	1	>15ppt		developed	B	risk level 4	11028.44
2m	1	>15ppt	Open	developed	B	risk level 4	7054.90
2m	1	>15ppt	Open	developed	C	risk level 4	5130.82
2m	2	>15ppt		developed	B	risk level 4	24107.76
2m	2	>15ppt		developed	C	risk level 4	6367.08
2m	2	>15ppt	Condemned	developed	C	risk level 4	349.50
2m	2	>15ppt	Open	developed	B	risk level 4	11308.81
2m	2	>15ppt	Open	developed	C	risk level 4	2197.29
2m	3	>15ppt		developed	C	risk level 4	803.12
2m	3	>15ppt	Open	developed	B	risk level 4	1309.41
2m	3	>15ppt	Open	developed	C	risk level 4	322.46
2m	4	>15ppt		developed	A	risk level 4	1990.80
2m	4	>15ppt		developed	B	risk level 4	23690.03
2m	4	>15ppt	Open	developed	C	risk level 4	1423.66
2m	4	>15ppt	Open	developed-fb	C	risk level 4	16.39
2m	0	>15ppt	Prohibited	natural	C	risk level 4	6906.56
2m	1	>15ppt		natural	A	risk level 4	64532.04
2m	1	>15ppt		natural	B	risk level 4	11422.22
2m	1	>15ppt		natural	C	risk level 4	375839.51
2m	1	>15ppt	Condemned	natural	C	risk level 4	1401.01
2m	1	>15ppt	Open	natural	A	risk level 4	5539.93
2m	1	>15ppt	Open	natural	B	risk level 4	89.02
2m	1	>15ppt	Open	natural	C	risk level 4	16908.16
2m	2	>15ppt		natural	A	risk level 4	28394.34
2m	2	>15ppt		natural	B	risk level 4	6867.22
2m	2	>15ppt		natural	C	risk level 4	1776374.73
2m	2	>15ppt		natural	D	risk level 4	10075.85
2m	2	>15ppt	Condemned	natural	C	risk level 4	6714.33
2m	2	>15ppt	Condemned	natural	D	risk level 4	2168.44
2m	2	>15ppt	Open	natural	A	risk level 4	13554.62
2m	2	>15ppt	Open	natural	B	risk level 4	9348.49
2m	2	>15ppt	Open	natural	C	risk level 4	19346.20

2m	3	>15ppt		natural		risk level 4	46337.70
2m	3	>15ppt		natural	C	risk level 4	292008.17
2m	3	>15ppt	Condemned	natural	C	risk level 4	3050.53
2m	3	>15ppt	Open	natural	C	risk level 4	22321.96
2m	4	>15ppt		natural	A	risk level 4	22285.21
2m	4	>15ppt		natural	C	risk level 4	512368.70
2m	4	>15ppt	Open	natural	A	risk level 4	6876.41
2m	4	>15ppt	Open	natural	C	risk level 4	10627.54
2m	0	>20ppt	Prohibited	developed	C	risk level 4	5439.47
2m	0	>20ppt	Prohibited	developed	D	risk level 4	12510.67
2m	1	>20ppt		developed	A	risk level 4	1452.15
2m	1	>20ppt		developed	B	risk level 4	13971.45
2m	1	>20ppt		developed	C	risk level 4	7330.62
2m	1	>20ppt		developed	D	risk level 4	126.53
2m	2	>20ppt		developed	A	risk level 4	4523.21
2m	2	>20ppt		developed	B	risk level 4	3768.47
2m	2	>20ppt	Condemned	developed	D	risk level 4	176.74
2m	3	>20ppt		developed	A	risk level 4	10258.97
2m	3	>20ppt	Open	developed	D	risk level 4	1360.33
2m	4	>20ppt		developed	A	risk level 4	63.68
2m	0	>20ppt	Prohibited	developed-fb	C	risk level 4	1836.04
2m	0	>20ppt	Prohibited	natural	C	risk level 4	10722.84
2m	0	>20ppt	Prohibited	natural	D	risk level 4	10833.75
2m	1	>20ppt		natural	A	risk level 4	66097.38
2m	1	>20ppt		natural	B	risk level 4	2808.35
2m	1	>20ppt		natural	C	risk level 4	43091.34
2m	1	>20ppt		natural	D	risk level 4	4924.30
2m	2	>20ppt		natural	A	risk level 4	68605.70
2m	2	>20ppt		natural	D	risk level 4	7339.86
2m	3	>20ppt		natural	A	risk level 4	670.34
2m	3	>20ppt		natural	C	risk level 4	22.86
2m	3	>20ppt	Open	natural	D	risk level 4	3573.61
2m	4	>20ppt		natural	A	risk level 4	9569.41
	0	0		developed	C	risk level 4	321173.86
	0	0		developed	D	risk level 4	2.13
	0	0	Condemned	developed	D	risk level 4	1.86
	0	0	Prohibited	developed	D	risk level 4	78.09
	0	0		developed-fb	C	risk level 4	2122.35
	0	0		natural		risk level 4	227089.77
	0	0		natural	A	risk level 4	12944.68
	0	0		natural	C	risk level 4	10593384.48
	0	0		natural	D	risk level 4	40.93
	0	0	Condemned	natural	C	risk level 4	12788.18
	0	0	Open	natural	C	risk level 4	458.82
	0	0	Open	natural	D	risk level 4	0.00
	0	0	Prohibited	natural	D	risk level 4	215.82
	1	0		natural	C	risk level 4	209.27
	4	0		natural	C	risk level 4	181.57
	0	0			C	risk level 4	11891.69
	0	0	Condemned			risk level 4	11087.25
	0	0	Open			risk level 4	587.06

	0	0	Prohibited			risk level 4	53.84
	1	0				risk level 4	44.65
	4	0				risk level 4	87.39
	0	<15ppt		developed	C	risk level 4	5578.60
	0	<15ppt	Condemned	developed	C	risk level 4	101.51
	0	<15ppt		natural	C	risk level 4	1461058.97
	0	<15ppt	Condemned	natural	C	risk level 4	407271.46
	0	<15ppt				risk level 4	2283655.58
	0	<15ppt	Condemned			risk level 4	114.79
	1	>15ppt		natural	C	risk level 4	4952.49
	2	>15ppt		natural	C	risk level 4	28438.21
	2	>15ppt	Condemned	natural	C	risk level 4	49.63
	3	>15ppt		natural	C	risk level 4	19339.80
	4	>15ppt		natural	C	risk level 4	8504.60
	1	>15ppt				risk level 4	131.98
	3	>15ppt				risk level 4	59.07
	4	>15ppt				risk level 4	318.00
	0	>20ppt	Prohibited	developed	D	risk level 4	342.88
	0	>20ppt	Prohibited	natural	D	risk level 4	683.34

Eastern Shore Oyster Aquaculture Vulnerability Scores

BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt		natural		risk level 0	55296.37
0.5m	0	>7ppt		natural	A	risk level 0	1079032.89
0.5m	0	>7ppt	Open	natural		risk level 0	0.05
0.5m	0	>7ppt	Open	natural	A	risk level 0	519244.49
1m	0	>7ppt		natural		risk level 0	9491305.42
1m	0	>7ppt		natural	A	risk level 0	797401.59
1m	0	>7ppt	Open	natural	A	risk level 0	172066.26
2m	0	>7ppt		natural		risk level 0	34091768.50
2m	0	>7ppt		natural	A	risk level 0	380173593.43
2m	0	>7ppt	Open	natural		risk level 0	0.07
2m	0	>7ppt	Open	natural	A	risk level 0	268133.79
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt		developed-fb	A	risk level 1	319.79
0.5m	0	>7ppt		natural	B	risk level 1	1463046.71
0.5m	0	>7ppt	Open	natural	B	risk level 1	855924.99
1m	0	>7ppt		natural	B	risk level 1	865799.07
1m	0	>7ppt	Open	natural	B	risk level 1	397623.53
2m	0	>7ppt		natural	B	risk level 1	3693171.79
2m	0	>7ppt	Open	natural	B	risk level 1	17038801.36
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt	Condemned	developed		risk level 2	161.93
0.5m	0	>7ppt	Condemned	developed	B	risk level 2	372986.35
0.5m	0	>7ppt	Open	developed	A	risk level 2	10863.77
0.5m	0	>7ppt	Open	developed	B	risk level 2	816158.19
0.5m	0	>7ppt	Seasonally Condemned	developed	B	risk level 2	5902.73
0.5m	0	>7ppt		developed		risk level 2	0.07
0.5m	0	>7ppt		developed	A	risk level 2	334599.83
0.5m	0	>7ppt		developed	B	risk level 2	1200761.07
0.5m	0	>7ppt	Condemned	developed-fb	B	risk level 2	16411.11
0.5m	0	>7ppt	Condemned	natural		risk level 2	57.56
0.5m	0	>7ppt	Condemned	natural	A	risk level 2	9369.95
0.5m	0	>7ppt	Condemned	natural	B	risk level 2	385607.84
0.5m	0	>7ppt	Seasonally Condemned	natural	B	risk level 2	7823.53
1m	0	>7ppt	Condemned	developed	B	risk level 2	92800.10
1m	0	>7ppt	Open	developed	A	risk level 2	981.33
1m	0	>7ppt	Open	developed	B	risk level 2	323388.99
1m	0	>7ppt	Seasonally Condemned	developed	B	risk level 2	5453.21
1m	0	>7ppt		developed	A	risk level 2	396287.84
1m	0	>7ppt		developed	B	risk level 2	557530.75
1m	0	>7ppt	Condemned	developed-fb	B	risk level 2	668.67
1m	0	>7ppt	Condemned	natural	A	risk level 2	17076.81
1m	0	>7ppt	Condemned	natural	B	risk level 2	126719.43
1m	0	>7ppt	Seasonally Condemned	natural	B	risk level 2	14031.20
2m	0	>7ppt	Condemned	developed	A	risk level 2	790.70

