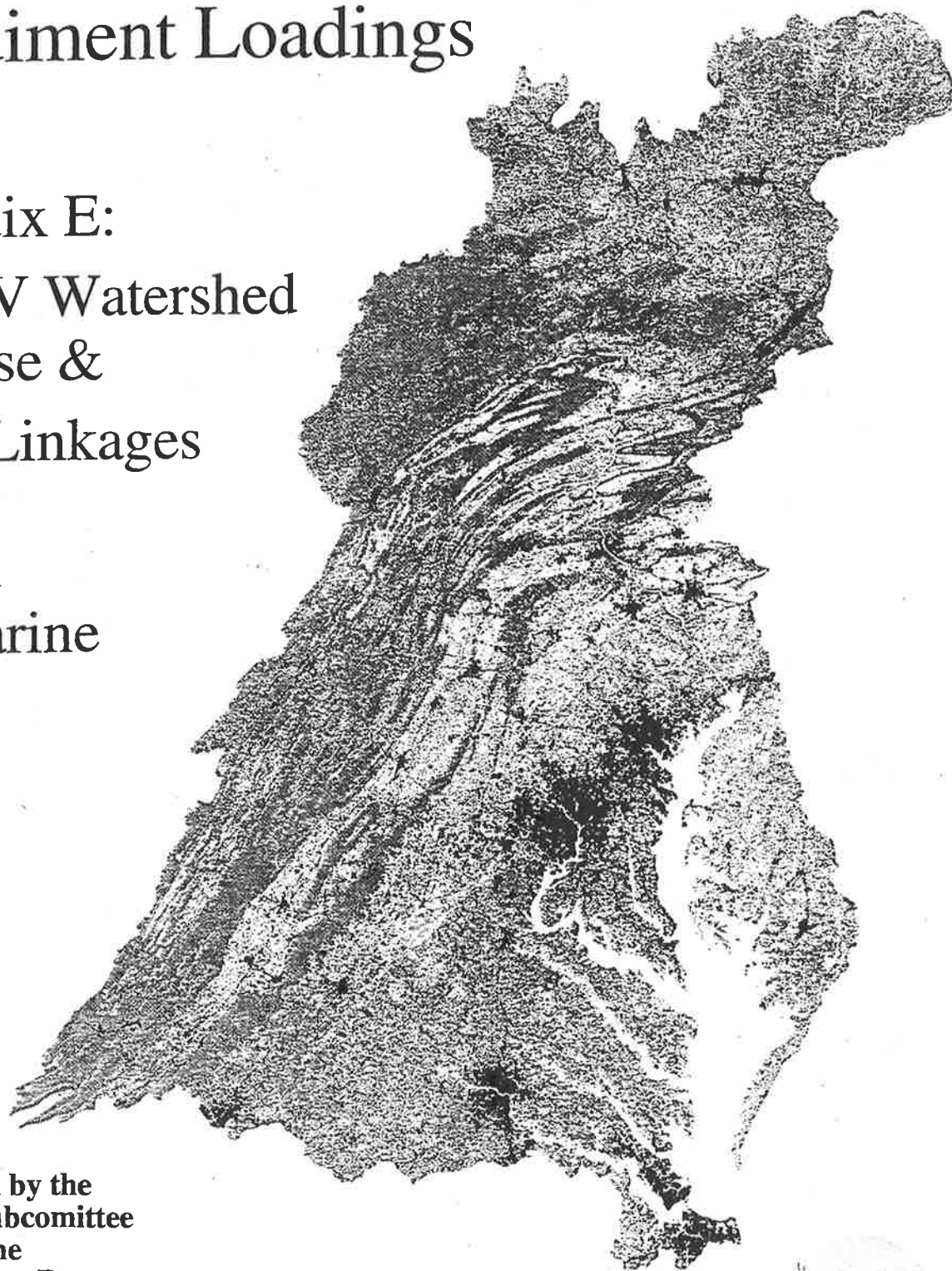


Chesapeake Bay Watershed Model Application & Calculation of Nutrient & Sediment Loadings

Appendix E: Phase IV Watershed Land Use & Model Linkages to the Airshed & Estuarine Models



Prepared by the
Modeling Subcommittee
of the
Chesapeake Bay Program

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Chesapeake Bay Program

CHESAPEAKE BAY WATERSHED MODEL APPLICATION AND CALCULATION OF NUTRIENT AND SEDIMENT LOADINGS

Appendix E: Phase IV Watershed Land Uses And Model Linkages to the Airshed and Estuarine Models

A Report of the
Chesapeake Bay Program
Modeling Subcommittee
Annapolis, MD

August 1997



Chesapeake Bay Program

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Acknowledgments

We would like to acknowledge the following groups for their contribution to the development and documentation of the CBP Land Use Database. The Land, Growth and Stewardship Subcommittee and the Modeling Subcommittee developed the methodology to forecast CBP land use to years beyond the 1990 base year and backcast the CBP land use to the 1985 reference year. Assistance and review of the technical information in this report was provided by the Nutrient Subcommittee. The Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi assisted us in providing what was needed to document the linkages among the airshed, watershed, and estuarine/living resource models. Finally, the engineers, scientists and managers of the Modeling Subcommittee and Model Evaluation Group are acknowledged for their guidance and review in the development and documentation of the CBP Land Use database. This document and other CBP modeling documents can be found on the Modeling Subcommittee web page:

http://www.epa.gov/chesapeake/cbp_home/bayprog/committ/mdsc/mdsc.htm.