2m	0	>7ppt	Condemned	developed	B	risk level 2	89995.98
2m	0	>7ppt	Open	developed	A	risk level 2	4099.21
2m	0	>7ppt	Open	developed	B	risk level 2	1564783.07
2m	0	>7ppt	Seasonally Condemned	developed	B	risk level 2	66435.60
2m	0	>7ppt		developed	A	risk level 2	1648216.70
2m	0	>7ppt		developed	B	risk level 2	1344397.94
2m	0	>7ppt	Condemned	natural	A	risk level 2	44284.12
2m	0	>7ppt	Condemned	natural	B	risk level 2	286825.81
2m	0	>7ppt	Seasonally Condemned	natural	B	risk level 2	234355.05
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt	Condemned	developed	C	risk level 3	3036503.12
0.5m	0	>7ppt	Condemned	developed	D	risk level 3	224555.65
0.5m	0	>7ppt	Open	developed	C	risk level 3	3114174.83
0.5m	0	>7ppt	Open	developed	D	risk level 3	11105.61
0.5m	0	>7ppt	Seasonally Condemned	developed	C	risk level 3	31334.57
0.5m	0	>7ppt	Seasonally Condemned	developed	D	risk level 3	42672.57
0.5m	0	>7ppt		developed	C	risk level 3	3247621.70
0.5m	0	>7ppt		developed	D	risk level 3	813168.17
0.5m	0	>7ppt	Condemned	developed-fb	C	risk level 3	275641.69
0.5m	0	>7ppt	Condemned	developed-fb	D	risk level 3	564.24
0.5m	0	>7ppt	Open	developed-fb	B	risk level 3	40197.05
0.5m	0	>7ppt	Open	developed-fb	C	risk level 3	289756.55
0.5m	0	>7ppt		developed-fb	B	risk level 3	20090.97
0.5m	0	>7ppt		developed-fb	C	risk level 3	151780.38
0.5m	0	>7ppt		developed-fb	D	risk level 3	17502.21
0.5m	0	>7ppt	Condemned	natural	C	risk level 3	9924762.83
0.5m	0	>7ppt	Condemned	natural	D	risk level 3	523911.92
0.5m	0	>7ppt	Open	natural	C	risk level 3	6545442.37
0.5m	0	>7ppt	Open	natural	D	risk level 3	10738.45
0.5m	0	>7ppt	Seasonally Condemned	natural	C	risk level 3	58832.58
0.5m	0	>7ppt	Seasonally Condemned	natural	D	risk level 3	55847.02
0.5m	0	>7ppt		natural	C	risk level 3	29153340.07
0.5m	0	>7ppt		natural	D	risk level 3	1919701.42
1m	0	>7ppt	Condemned	developed	C	risk level 3	983706.39
1m	0	>7ppt	Condemned	developed	D	risk level 3	121163.49
1m	0	>7ppt	Open	developed	C	risk level 3	1664014.50
1m	0	>7ppt	Open	developed	D	risk level 3	3974.56
1m	0	>7ppt	Seasonally Condemned	developed	C	risk level 3	12024.65
1m	0	>7ppt	Seasonally Condemned	developed	D	risk level 3	11745.29
1m	0	>7ppt		developed	C	risk level 3	1543358.56
1m	0	>7ppt		developed	D	risk level 3	1404969.68
1m	0	>7ppt	Condemned	developed-fb	C	risk level 3	22444.58
1m	0	>7ppt	Open	developed-fb	B	risk level 3	21647.55
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2m	4	>7ppt		natural	C	risk level 4	512368.70
2m	0	0			C	risk level 4	73.12
	0	0	Condemned	developed	D	risk level 4	1.86
	0	0	Prohibited	developed	D	risk level 4	78.09
	0	>7ppt	Prohibited	developed	D	risk level 4	342.88
	0	0		developed	C	risk level 4	321173.86
	0	0		developed	D	risk level 4	2.13
	0	0		developed-fb	C	risk level 4	2122.35
	0	0	Condemned	natural	C	risk level 4	12788.18
	0	<7ppt	Condemned	natural	C	risk level 4	43134.38
	2	>7ppt	Condemned	natural	C	risk level 4	49.63
	0	0	Open	natural	C	risk level 4	458.82
	0	0	Open	natural	D	risk level 4	0.00
	0	0	Prohibited	natural	D	risk level 4	215.82
	0	>7ppt	Prohibited	natural	D	risk level 4	683.34
	0	0		natural		risk level 4	227089.77
	0	0		natural	A	risk level 4	12944.68
	0	0		natural	C	risk level 4	10593384.48
	0	0		natural	D	risk level 4	40.93
	1	0		natural	C	risk level 4	209.27
	4	0		natural	C	risk level 4	181.57
	0	<7ppt		natural	C	risk level 4	55585.67
	1	>7ppt		natural	C	risk level 4	4952.49
	2	>7ppt		natural	C	risk level 4	28438.21
	3	>7ppt		natural	C	risk level 4	19339.80
	4	>7ppt		natural	C	risk level 4	8504.60
	0	0	Condemned			risk level 4	11087.25
	0	0	Open			risk level 4	587.06
	0	0	Prohibited			risk level 4	53.84
	0	0			C	risk level 4	11891.69
	1	0				risk level 4	44.65
	4	0				risk level 4	87.39
	1	>7ppt				risk level 4	131.98
	3	>7ppt				risk level 4	59.07
	4	>7ppt				risk level 4	318.00

Gloucester County Hard Clam Aquaculture Vulnerability Scores

BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>20ppt		natural	A	risk level 0	1623.50
0.5m	0	>20ppt	Open	natural	A	risk level 0	13038.08
1m	0	>20ppt		natural	A	risk level 0	5205.90
1m	0	>20ppt	Open	natural	A	risk level 0	14372.24
2m	0	>20ppt		natural	A	risk level 0	21974.53
2m	0	>20ppt	Open	natural	A	risk level 0	11729.10
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>15ppt		developed-fb		risk level 1	3.97
0.5m	0	>15ppt		developed-fb	A	risk level 1	16515.05
0.5m	0	>15ppt	Open	developed-fb	A	risk level 1	32125.73
0.5m	0	>15ppt		natural		risk level 1	2052.11
0.5m	0	>15ppt		natural	A	risk level 1	4650438.58
0.5m	0	>15ppt	Open	natural		risk level 1	194.06
0.5m	0	>15ppt	Open	natural	A	risk level 1	3006086.15
0.5m	0	>20ppt		natural	B	risk level 1	82893.36
0.5m	0	>20ppt	Open	natural	B	risk level 1	4618.18
1m	0	>15ppt	Open	developed-fb	A	risk level 1	8282.52
1m	0	>15ppt		natural		risk level 1	39.15
1m	0	>15ppt		natural	A	risk level 1	7615183.72
1m	0	>15ppt	Open	natural	A	risk level 1	1466815.94
1m	0	>20ppt		natural	B	risk level 1	224097.23
1m	0	>20ppt	Open	natural	B	risk level 1	2806.15
2m	0	>15ppt	Open	developed-fb	A	risk level 1	12123.94
2m	0	>15ppt		natural		risk level 1	152.10
2m	0	>15ppt		natural	A	risk level 1	11421023.29
2m	0	>15ppt	Open	natural	A	risk level 1	2628071.15
2m	0	>20ppt		natural	B	risk level 1	809824.90
2m	0	>20ppt	Open	natural	B	risk level 1	11905.31
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>15ppt		developed		risk level 2	105.64
0.5m	0	>15ppt		developed	A	risk level 2	356609.14
0.5m	0	>15ppt		developed	B	risk level 2	867829.18
0.5m	0	>15ppt	Condemned	developed		risk level 2	3234.24
0.5m	0	>15ppt	Condemned	developed	A	risk level 2	1280828.76
0.5m	0	>15ppt	Condemned	developed	B	risk level 2	706491.30
0.5m	0	>15ppt	Open	developed		risk level 2	811.61
0.5m	0	>15ppt	Open	developed	A	risk level 2	914306.43
0.5m	0	>15ppt	Open	developed	B	risk level 2	32097.41
0.5m	0	>15ppt	Seasonally Condemned	developed	A	risk level 2	51854.76
0.5m	0	>15ppt	Seasonally Condemned	developed	B	risk level 2	7537.76
0.5m	0	>15ppt	Condemned	developed-fb		risk level 2	1324.30
0.5m	0	>15ppt	Condemned	developed-fb	A	risk level 2	75420.83
0.5m	0	>15ppt	Condemned	developed-fb	B	risk level 2	71053.86
0.5m	0	>15ppt	Seasonally Condemned	developed-fb	A	risk level 2	699.57
0.5m	0	>15ppt	Condemned	natural		risk level 2	37440.58
0.5m	0	>15ppt	Condemned	natural	A	risk level 2	3594292.16
0.5m	0	>15ppt	Condemned	natural	B	risk level 2	2502865.63

0.5m	0	>15ppt	Seasonally Condemned	natural	A	risk level 2	74650.45
0.5m	0	>15ppt	Seasonally Condemned	natural	B	risk level 2	23326.98
0.5m	0	>20ppt		developed	A	risk level 2	1847.47
0.5m	0	>20ppt		developed	B	risk level 2	71772.51
0.5m	0	>20ppt	Condemned	developed		risk level 2	0.04
0.5m	0	>20ppt	Condemned	developed	A	risk level 2	4670.77
0.5m	0	>20ppt	Condemned	developed	B	risk level 2	263289.67
0.5m	0	>20ppt	Open	developed	B	risk level 2	22805.21
0.5m	0	>20ppt	Seasonally Condemned	developed	B	risk level 2	19235.01
0.5m	0	>20ppt	Condemned	developed-fb	B	risk level 2	17057.76
0.5m	0	>20ppt	Seasonally Condemned	developed-fb	B	risk level 2	1884.41
0.5m	0	>20ppt	Condemned	natural		risk level 2	0.00
0.5m	0	>20ppt	Condemned	natural	A	risk level 2	6534.18
0.5m	0	>20ppt	Condemned	natural	B	risk level 2	235861.83
0.5m	0	>20ppt	Seasonally Condemned	natural	B	risk level 2	16785.16
1m	0	>15ppt		developed	A	risk level 2	358381.44
1m	0	>15ppt		developed	B	risk level 2	651733.65
1m	0	>15ppt	Condemned	developed	A	risk level 2	399928.92
1m	0	>15ppt	Condemned	developed	B	risk level 2	554926.93
1m	0	>15ppt	Open	developed	A	risk level 2	364276.96
1m	0	>15ppt	Open	developed	B	risk level 2	14339.96
1m	0	>15ppt	Seasonally Condemned	developed	A	risk level 2	22320.82
1m	0	>15ppt	Seasonally Condemned	developed	B	risk level 2	5545.21
1m	0	>15ppt	Condemned	developed-fb	A	risk level 2	39950.79
1m	0	>15ppt	Condemned	developed-fb	B	risk level 2	37786.11
1m	0	>15ppt	Condemned	natural	A	risk level 2	904740.79
1m	0	>15ppt	Condemned	natural	B	risk level 2	1564982.36
1m	0	>15ppt	Seasonally Condemned	natural	A	risk level 2	16876.66
1m	0	>15ppt	Seasonally Condemned	natural	B	risk level 2	11854.24
1m	0	>20ppt		developed	A	risk level 2	27168.68
1m	0	>20ppt		developed	B	risk level 2	68444.55
1m	0	>20ppt	Condemned	developed	A	risk level 2	2570.34
1m	0	>20ppt	Condemned	developed	B	risk level 2	47792.22
1m	0	>20ppt	Open	developed	B	risk level 2	18443.18
1m	0	>20ppt	Seasonally Condemned	developed	B	risk level 2	23692.98
1m	0	>20ppt	Condemned	developed-fb	B	risk level 2	5211.67
1m	0	>20ppt	Seasonally Condemned	developed-fb	B	risk level 2	411.24
1m	0	>20ppt	Condemned	natural	A	risk level 2	3005.07
1m	0	>20ppt	Condemned	natural	B	risk level 2	69228.46
1m	0	>20ppt	Seasonally Condemned	natural	B	risk level 2	17889.71
2m	0	>15ppt		developed	A	risk level 2	507341.00
2m	0	>15ppt		developed	B	risk level 2	795819.85
2m	0	>15ppt	Condemned	developed	A	risk level 2	438160.06
2m	0	>15ppt	Condemned	developed	B	risk level 2	421791.23
2m	0	>15ppt	Open	developed	A	risk level 2	695484.61
2m	0	>15ppt	Open	developed	B	risk level 2	28535.39
2m	0	>15ppt	Seasonally Condemned	developed	A	risk level 2	46775.04
2m	0	>15ppt	Seasonally Condemned	developed	B	risk level 2	9484.03
2m	0	>15ppt	Condemned	developed-fb	A	risk level 2	19908.45
2m	0	>15ppt	Condemned	developed-fb	B	risk level 2	37213.44
2m	0	>15ppt	Condemned	natural		risk level 2	6.18
2m	0	>15ppt	Condemned	natural	A	risk level 2	1083334.52
2m	0	>15ppt	Condemned	natural	B	risk level 2	1731987.91
2m	0	>15ppt	Seasonally Condemned	natural	A	risk level 2	37232.43
2m	0	>15ppt	Seasonally Condemned	natural	B	risk level 2	17529.98