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Section E.1

Phase II and Phase IV Watershed Model Segmentation, Above and Below Fall Line

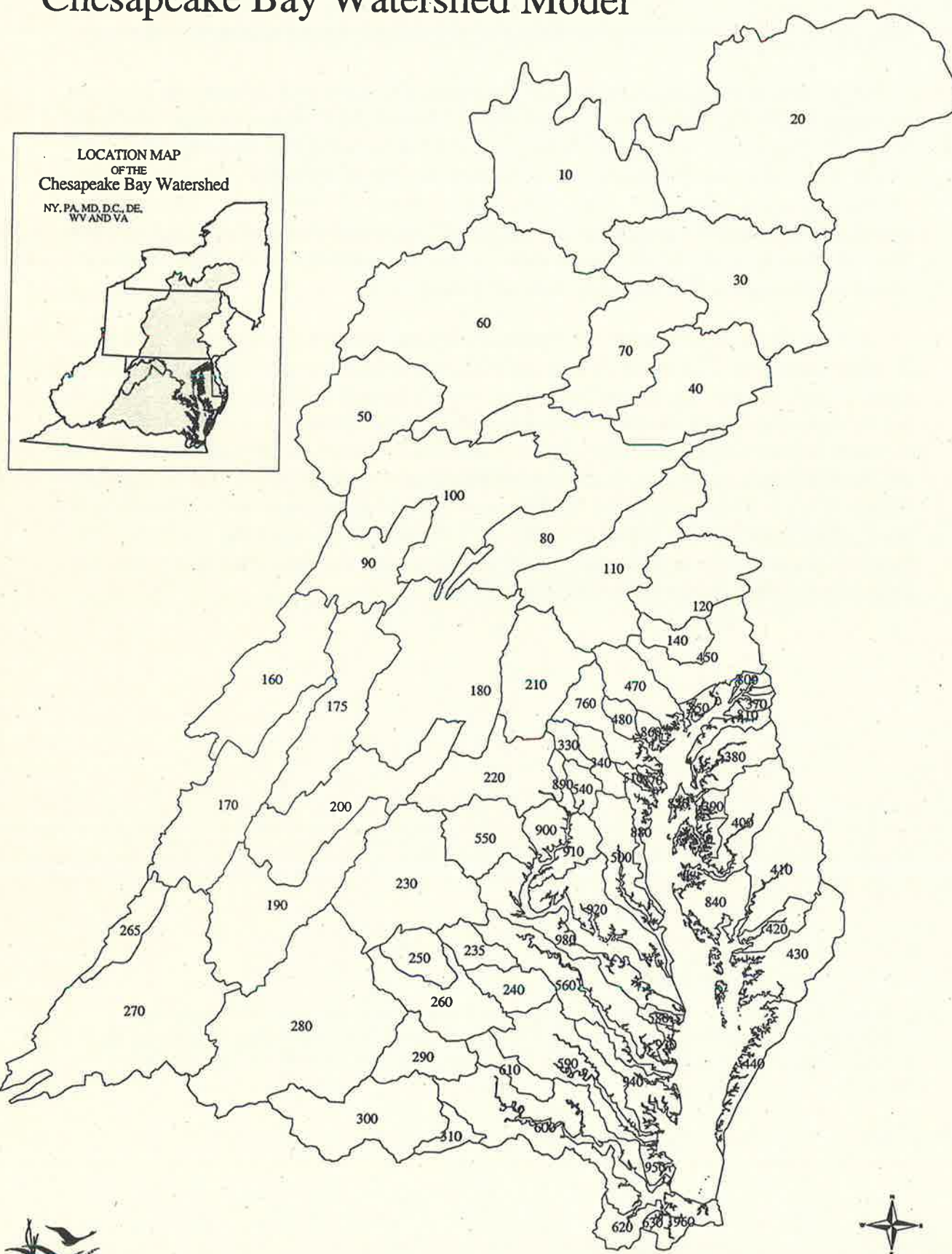
For watershed modeling purposes, the Chesapeake Bay basin was divided into 63 model segments in 1992 as part of the development of Phase II the Chesapeake Bay Watershed Model (Figure E.1.1)¹. The original phase II segmentation was based on a combination of USGS hydrologic unit boundaries, NOAA shore line data for the Bay, location of water quality gauging stations, and the aggregation of relatively homogeneous hydrologic/topographic regions. For more detailed documentation on the approach taken in the development of this model please refer to the "Chesapeake Bay Program Watershed Model Application to Calculate Bay Nutrient Loadings."²

In Phase IV, the Bay Program Watershed Model was strategically increased from 63 to 87 model segments. The increased segmentation was designed to give higher resolution to areas of high nutrient loadings such as the Lancaster area of the Susquehanna. The new model segmentation also increased resolution in areas such as reservoirs and increased access to observed monitoring data. Forty-four of the Phase IV model segments are classified as the above fall line (Figure E.1.3.), and the remaining forty-three are below fall line segments (Figure E.1.4). Above and below fall line segmentation is important to the simulation of water quality and loading transport to the Bay. Simulation of land use loads and river transport water quality is performed for the above fall line segments, while only land use loads are simulated for the below fall line segments.