2m	0	>20ppt		developed	A	risk level 2	328627.02
2m	0	>20ppt		developed	B	risk level 2	327621.83
2m	0	>20ppt	Condemned	developed	A	risk level 2	2100.02
2m	0	>20ppt	Condemned	developed	B	risk level 2	75361.35
2m	0	>20ppt	Open	developed	B	risk level 2	60842.14
2m	0	>20ppt	Seasonally Condemned	developed	B	risk level 2	73887.80
2m	0	>20ppt	Condemned	developed-fb	B	risk level 2	3276.64
2m	0	>20ppt	Seasonally Condemned	developed-fb	B	risk level 2	812.39
2m	0	>20ppt	Condemned	natural	A	risk level 2	10517.20
2m	0	>20ppt	Condemned	natural	B	risk level 2	110265.90
2m	0	>20ppt	Seasonally Condemned	natural	B	risk level 2	50052.80
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
0.5m	0	>15ppt		developed	C	risk level 3	128961.59
0.5m	0	>15ppt	Condemned	developed	C	risk level 3	125887.05
0.5m	0	>15ppt		developed-fb	B	risk level 3	49310.36
0.5m	0	>15ppt		developed-fb	C	risk level 3	17.11
0.5m	0	>15ppt	Condemned	developed-fb	C	risk level 3	18956.92
0.5m	0	>15ppt	Open	developed-fb	B	risk level 3	958.07
0.5m	0	>15ppt		natural	B	risk level 3	1876546.20
0.5m	0	>15ppt		natural	C	risk level 3	1795636.55
0.5m	0	>15ppt	Condemned	natural	C	risk level 3	927643.36
0.5m	0	>15ppt	Open	natural	B	risk level 3	254335.78
0.5m	0	>15ppt	Open	natural	C	risk level 3	21610.83
0.5m	0	>20ppt		developed	C	risk level 3	1074.83
0.5m	0	>20ppt		developed	D	risk level 3	0.11
0.5m	0	>20ppt	Condemned	developed	C	risk level 3	12139.67
0.5m	0	>20ppt	Condemned	developed	D	risk level 3	6063.85
0.5m	0	>20ppt		developed-fb	B	risk level 3	45204.21
0.5m	0	>20ppt		developed-fb	D	risk level 3	4.17
0.5m	0	>20ppt	Condemned	developed-fb	D	risk level 3	770.79
0.5m	0	>20ppt		natural	C	risk level 3	6.99
0.5m	0	>20ppt		natural	D	risk level 3	4.65
0.5m	0	>20ppt	Condemned	natural	C	risk level 3	15192.66
0.5m	0	>20ppt	Condemned	natural	D	risk level 3	3460.86
1m	0	>15ppt		developed	C	risk level 3	157419.91
1m	0	>15ppt	Condemned	developed	C	risk level 3	70417.23
1m	0	>15ppt		developed-fb	B	risk level 3	15650.06
1m	0	>15ppt	Condemned	developed-fb	C	risk level 3	244.20
1m	0	>15ppt	Open	developed-fb	B	risk level 3	117.75
1m	0	>15ppt		natural	B	risk level 3	1122578.32
1m	0	>15ppt		natural	C	risk level 3	921952.86
1m	0	>15ppt	Condemned	natural	C	risk level 3	369737.62
1m	0	>15ppt	Open	natural	B	risk level 3	145217.25
1m	0	>15ppt	Open	natural	C	risk level 3	3115.59
1m	0	>20ppt		developed	C	risk level 3	30.96
1m	0	>20ppt	Condemned	developed	C	risk level 3	5998.77
1m	0	>20ppt		developed-fb	B	risk level 3	17185.93
1m	0	>20ppt	Condemned	natural	C	risk level 3	7799.22
2m	0	>15ppt		developed	C	risk level 3	31902.62
2m	0	>15ppt	Condemned	developed	C	risk level 3	10571.39
2m	0	>15ppt		developed-fb	B	risk level 3	4959.83
2m	0	>15ppt	Condemned	developed-fb	C	risk level 3	1112.54
2m	0	>15ppt	Open	developed-fb	B	risk level 3	192.05

2m	0	>15ppt		natural	B	risk level 3	1263593.69
2m	0	>15ppt		natural	C	risk level 3	1721382.96
2m	0	>15ppt		natural	D	risk level 3	2722.12
2m	0	>15ppt	Condemned	natural	C	risk level 3	357392.19
2m	0	>15ppt	Open	natural	B	risk level 3	220226.41
2m	0	>15ppt	Open	natural	C	risk level 3	4247.93
2m	0	>20ppt	Condemned	developed	C	risk level 3	10780.50
2m	0	>20ppt		developed-fb	B	risk level 3	26104.04
2m	0	>20ppt	Condemned	natural	C	risk level 3	7813.00
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	HCLAMINDEX	AREA (m2)
>2m	0	<15ppt		developed	B	risk level 4	198005.28
>2m	0	<15ppt		developed	C	risk level 4	1322.44
>2m	0	<15ppt		natural		risk level 4	283.77
>2m	0	<15ppt		natural	A	risk level 4	1555873.16
>2m	0	<15ppt		natural	B	risk level 4	594636.52
>2m	0	<15ppt		natural	D	risk level 4	47619.71
>2m	0	>15ppt		developed		risk level 4	1378.08
>2m	0	>15ppt		developed	A	risk level 4	2978823.30
>2m	0	>15ppt		developed	B	risk level 4	4298441.22
>2m	0	>15ppt		developed	C	risk level 4	762287.80
>2m	0	>15ppt	Condemned	developed	A	risk level 4	49858.64
>2m	0	>15ppt	Condemned	developed	B	risk level 4	147794.88
>2m	0	>15ppt	Condemned	developed	C	risk level 4	1820.58
>2m	0	>15ppt	Open	developed	A	risk level 4	2046517.40
>2m	0	>15ppt	Open	developed	B	risk level 4	103736.95
>2m	0	>15ppt	Seasonally Condemned	developed	A	risk level 4	1795.83
>2m	2	>15ppt		developed	A	risk level 4	43.54
>2m	0	>15ppt		developed-fb	B	risk level 4	1600.26
>2m	0	>15ppt	Condemned	developed-fb	B	risk level 4	50289.51
>2m	0	>15ppt	Open	developed-fb	A	risk level 4	34193.11
>2m	0	>15ppt	Open	developed-fb	B	risk level 4	4027.87
>2m	0	>15ppt		natural		risk level 4	8126.66
>2m	0	>15ppt		natural	A	risk level 4	61296669.25
>2m	0	>15ppt		natural	B	risk level 4	7591394.56
>2m	0	>15ppt		natural	C	risk level 4	5106551.52
>2m	0	>15ppt		natural	D	risk level 4	571615.07
>2m	0	>15ppt	Condemned	natural	A	risk level 4	218384.28
>2m	0	>15ppt	Condemned	natural	B	risk level 4	679517.30
>2m	0	>15ppt	Condemned	natural	C	risk level 4	2229.56
>2m	0	>15ppt	Open	natural	A	risk level 4	7589683.05
>2m	0	>15ppt	Open	natural	B	risk level 4	1179049.95
>2m	0	>15ppt	Seasonally Condemned	natural	A	risk level 4	3623.19
>2m	0	>15ppt	Seasonally Condemned	natural	B	risk level 4	8.52
>2m	2	>15ppt		natural	A	risk level 4	716.01
>2m	2	>15ppt	Open	natural	A	risk level 4	349.13
>2m	3	>15ppt		natural	A	risk level 4	2761.45
>2m	4	>15ppt	Open	natural	A	risk level 4	651.87
>2m	0	>15ppt				risk level 4	11062.87
>2m	0	>15ppt			A	risk level 4	48.57
>2m	0	>15ppt			B	risk level 4	193.18
>2m	0	>20ppt		developed		risk level 4	445.10
>2m	0	>20ppt		developed	A	risk level 4	1277474.36
>2m	0	>20ppt		developed	B	risk level 4	1828418.71

>2m	0	>20ppt	Condemned	developed		risk level 4	69.20
>2m	0	>20ppt	Condemned	developed	A	risk level 4	695900.84
>2m	0	>20ppt	Condemned	developed	B	risk level 4	22608.00
>2m	0	>20ppt	Open	developed	A	risk level 4	3477.25
>2m	0	>20ppt	Open	developed	B	risk level 4	113619.25
>2m	0	>20ppt	Seasonally Condemned	developed	B	risk level 4	79039.72
>2m	2	>20ppt		developed	B	risk level 4	457.45
>2m	3	>20ppt	Seasonally Condemned	developed	B	risk level 4	767.13
>2m	0	>20ppt		developed-fb	B	risk level 4	322837.62
>2m	0	>20ppt	Condemned	developed-fb	B	risk level 4	140.60
>2m	0	>20ppt	Seasonally Condemned	developed-fb	B	risk level 4	1547.15
>2m	0	>20ppt		natural		risk level 4	2888.76
>2m	0	>20ppt		natural	A	risk level 4	9153895.59
>2m	0	>20ppt		natural	B	risk level 4	3048512.89
>2m	0	>20ppt		natural	C	risk level 4	347.85
>2m	0	>20ppt	Condemned	natural		risk level 4	524.46
>2m	0	>20ppt	Condemned	natural	A	risk level 4	597157.67
>2m	0	>20ppt	Condemned	natural	B	risk level 4	16474.86
>2m	0	>20ppt	Open	natural	A	risk level 4	439860.18
>2m	0	>20ppt	Open	natural	B	risk level 4	29773.94
>2m	0	>20ppt	Seasonally Condemned	natural	B	risk level 4	53555.57
>2m	4	>20ppt	Open	natural	A	risk level 4	18.21
>2m	0	>20ppt				risk level 4	7801.30
>2m	0	>20ppt			B	risk level 4	161.93
>2m	0	>20ppt	Condemned			risk level 4	1718.08
0.5m	0	<15ppt		developed	A	risk level 4	2291.20
0.5m	0	<15ppt		developed	B	risk level 4	226131.29
0.5m	0	<15ppt		developed	C	risk level 4	21204.43
0.5m	0	<15ppt		developed	D	risk level 4	28.87
0.5m	0	<15ppt	Condemned	developed	A	risk level 4	2483.46
0.5m	0	<15ppt	Condemned	developed	B	risk level 4	10763.49
0.5m	0	<15ppt	Condemned	developed	C	risk level 4	86984.28
0.5m	0	<15ppt	Condemned	developed	D	risk level 4	1200.68
0.5m	0	<15ppt	Open	developed	A	risk level 4	1307.16
0.5m	0	<15ppt		developed-fb	B	risk level 4	767.70
0.5m	0	<15ppt		developed-fb	C	risk level 4	191.19
0.5m	0	<15ppt	Condemned	developed-fb	B	risk level 4	7876.44
0.5m	0	<15ppt	Condemned	developed-fb	C	risk level 4	5182.27
0.5m	0	<15ppt		natural		risk level 4	6.01
0.5m	0	<15ppt		natural	A	risk level 4	837307.79
0.5m	0	<15ppt		natural	B	risk level 4	326299.83
0.5m	0	<15ppt		natural	C	risk level 4	152900.25
0.5m	0	<15ppt		natural	D	risk level 4	19380.33
0.5m	0	<15ppt	Condemned	natural		risk level 4	21608.44
0.5m	0	<15ppt	Condemned	natural	A	risk level 4	902084.73
0.5m	0	<15ppt	Condemned	natural	B	risk level 4	417609.24
0.5m	0	<15ppt	Condemned	natural	C	risk level 4	1218814.32
0.5m	0	<15ppt	Condemned	natural	D	risk level 4	2652.80
0.5m	0	<15ppt	Open	natural		risk level 4	130.93
0.5m	0	<15ppt	Open	natural	A	risk level 4	45605.29
0.5m	0	<15ppt	Open	natural	C	risk level 4	8586.28
0.5m	4	<15ppt		natural	A	risk level 4	0.20
0.5m	0	<15ppt	Condemned			risk level 4	0.06
0.5m	1	>15ppt		developed	A	risk level 4	78418.60
0.5m	1	>15ppt	Open	developed	A	risk level 4	14665.71

0.5m	2	>15ppt		developed	A	risk level 4	241820.38
0.5m	2	>15ppt	Open	developed	A	risk level 4	72784.65
0.5m	3	>15ppt		developed	A	risk level 4	150949.25
0.5m	3	>15ppt		developed	B	risk level 4	187673.73
0.5m	3	>15ppt	Seasonally Condemned	developed	A	risk level 4	417.97
0.5m	4	>15ppt		developed	A	risk level 4	201532.93
0.5m	4	>15ppt	Open	developed	A	risk level 4	11618.86
0.5m	1	>15ppt		natural	A	risk level 4	1245661.12
0.5m	1	>15ppt		natural	B	risk level 4	21612.14
0.5m	1	>15ppt	Condemned	natural	A	risk level 4	396.32
0.5m	1	>15ppt	Open	natural	A	risk level 4	82160.69
0.5m	2	>15ppt		natural		risk level 4	125.11
0.5m	2	>15ppt		natural	A	risk level 4	1717752.39
0.5m	2	>15ppt	Open	natural	A	risk level 4	92583.96
0.5m	3	>15ppt		natural	A	risk level 4	907086.00
0.5m	3	>15ppt		natural	B	risk level 4	84859.52
0.5m	3	>15ppt		natural	C	risk level 4	98.48
0.5m	3	>15ppt	Condemned	natural	A	risk level 4	2339.76
0.5m	3	>15ppt	Condemned	natural	B	risk level 4	40491.35
0.5m	3	>15ppt	Condemned	natural	C	risk level 4	53668.70
0.5m	3	>15ppt	Open	natural	A	risk level 4	89130.47
0.5m	3	>15ppt	Seasonally Condemned	natural	A	risk level 4	75.23
0.5m	3	>15ppt	Seasonally Condemned	natural	B	risk level 4	1135.85
0.5m	4	>15ppt		natural		risk level 4	185.27
0.5m	4	>15ppt		natural	A	risk level 4	3845091.75
0.5m	4	>15ppt	Condemned	natural	A	risk level 4	4292.68
0.5m	4	>15ppt	Open	natural	A	risk level 4	1260219.15
0.5m	2	>15ppt				risk level 4	13.44
0.5m	4	>15ppt				risk level 4	13.44
0.5m	1	>20ppt		developed	A	risk level 4	446.04
0.5m	1	>20ppt		developed	B	risk level 4	1331.30
0.5m	2	>20ppt		developed	A	risk level 4	8406.43
0.5m	2	>20ppt		developed	B	risk level 4	45401.04
0.5m	2	>20ppt	Seasonally Condemned	developed	B	risk level 4	7982.45
0.5m	3	>20ppt		developed	A	risk level 4	9650.22
0.5m	3	>20ppt		developed	B	risk level 4	34496.55
0.5m	3	>20ppt	Open	developed	B	risk level 4	9919.80
0.5m	3	>20ppt	Seasonally Condemned	developed	B	risk level 4	48929.74
0.5m	1	>20ppt		natural	B	risk level 4	2765.49
0.5m	2	>20ppt		natural	B	risk level 4	11593.27
0.5m	2	>20ppt	Open	natural	B	risk level 4	2166.73
0.5m	2	>20ppt	Seasonally Condemned	natural	B	risk level 4	7206.51
0.5m	3	>20ppt		natural	B	risk level 4	32120.44
0.5m	3	>20ppt	Open	natural	B	risk level 4	3470.14
0.5m	3	>20ppt	Seasonally Condemned	natural	B	risk level 4	21469.16
0.5m	4	>20ppt	Open	natural	A	risk level 4	13606.78
1m	0	<15ppt		developed	A	risk level 4	2022.80
1m	0	<15ppt		developed	B	risk level 4	223031.84
1m	0	<15ppt		developed	C	risk level 4	77249.43
1m	0	<15ppt	Condemned	developed	B	risk level 4	2159.92
1m	0	<15ppt	Condemned	developed	C	risk level 4	18496.38
1m	0	<15ppt	Condemned	developed-fb	B	risk level 4	1773.30
1m	0	<15ppt		natural		risk level 4	101.08
1m	0	<15ppt		natural	A	risk level 4	512635.68
1m	0	<15ppt		natural	B	risk level 4	216680.71

1m	0	<15ppt		natural	C	risk level 4	36690.02
1m	0	<15ppt		natural	D	risk level 4	30660.46
1m	0	<15ppt	Condemned	natural	A	risk level 4	43552.50
1m	0	<15ppt	Condemned	natural	B	risk level 4	45301.75
1m	0	<15ppt	Condemned	natural	C	risk level 4	187236.24
1m	0	<15ppt	Condemned	natural	D	risk level 4	26.05
1m	0	<15ppt	Open	natural		risk level 4	107.25
1m	0	<15ppt	Open	natural	A	risk level 4	27307.20
1m	0	<15ppt	Open	natural	C	risk level 4	11664.42
1m	1	>15ppt		developed	A	risk level 4	11349.44
1m	2	>15ppt		developed	A	risk level 4	43047.83
1m	3	>15ppt		developed	A	risk level 4	25936.61
1m	3	>15ppt		developed	B	risk level 4	10501.49
1m	4	>15ppt		developed	A	risk level 4	16993.26
1m	4	>15ppt	Open	developed	A	risk level 4	116.88
1m	1	>15ppt		natural	A	risk level 4	589569.92
1m	1	>15ppt		natural	B	risk level 4	1101.19
1m	1	>15ppt	Open	natural	A	risk level 4	342.92
1m	2	>15ppt		natural	A	risk level 4	400926.71
1m	2	>15ppt	Open	natural	A	risk level 4	1695.21
1m	3	>15ppt		natural	A	risk level 4	143600.79
1m	3	>15ppt		natural	B	risk level 4	271.67
1m	3	>15ppt		natural	C	risk level 4	3.92
1m	3	>15ppt	Condemned	natural	A	risk level 4	1919.37
1m	3	>15ppt	Condemned	natural	B	risk level 4	6665.99
1m	3	>15ppt	Condemned	natural	C	risk level 4	7087.74
1m	3	>15ppt	Open	natural	A	risk level 4	543.00
1m	4	>15ppt		natural	A	risk level 4	1232754.74
1m	4	>15ppt	Condemned	natural	A	risk level 4	313.73
1m	4	>15ppt	Open	natural	A	risk level 4	122795.17
1m	1	>20ppt		developed	A	risk level 4	58.47
1m	1	>20ppt		developed	B	risk level 4	188.33
1m	2	>20ppt		developed	A	risk level 4	1428.00
1m	2	>20ppt		developed	B	risk level 4	2222.90
1m	2	>20ppt	Seasonally Condemned	developed	B	risk level 4	49.69
1m	3	>20ppt		developed	A	risk level 4	1763.83
1m	3	>20ppt		developed	B	risk level 4	502.63
1m	3	>20ppt	Open	developed	B	risk level 4	3845.17
1m	3	>20ppt	Seasonally Condemned	developed	B	risk level 4	3677.81
1m	1	>20ppt		natural	B	risk level 4	45.88
1m	2	>20ppt		natural	B	risk level 4	848.76
1m	2	>20ppt	Open	natural	B	risk level 4	661.61
1m	2	>20ppt	Seasonally Condemned	natural	B	risk level 4	311.28
1m	3	>20ppt		natural	B	risk level 4	2274.20
1m	3	>20ppt	Open	natural	B	risk level 4	1580.78
1m	3	>20ppt	Seasonally Condemned	natural	B	risk level 4	1231.51
1m	4	>20ppt	Open	natural	A	risk level 4	3072.92
2m	0	<15ppt		developed	A	risk level 4	10.49
2m	0	<15ppt		developed	B	risk level 4	262275.73
2m	0	<15ppt		developed	C	risk level 4	54724.37
2m	0	<15ppt	Condemned	developed	B	risk level 4	2478.77
2m	0	<15ppt	Condemned	developed	C	risk level 4	6332.83
2m	0	<15ppt	Condemned	developed-fb	B	risk level 4	1220.72
2m	0	<15ppt		natural	A	risk level 4	412456.93
2m	0	<15ppt		natural	B	risk level 4	400230.15

2m	0	<15ppt		natural	C	risk level 4	54803.96
2m	0	<15ppt		natural	D	risk level 4	82718.47
2m	0	<15ppt	Condemned	natural	A	risk level 4	8975.05
2m	0	<15ppt	Condemned	natural	B	risk level 4	80035.05
2m	0	<15ppt	Condemned	natural	C	risk level 4	240328.55
2m	0	<15ppt	Open	natural	A	risk level 4	57814.97
2m	0	<15ppt	Open	natural	C	risk level 4	19803.11
2m	1	>15ppt		developed	A	risk level 4	2751.71
2m	2	>15ppt		developed	A	risk level 4	5700.97
2m	3	>15ppt		developed	A	risk level 4	1876.51
2m	4	>15ppt		developed	A	risk level 4	74.25
2m	1	>15ppt		natural	A	risk level 4	65571.24
2m	2	>15ppt		natural	A	risk level 4	16168.44
2m	2	>15ppt	Open	natural	A	risk level 4	1187.88
2m	3	>15ppt		natural	A	risk level 4	10510.66
2m	3	>15ppt	Condemned	natural	A	risk level 4	1144.55
2m	3	>15ppt	Condemned	natural	B	risk level 4	1001.47
2m	3	>15ppt	Condemned	natural	C	risk level 4	189.59
2m	4	>15ppt		natural	A	risk level 4	69799.30
2m	4	>15ppt	Condemned	natural	A	risk level 4	47.97
2m	4	>15ppt	Open	natural	A	risk level 4	16814.12
2m	2	>20ppt		developed	A	risk level 4	253.16
2m	2	>20ppt		developed	B	risk level 4	791.54
2m	3	>20ppt	Seasonally Condemned	developed	B	risk level 4	4021.23
2m	2	>20ppt		natural	B	risk level 4	360.52
2m	2	>20ppt	Open	natural	B	risk level 4	119.86
2m	3	>20ppt	Open	natural	B	risk level 4	1.18
2m	3	>20ppt	Seasonally Condemned	natural	B	risk level 4	253.42
2m	4	>20ppt	Open	natural	A	risk level 4	825.24
	0	<15ppt	Condemned	developed	C	risk level 4	11816.14
	0	<15ppt		natural	A	risk level 4	8009.92
	0	<15ppt		natural	B	risk level 4	12.60
	0	<15ppt	Condemned	natural	A	risk level 4	37.74
	0	<15ppt	Condemned	natural	B	risk level 4	18063.08
	0	<15ppt	Condemned	natural	C	risk level 4	150178.33
	0	<15ppt	Open	natural	A	risk level 4	11791.02
	0	<15ppt	Open	natural	C	risk level 4	22011.34