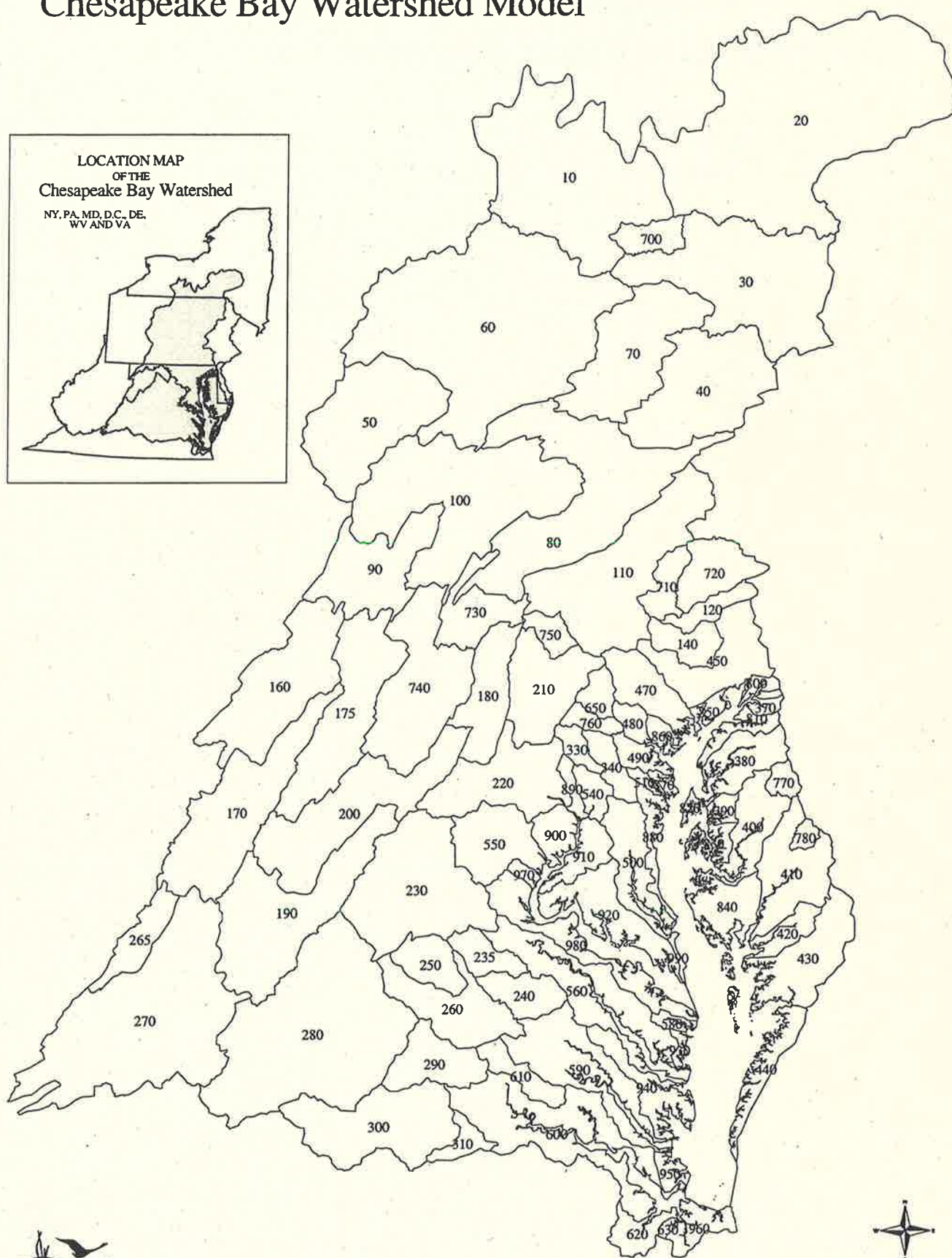
¹ Donigian, A., Linker, L., Chang, C., and Carsel, R., Chesapeake Bay Program: Watershed Model Application to Calculate Bay Nutrient Loadings, Final Findings and Recommendations, Chesapeake Bay Program Office, US EPA Region III, Annapolis, MD, 21403, July 1994, CBP/TRS 157/96, EPA 903-R-94-042

² *ibid.*

Phase II Model Segments in the Chesapeake Bay Watershed Model



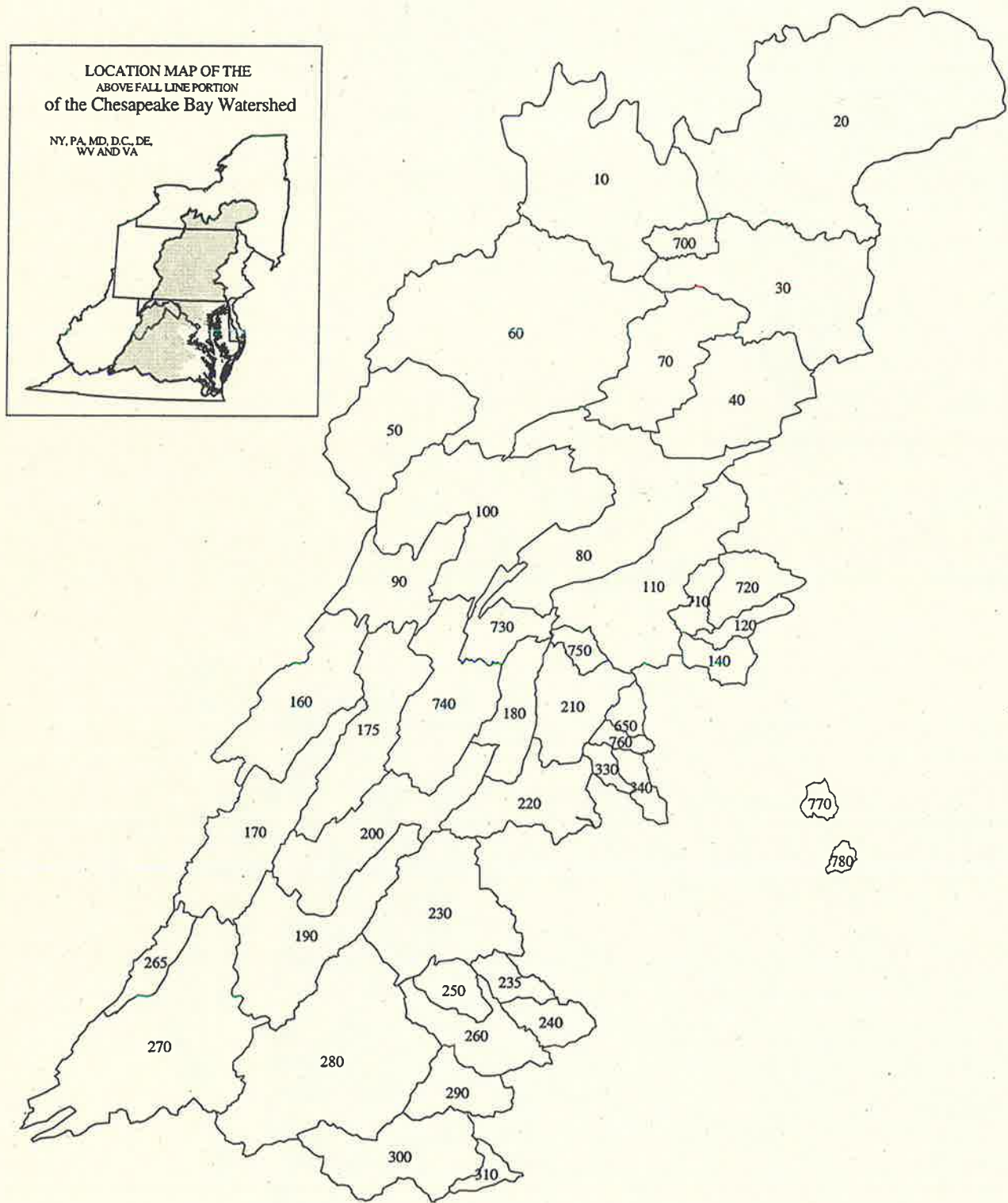
Phase IV Model Segments in the Chesapeake Bay Watershed Model