Gloucester County Oyster Aquaculture Vulnerability Scores

BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt		natural		risk level 0	2058.12
0.5m	0	>7ppt		natural	A	risk level 0	5489368.73
0.5m	0	>7ppt	Open	natural		risk level 0	324.99
0.5m	0	>7ppt	Open	natural	A	risk level 0	3064729.52
1m	0	>7ppt		natural		risk level 0	140.23
1m	0	>7ppt		natural	A	risk level 0	8133025.30
1m	0	>7ppt	Open	natural		risk level 0	107.25
1m	0	>7ppt	Open	natural	A	risk level 0	1508495.38
2m	0	>7ppt		natural		risk level 0	152.10
2m	0	>7ppt		natural	A	risk level 0	11855454.75
2m	0	>7ppt	Open	natural	A	risk level 0	2697615.22
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt		developed-fb	A	risk level 1	16515.05
0.5m	0	>7ppt	Open	developed-fb	A	risk level 1	32125.73
0.5m	0	>7ppt		developed-fb		risk level 1	3.97
0.5m	0	>7ppt		natural	B	risk level 1	2285739.39
0.5m	0	>7ppt	Open	natural	B	risk level 1	258953.97
1m	0	>7ppt	Open	developed-fb	A	risk level 1	8282.52
1m	0	>7ppt		natural	B	risk level 1	1563356.26
1m	0	>7ppt	Open	natural	B	risk level 1	148023.40
2m	0	>7ppt	Open	developed-fb	A	risk level 1	12123.94
2m	0	>7ppt		natural	B	risk level 1	2473648.75
2m	0	>7ppt	Open	natural	B	risk level 1	232131.72
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
0.5m	0	>7ppt		developed	A	risk level 2	360747.80
0.5m	0	>7ppt	Condemned	developed	A	risk level 2	1287982.99
0.5m	0	>7ppt	Open	developed	A	risk level 2	915613.59
0.5m	0	>7ppt	Seasonally Condemned	developed	A	risk level 2	51854.76
0.5m	0	>7ppt		developed	B	risk level 2	1165732.98
0.5m	0	>7ppt	Condemned	developed	B	risk level 2	980544.47
0.5m	0	>7ppt	Open	developed	B	risk level 2	54902.62
0.5m	0	>7ppt	Seasonally Condemned	developed	B	risk level 2	26772.76
0.5m	0	>7ppt		developed		risk level 2	105.64
0.5m	0	>7ppt	Condemned	developed		risk level 2	3234.28
0.5m	0	>7ppt	Open	developed		risk level 2	811.61
0.5m	0	>7ppt	Condemned	developed-fb	A	risk level 2	75420.83
0.5m	0	>7ppt	Seasonally Condemned	developed-fb	A	risk level 2	699.57
0.5m	0	>7ppt	Condemned	developed-fb	B	risk level 2	95988.07
0.5m	0	>7ppt	Seasonally Condemned	developed-fb	B	risk level 2	1884.41
0.5m	0	>7ppt	Condemned	developed-fb		risk level 2	1324.30
0.5m	0	>7ppt	Condemned	natural	A	risk level 2	4502911.07
0.5m	0	>7ppt	Seasonally Condemned	natural	A	risk level 2	74650.45
0.5m	0	>7ppt	Condemned	natural	B	risk level 2	3156336.71
0.5m	0	>7ppt	Seasonally Condemned	natural	B	risk level 2	40112.14
0.5m	0	>7ppt	Condemned	natural		risk level 2	59049.02
1m	0	>7ppt		developed	A	risk level 2	387572.92
1m	0	>7ppt	Condemned	developed	A	risk level 2	402499.26

1m	0	>7ppt		natural	D	risk level 3	30660.46
1m	0	>7ppt	Condemned	natural	D	risk level 3	26.05
2m	0	>7ppt		developed	C	risk level 3	86626.99
2m	0	>7ppt	Condemned	developed	C	risk level 3	27684.72
2m	0	>7ppt		developed-fb	B	risk level 3	31063.86
2m	0	>7ppt	Open	developed-fb	B	risk level 3	192.05
2m	0	>7ppt	Condemned	developed-fb	C	risk level 3	1112.54
2m	0	>7ppt		natural	C	risk level 3	1776186.92
2m	0	>7ppt	Condemned	natural	C	risk level 3	605533.74
2m	0	>7ppt	Open	natural	C	risk level 3	24051.04
2m	0	>7ppt		natural	D	risk level 3	85440.58
BATH	DENSITY	GROUPED SALINITY	COND_TYPE	DOMINANT LAND USE	ZONE RATE	OYSTERINDEX	AREA (m2)
>2m	0	>7ppt		developed	A	risk level 4	4256297.66
>2m	0	>7ppt	Condemned	developed	A	risk level 4	745759.48
>2m	0	>7ppt	Open	developed	A	risk level 4	2049994.65
>2m	0	>7ppt	Seasonally Condemned	developed	A	risk level 4	1795.83
>2m	2	>7ppt		developed	A	risk level 4	43.54
>2m	0	>7ppt		developed	B	risk level 4	6324865.22
>2m	0	>7ppt	Condemned	developed	B	risk level 4	170402.88
>2m	0	>7ppt	Open	developed	B	risk level 4	217356.20
>2m	0	>7ppt	Seasonally Condemned	developed	B	risk level 4	79039.72
>2m	2	>7ppt		developed	B	risk level 4	457.45
>2m	3	>7ppt	Seasonally Condemned	developed	B	risk level 4	767.13
>2m	0	>7ppt		developed	C	risk level 4	763610.24
>2m	0	>7ppt	Condemned	developed	C	risk level 4	1820.58
>2m	0	>7ppt		developed		risk level 4	1823.18
>2m	0	>7ppt	Condemned	developed		risk level 4	69.20
>2m	0	>7ppt	Open	developed-fb	A	risk level 4	34193.11
>2m	0	>7ppt		developed-fb	B	risk level 4	324437.87
>2m	0	>7ppt	Condemned	developed-fb	B	risk level 4	50430.11
>2m	0	>7ppt	Open	developed-fb	B	risk level 4	4027.87
>2m	0	>7ppt	Seasonally Condemned	developed-fb	B	risk level 4	1547.15
>2m	0	>7ppt		natural	A	risk level 4	72006438.00
>2m	0	>7ppt	Condemned	natural	A	risk level 4	815541.95
>2m	0	>7ppt	Open	natural	A	risk level 4	8029543.23
>2m	0	>7ppt	Seasonally Condemned	natural	A	risk level 4	3623.19
>2m	2	>7ppt		natural	A	risk level 4	716.01
>2m	2	>7ppt	Open	natural	A	risk level 4	349.13
>2m	3	>7ppt		natural	A	risk level 4	2761.45
>2m	4	>7ppt	Open	natural	A	risk level 4	670.08
>2m	0	>7ppt		natural	B	risk level 4	11234543.98
>2m	0	>7ppt	Condemned	natural	B	risk level 4	695992.16
>2m	0	>7ppt	Open	natural	B	risk level 4	1208823.89
>2m	0	>7ppt	Seasonally Condemned	natural	B	risk level 4	53564.09
>2m	0	>7ppt		natural	C	risk level 4	5106899.37
>2m	0	>7ppt	Condemned	natural	C	risk level 4	2229.56
>2m	0	>7ppt		natural	D	risk level 4	619234.78
>2m	0	>7ppt		natural		risk level 4	11299.19
>2m	0	>7ppt	Condemned	natural		risk level 4	524.46
>2m	0	>7ppt			A	risk level 4	48.57
>2m	0	>7ppt			B	risk level 4	355.11
>2m	0	>7ppt				risk level 4	18864.17
>2m	0	>7ppt	Condemned			risk level 4	1718.08

0.5m	1	>7ppt		developed	A	risk level 4	78864.64
0.5m	1	>7ppt	Open	developed	A	risk level 4	14665.71
0.5m	2	>7ppt		developed	A	risk level 4	250226.81
0.5m	2	>7ppt	Open	developed	A	risk level 4	72784.65
0.5m	3	>7ppt		developed	A	risk level 4	160599.47
0.5m	3	>7ppt	Seasonally Condemned	developed	A	risk level 4	417.97
0.5m	4	>7ppt		developed	A	risk level 4	201532.93
0.5m	4	>7ppt	Open	developed	A	risk level 4	11618.86
0.5m	1	>7ppt		developed	B	risk level 4	1331.30
0.5m	2	>7ppt		developed	B	risk level 4	45401.04
0.5m	2	>7ppt	Seasonally Condemned	developed	B	risk level 4	7982.45
0.5m	3	>7ppt		developed	B	risk level 4	222170.27
0.5m	3	>7ppt	Open	developed	B	risk level 4	9919.80
0.5m	3	>7ppt	Seasonally Condemned	developed	B	risk level 4	48929.74
0.5m	0	<7ppt		natural	A	risk level 4	1.14
0.5m	1	>7ppt		natural	A	risk level 4	1245661.12
0.5m	1	>7ppt	Condemned	natural	A	risk level 4	396.32
0.5m	1	>7ppt	Open	natural	A	risk level 4	82160.69
0.5m	2	>7ppt		natural	A	risk level 4	1717752.39
0.5m	2	>7ppt	Open	natural	A	risk level 4	92583.96
0.5m	3	>7ppt		natural	A	risk level 4	907086.00
0.5m	3	>7ppt	Condemned	natural	A	risk level 4	2339.76
0.5m	3	>7ppt	Open	natural	A	risk level 4	89130.47
0.5m	3	>7ppt	Seasonally Condemned	natural	A	risk level 4	75.23
0.5m	4	<7ppt		natural	A	risk level 4	0.20
0.5m	4	>7ppt		natural	A	risk level 4	3845091.75
0.5m	4	>7ppt	Condemned	natural	A	risk level 4	4292.68
0.5m	4	>7ppt	Open	natural	A	risk level 4	1273825.94
0.5m	1	>7ppt		natural	B	risk level 4	24377.63
0.5m	2	>7ppt		natural	B	risk level 4	11593.27
0.5m	2	>7ppt	Open	natural	B	risk level 4	2166.73
0.5m	2	>7ppt	Seasonally Condemned	natural	B	risk level 4	7206.51
0.5m	3	>7ppt		natural	B	risk level 4	116979.96
0.5m	3	>7ppt	Condemned	natural	B	risk level 4	40491.35
0.5m	3	>7ppt	Open	natural	B	risk level 4	3470.14
0.5m	3	>7ppt	Seasonally Condemned	natural	B	risk level 4	22605.01
0.5m	3	>7ppt		natural	C	risk level 4	98.48
0.5m	3	>7ppt	Condemned	natural	C	risk level 4	53668.70
0.5m	2	>7ppt		natural		risk level 4	125.11
0.5m	4	>7ppt		natural		risk level 4	185.27
0.5m	2	>7ppt				risk level 4	13.44
0.5m	4	>7ppt				risk level 4	13.44
1m	1	>7ppt		developed	A	risk level 4	11407.91
1m	2	>7ppt		developed	A	risk level 4	44475.83
1m	3	>7ppt		developed	A	risk level 4	27700.44
1m	4	>7ppt		developed	A	risk level 4	16993.26
1m	4	>7ppt	Open	developed	A	risk level 4	116.88
1m	1	>7ppt		developed	B	risk level 4	188.33
1m	2	>7ppt		developed	B	risk level 4	2222.90
1m	2	>7ppt	Seasonally Condemned	developed	B	risk level 4	49.69
1m	3	>7ppt		developed	B	risk level 4	11004.12
1m	3	>7ppt	Open	developed	B	risk level 4	3845.17
1m	3	>7ppt	Seasonally Condemned	developed	B	risk level 4	3677.81
1m	1	>7ppt		natural	A	risk level 4	589569.92
1m	1	>7ppt	Open	natural	A	risk level 4	342.92

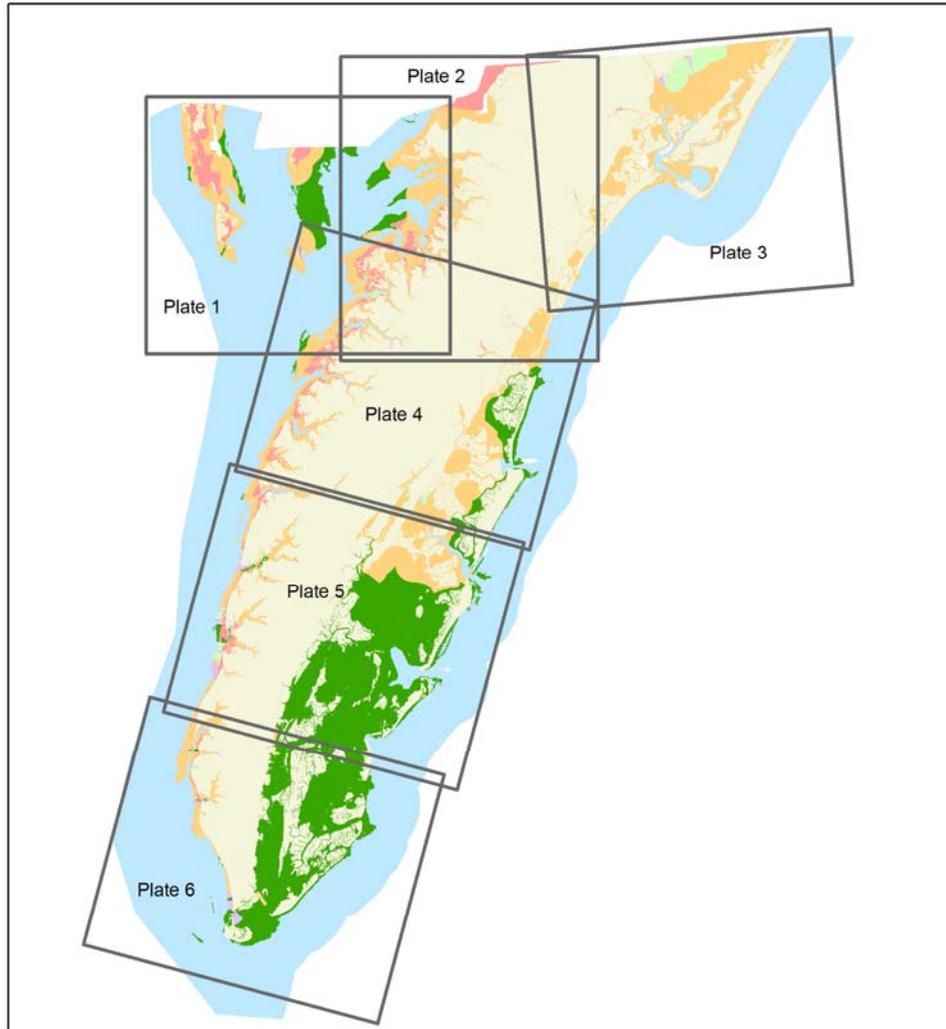
1m	2	>7ppt		natural	A	risk level 4	400926.71
1m	2	>7ppt	Open	natural	A	risk level 4	1695.21
1m	3	>7ppt		natural	A	risk level 4	143600.79
1m	3	>7ppt	Condemned	natural	A	risk level 4	1919.37
1m	3	>7ppt	Open	natural	A	risk level 4	543.00
1m	4	>7ppt		natural	A	risk level 4	1232754.74
1m	4	>7ppt	Condemned	natural	A	risk level 4	313.73
1m	4	>7ppt	Open	natural	A	risk level 4	125868.09
1m	1	>7ppt		natural	B	risk level 4	1147.07
1m	2	>7ppt		natural	B	risk level 4	848.76
1m	2	>7ppt	Open	natural	B	risk level 4	661.61
1m	2	>7ppt	Seasonally Condemned	natural	B	risk level 4	311.28
1m	3	>7ppt		natural	B	risk level 4	2545.87
1m	3	>7ppt	Condemned	natural	B	risk level 4	6665.99
1m	3	>7ppt	Open	natural	B	risk level 4	1580.78
1m	3	>7ppt	Seasonally Condemned	natural	B	risk level 4	1231.51
1m	3	>7ppt		natural	C	risk level 4	3.92
1m	3	>7ppt	Condemned	natural	C	risk level 4	7087.74
2m	1	>7ppt		developed	A	risk level 4	2751.71
2m	2	>7ppt		developed	A	risk level 4	5954.13
2m	3	>7ppt		developed	A	risk level 4	1876.51
2m	4	>7ppt		developed	A	risk level 4	74.25
2m	2	>7ppt		developed	B	risk level 4	791.54
2m	3	>7ppt	Seasonally Condemned	developed	B	risk level 4	4021.23
2m	1	>7ppt		natural	A	risk level 4	65571.24
2m	2	>7ppt		natural	A	risk level 4	16168.44
2m	2	>7ppt	Open	natural	A	risk level 4	1187.88
2m	3	>7ppt		natural	A	risk level 4	10510.66
2m	3	>7ppt	Condemned	natural	A	risk level 4	1144.55
2m	4	>7ppt		natural	A	risk level 4	69799.30
2m	4	>7ppt	Condemned	natural	A	risk level 4	47.97
2m	4	>7ppt	Open	natural	A	risk level 4	17639.36
2m	2	>7ppt		natural	B	risk level 4	360.52
2m	2	>7ppt	Open	natural	B	risk level 4	119.86
2m	3	>7ppt	Condemned	natural	B	risk level 4	1001.47
2m	3	>7ppt	Open	natural	B	risk level 4	1.18
2m	3	>7ppt	Seasonally Condemned	natural	B	risk level 4	253.42
2m	3	>7ppt	Condemned	natural	C	risk level 4	189.59

APPENDIX 2.

SHELLFISH AQUACULTURE VULNERABILITY MODEL OUTPUT

Eastern Shore Maps
Hard Clam Aquaculture
Oyster Aquaculture

Gloucester County Maps
Hard Clam Aquaculture
Oyster Aquaculture



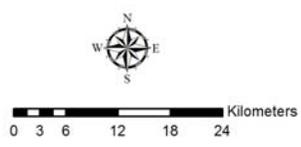
Eastern Shore Aquaculture Vulnerability Model Plate Index

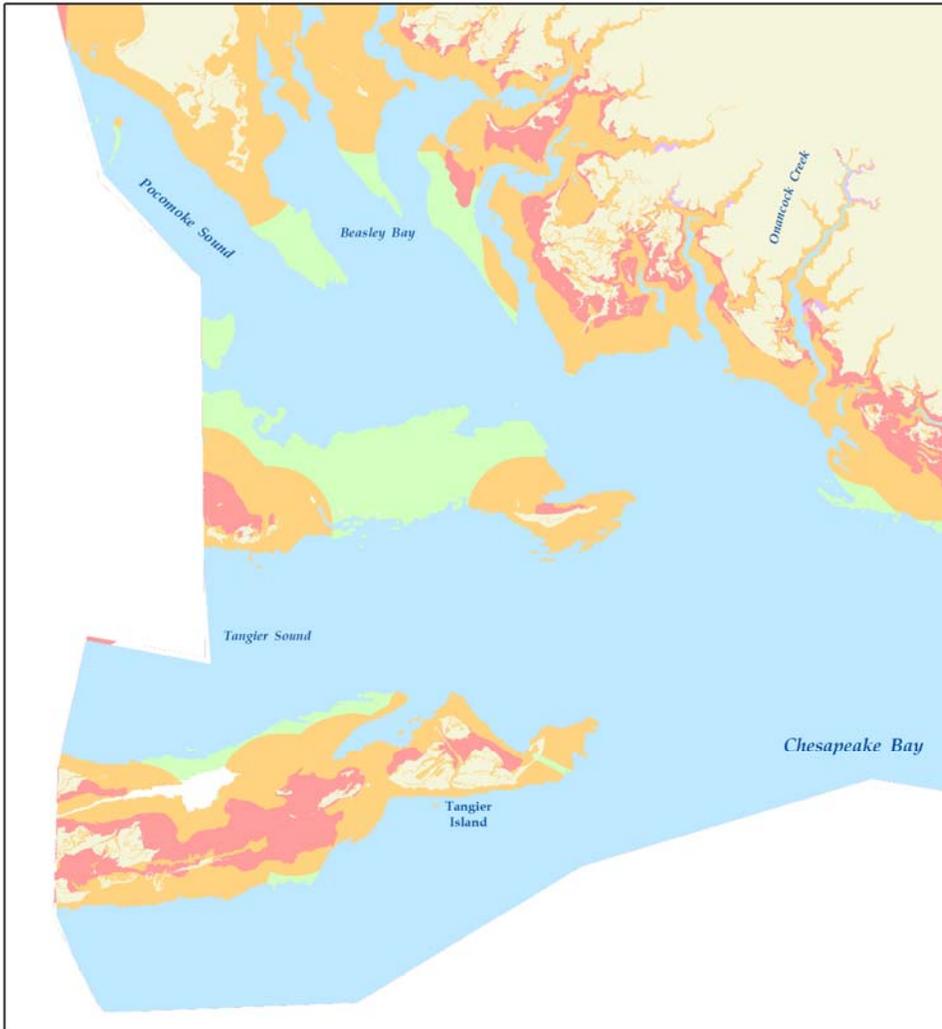
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present