Chesapeake Bay Watershed Model

Phase IV Watershed Model Segmentation

Above Fall Line Model Segments

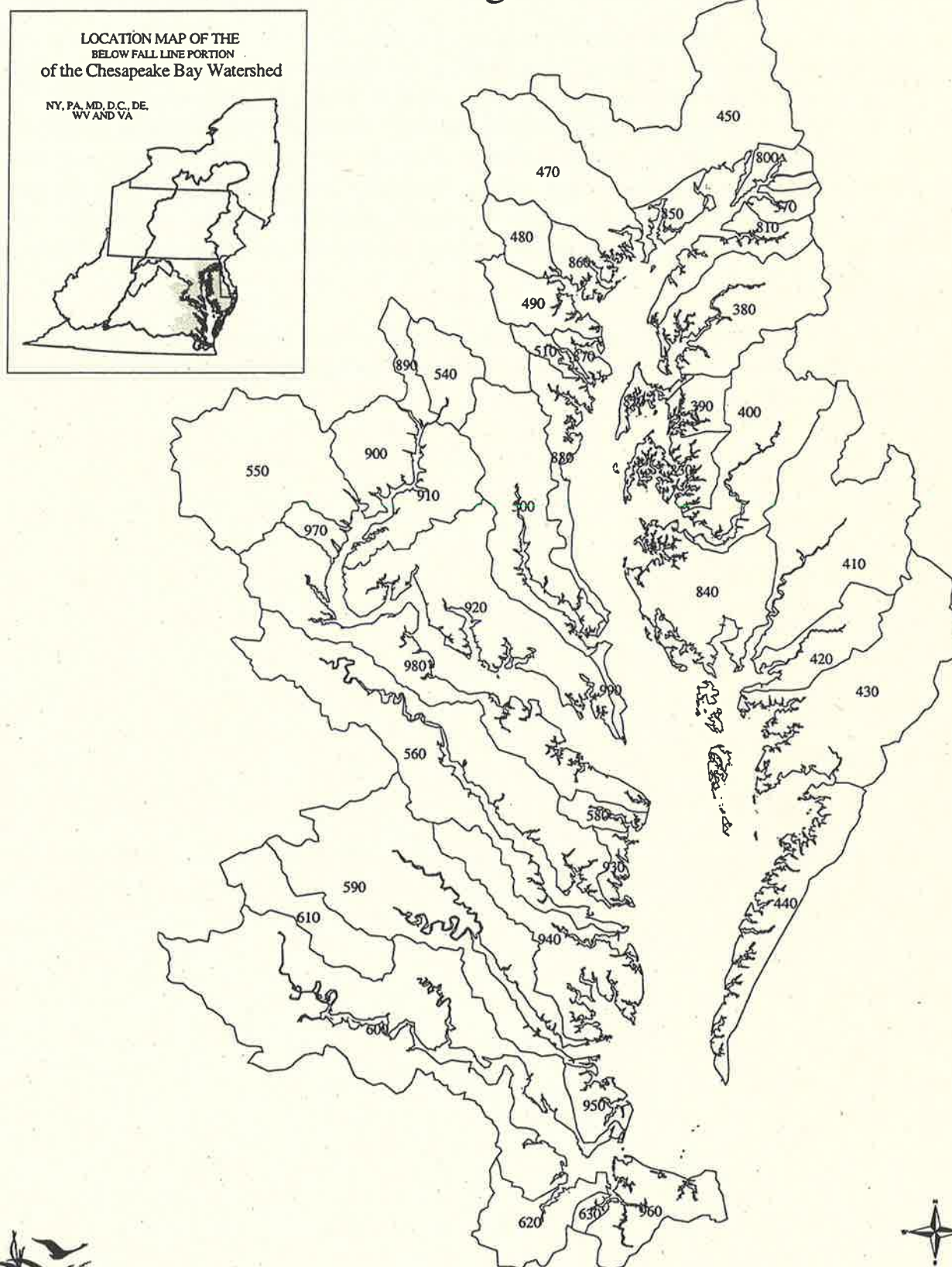


KJH Map Date: April, 1997

/s/v7/hopkins/maps/pp4msall.ps

Source: Chesapeake Bay Program Modeling Team

Chesapeake Bay Watershed Model Phase IV Watershed Model Segmentation Below Fall Line Model Segments



KJH Map Date: April, 1997

/srv7/hopkins/maps/pp4msbfl.ps

Source: Chesapeake Bay Program Modeling Team

Section E.2

Model Segments, State Boundaries and County Boundaries

The county boundaries are the standard political divisions of New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and Washington D.C. Polygon GIS coverages of the county boundaries and Phase IV Watershed Model segments were overlaid. In the counties with shoreline boundaries, the Phase IV model segment coverage shoreline was more accurate than the county coverage shoreline so the model coverage was used to determine shoreline. Remaining county boundaries were determined from the county coverages. The overlay was done to obtain proportional county contribution to the Watershed Model segment area which is used to allocate load values to the different state jurisdictions.