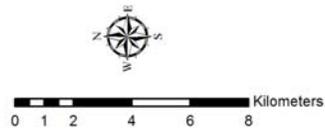
Legend

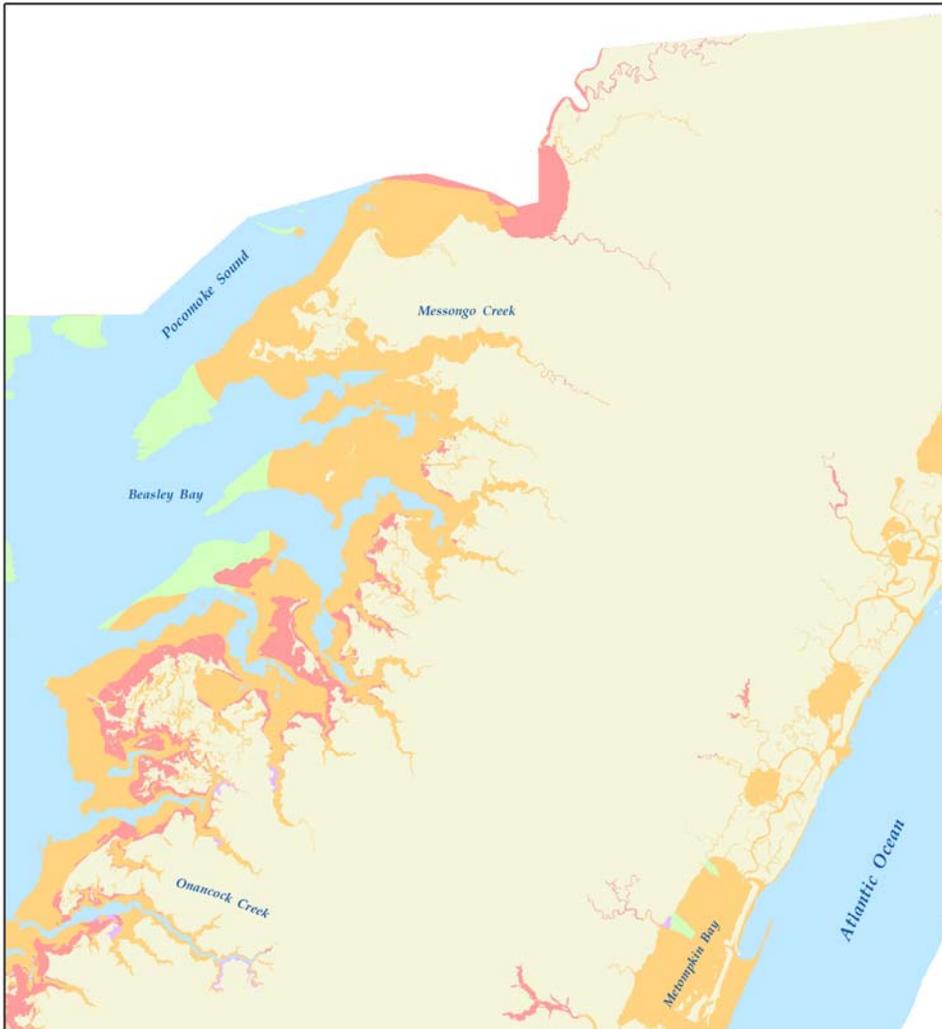
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Hard Clam Aquaculture
Vulnerability Model
Plate 1**





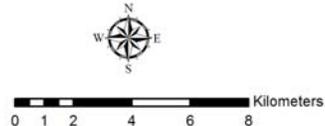
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Hard Clam Aquaculture
Vulnerability Model
Plate 2**





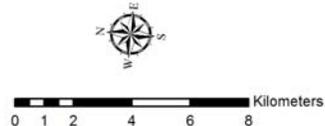
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Hard Clam Aquaculture
Vulnerability Model
Plate 3**





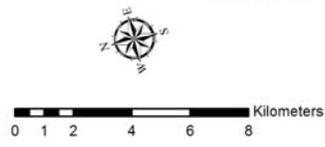
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Eastern Shore Hard Clam Aquaculture Vulnerability Model Plate 4





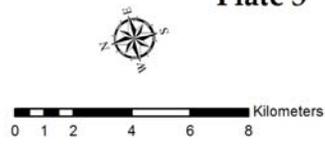
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Hard Clam Aquaculture
Vulnerability Model
Plate 5**





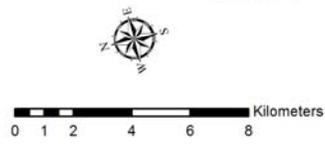
Legend

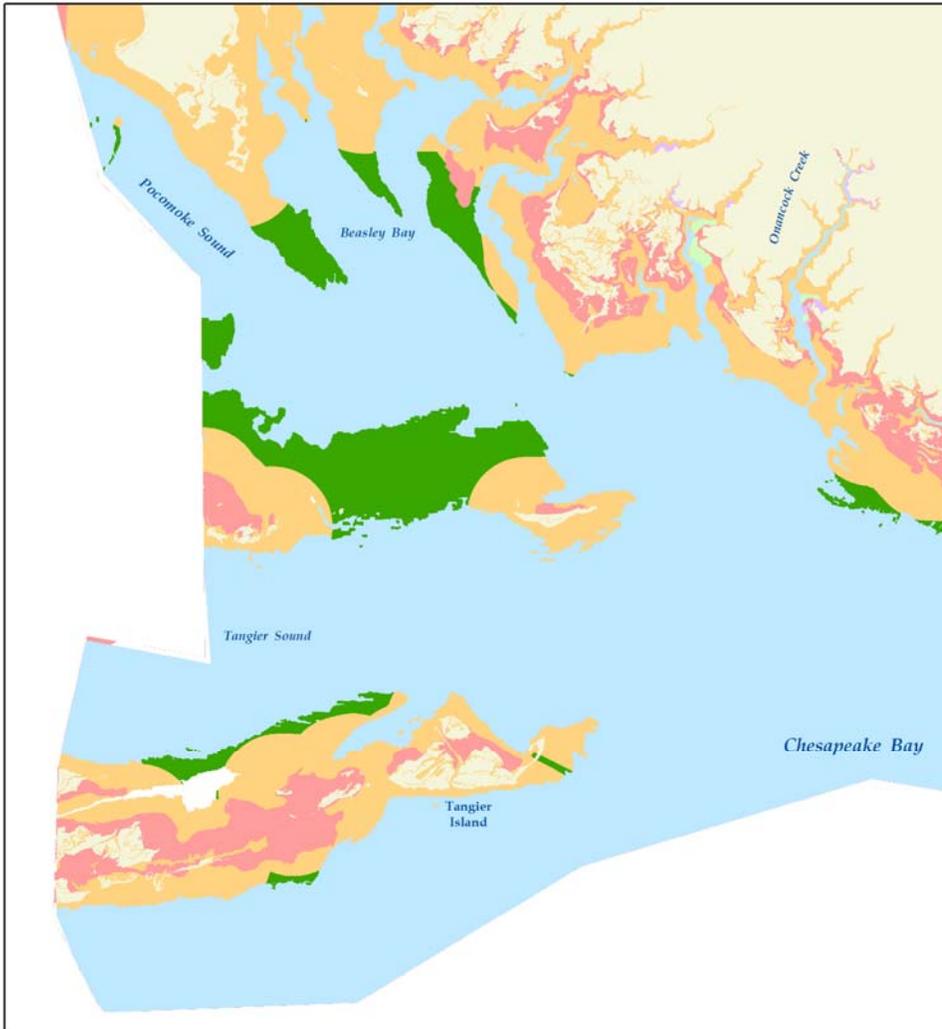
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Hard Clam Aquaculture
Vulnerability Model
Plate 6**





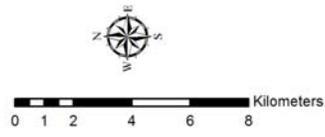
Legend

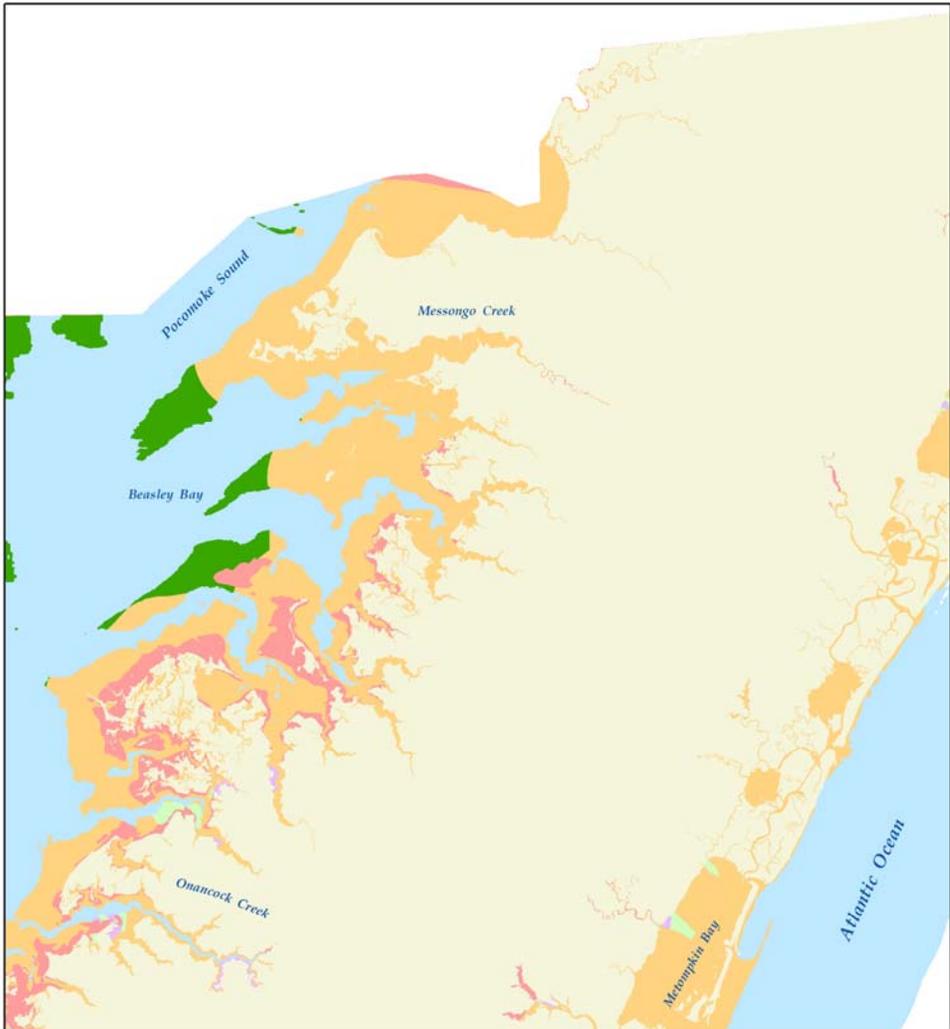
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Eastern Shore Oyster Aquaculture Vulnerability Model Plate 1





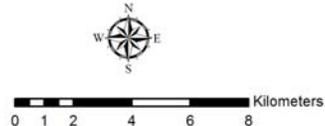
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Oyster Aquaculture
Vulnerability Model
Plate 2**





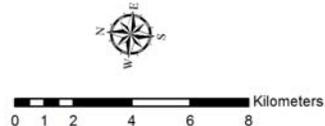
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Oyster Aquaculture
Vulnerability Model
Plate 3**