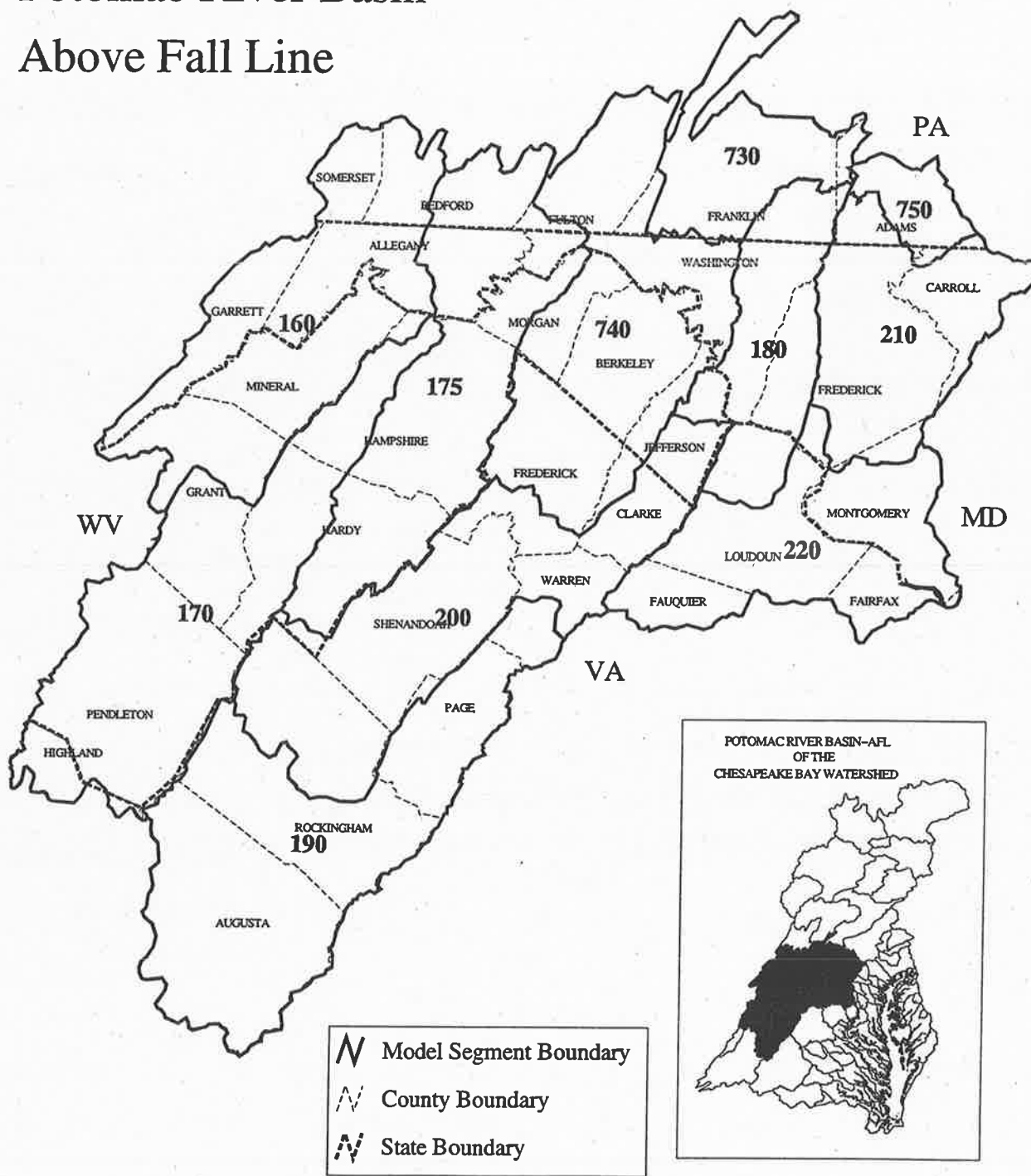
The state and county boundaries overlaid on the Phase IV Chesapeake Bay Watershed Model are presented by ten major tributary basins for both above and below fall line model segments (Figures E.2.1 - E.2.12).

State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments: Susquehanna River Basin



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Potomac River Basin—
Above Fall Line

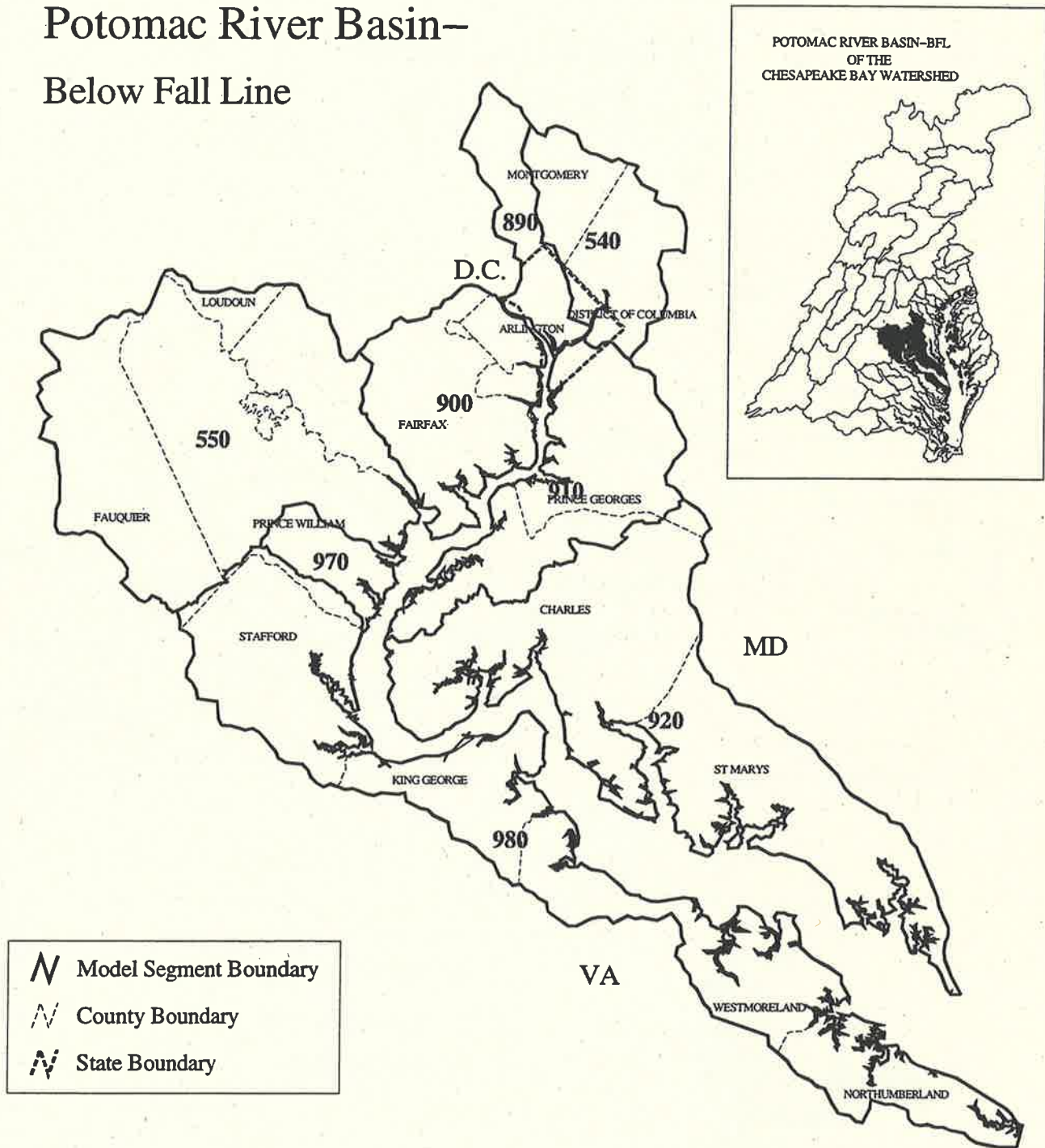


AFL Model Segments: 160, 170, 175, 180, 190, 200,
210, 220, 730, 740, and 750



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Potomac River Basin— Below Fall Line



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

James River Basin— Above Fall Line



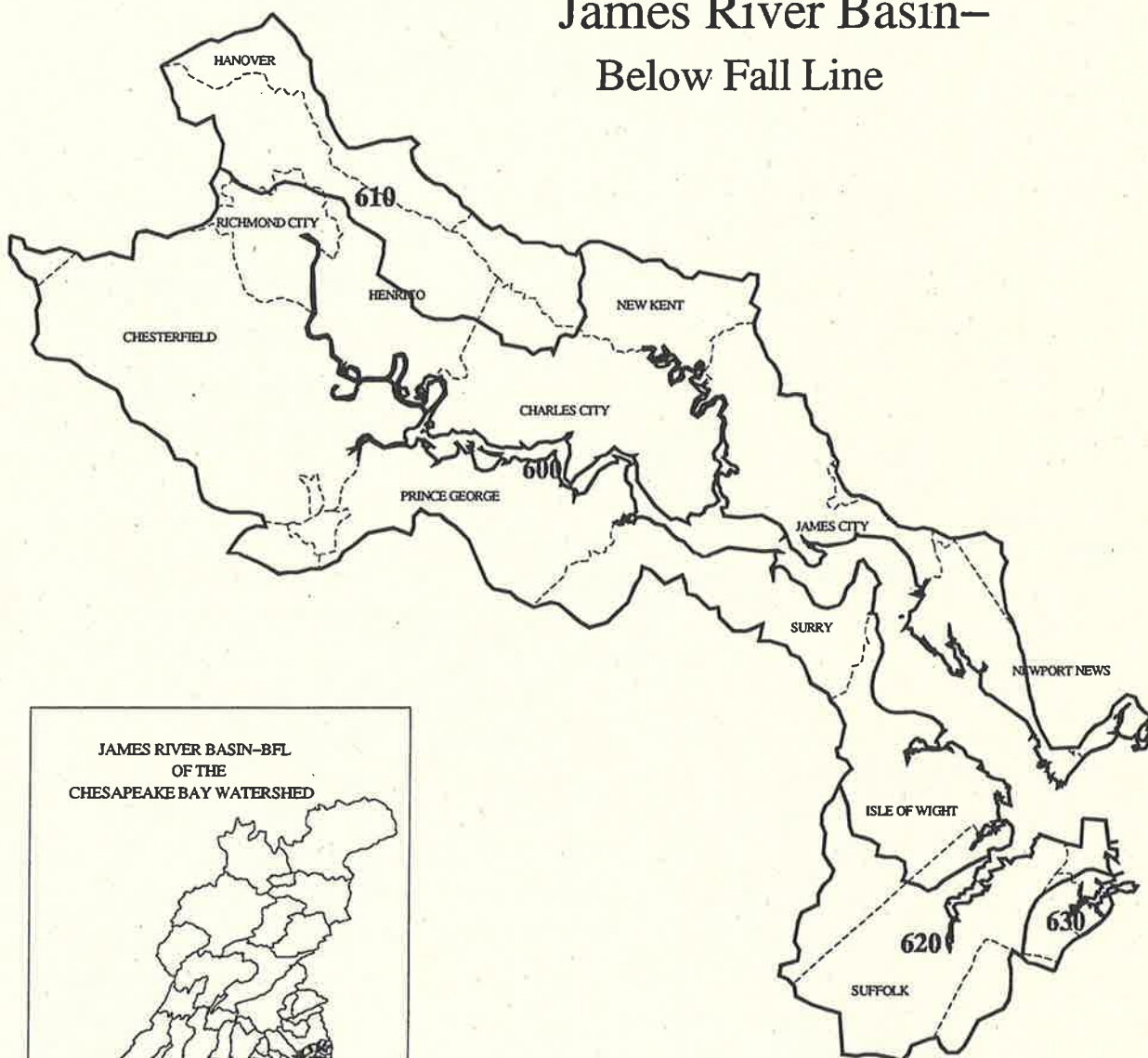
-  Model Segment Boundary
-  County Boundary
-  State Boundary