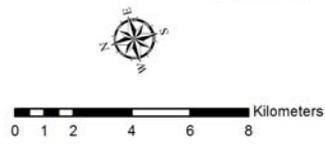
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Eastern Shore Oyster Aquaculture Vulnerability Model Plate 4





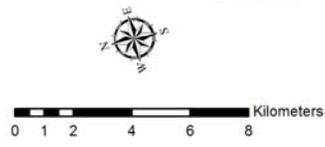
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

**Eastern Shore
Oyster Aquaculture
Vulnerability Model
Plate 5**





Legend

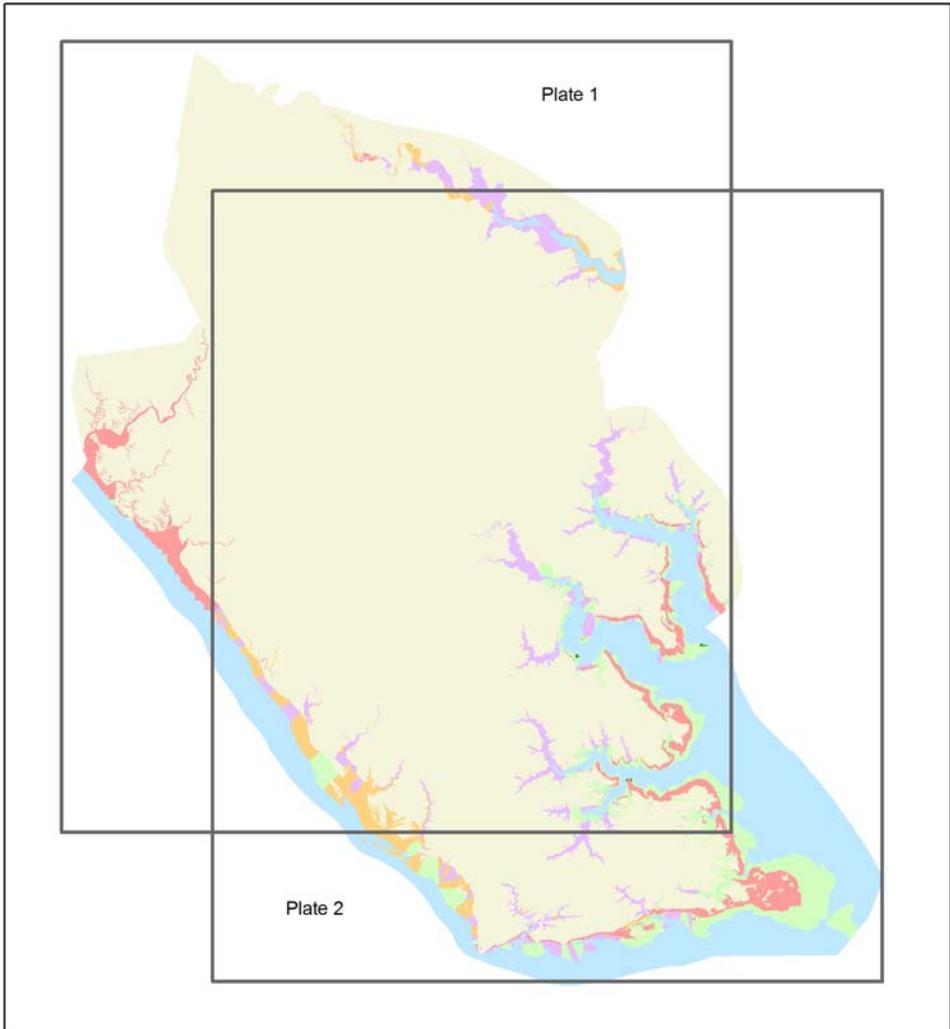
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Eastern Shore Oyster Aquaculture Vulnerability Model Plate 6





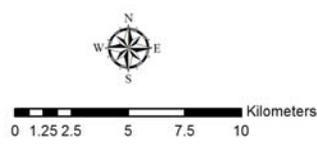
Gloucester County Aquaculture Vulnerability Model Plate Index

Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present





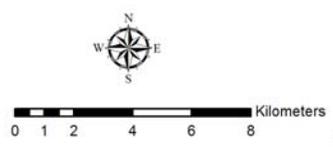
Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Gloucester County Hard Clam Aquaculture Vulnerability Model Plate 1





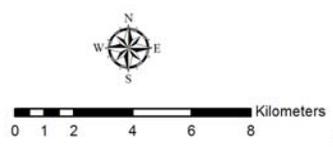
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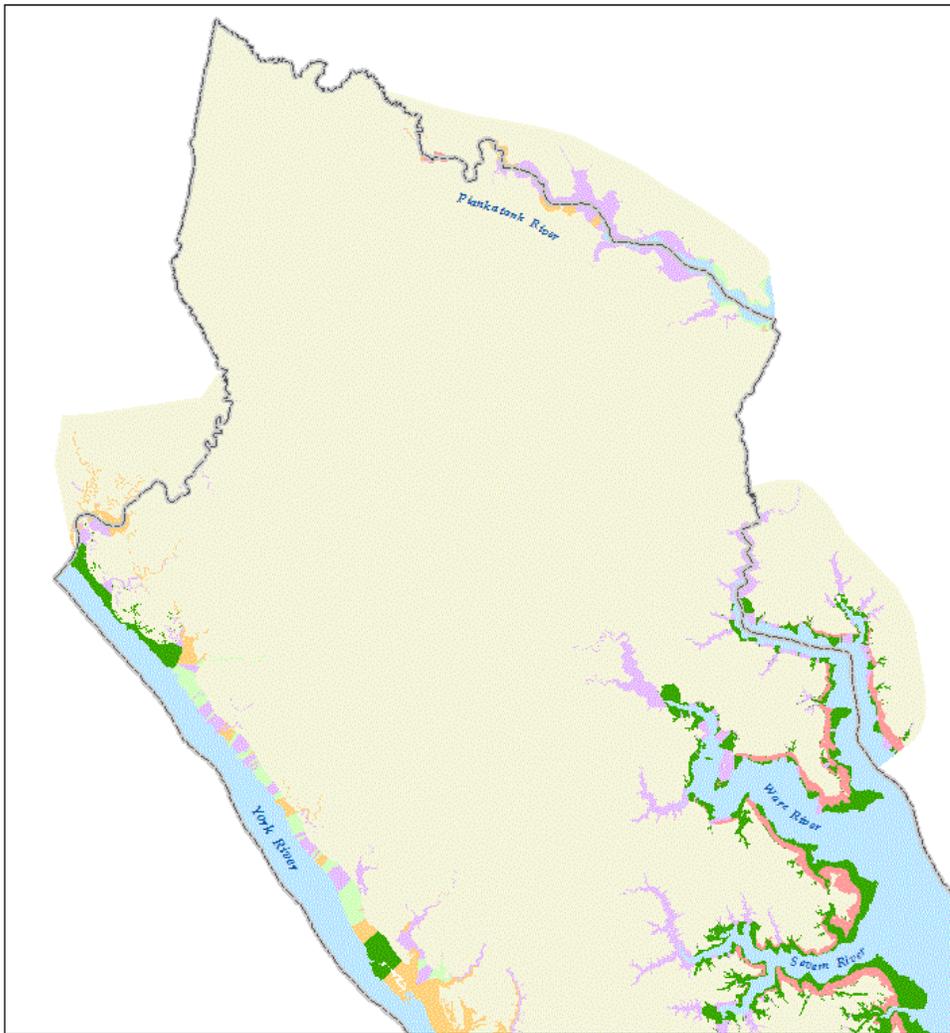
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Gloucester County Hard Clam Aquaculture Vulnerability Model Plate 2





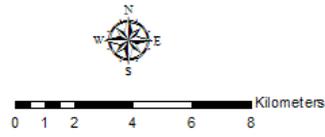
Legend

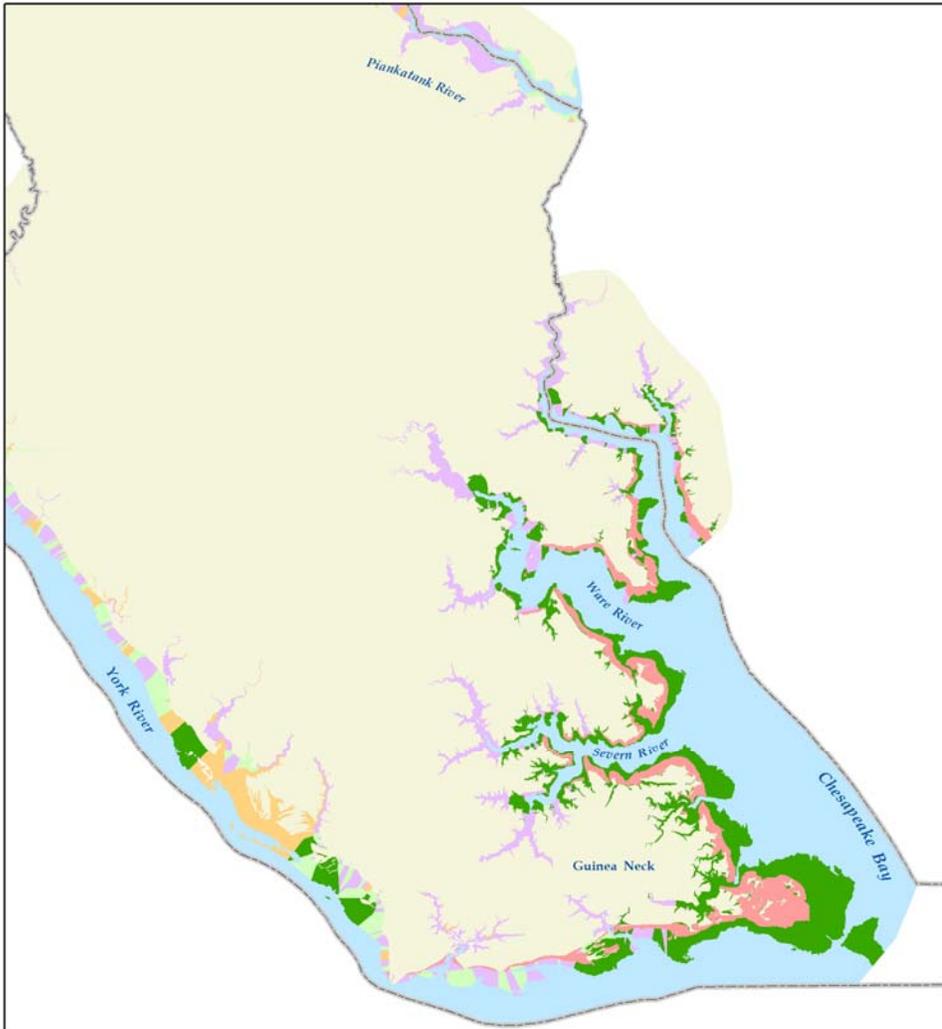
- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
- risk level 1 - minimal risk
- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Gloucester County Oyster Aquaculture Vulnerability Model Plate 1





Legend

- depth >2m - study limits for shellfish growing
- land

Vulnerability Index

- risk level 0 - no current or impending threats
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- risk level 2 - existing H2O quality concerns
- risk level 3 - future H2O quality concerns possible
- risk level 4 - ecological use conflicts present

Gloucester County Oyster Aquaculture Vulnerability Model Plate 2