AFL Model Segments: 265, 270, 280, 290, 300, and 310



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

James River Basin— Below Fall Line



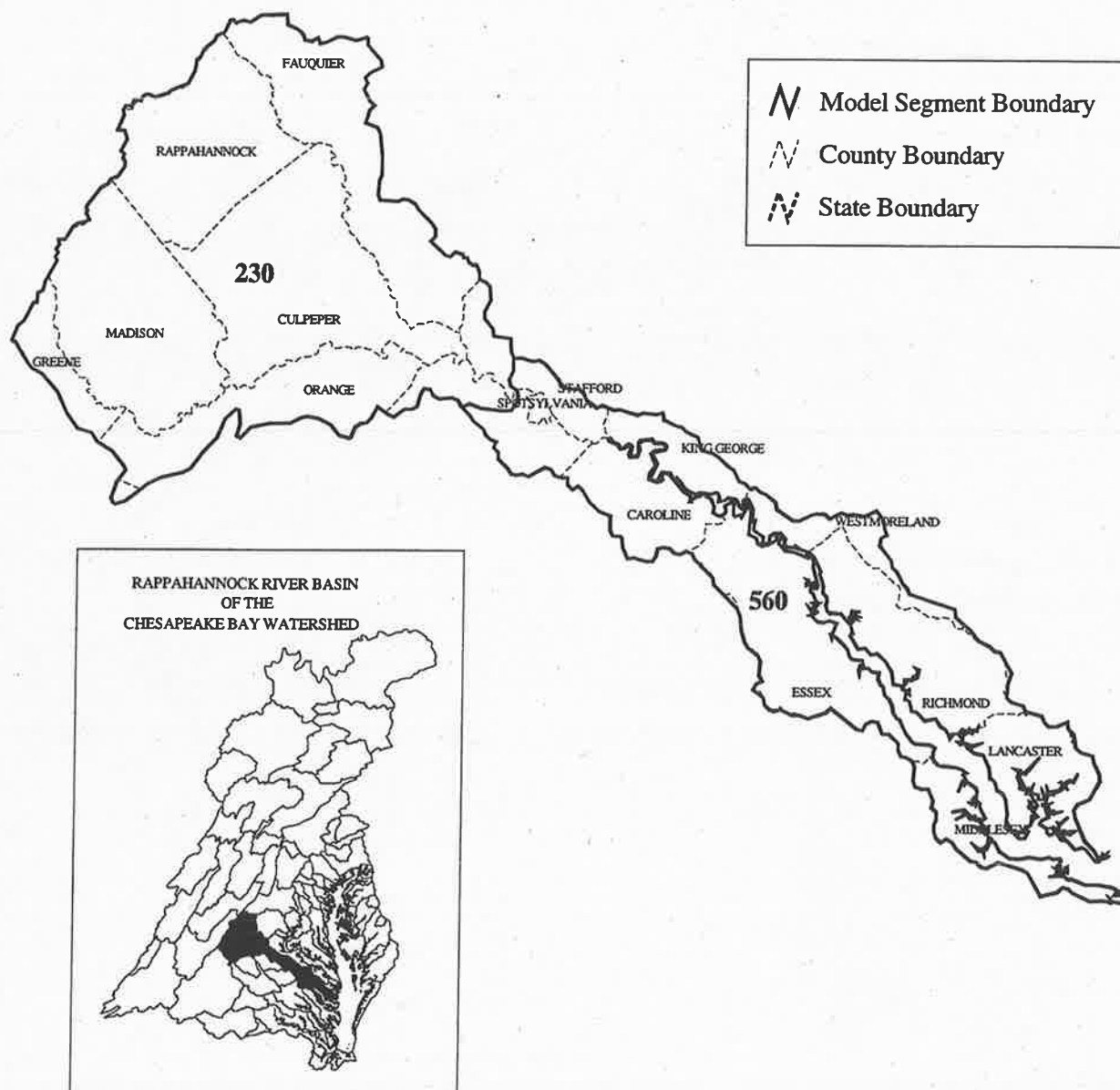
JAMES RIVER BASIN-BFL
OF THE
CHESAPEAKE BAY WATERSHED

-  Model Segment Boundary
-  County Boundary
-  State Boundary



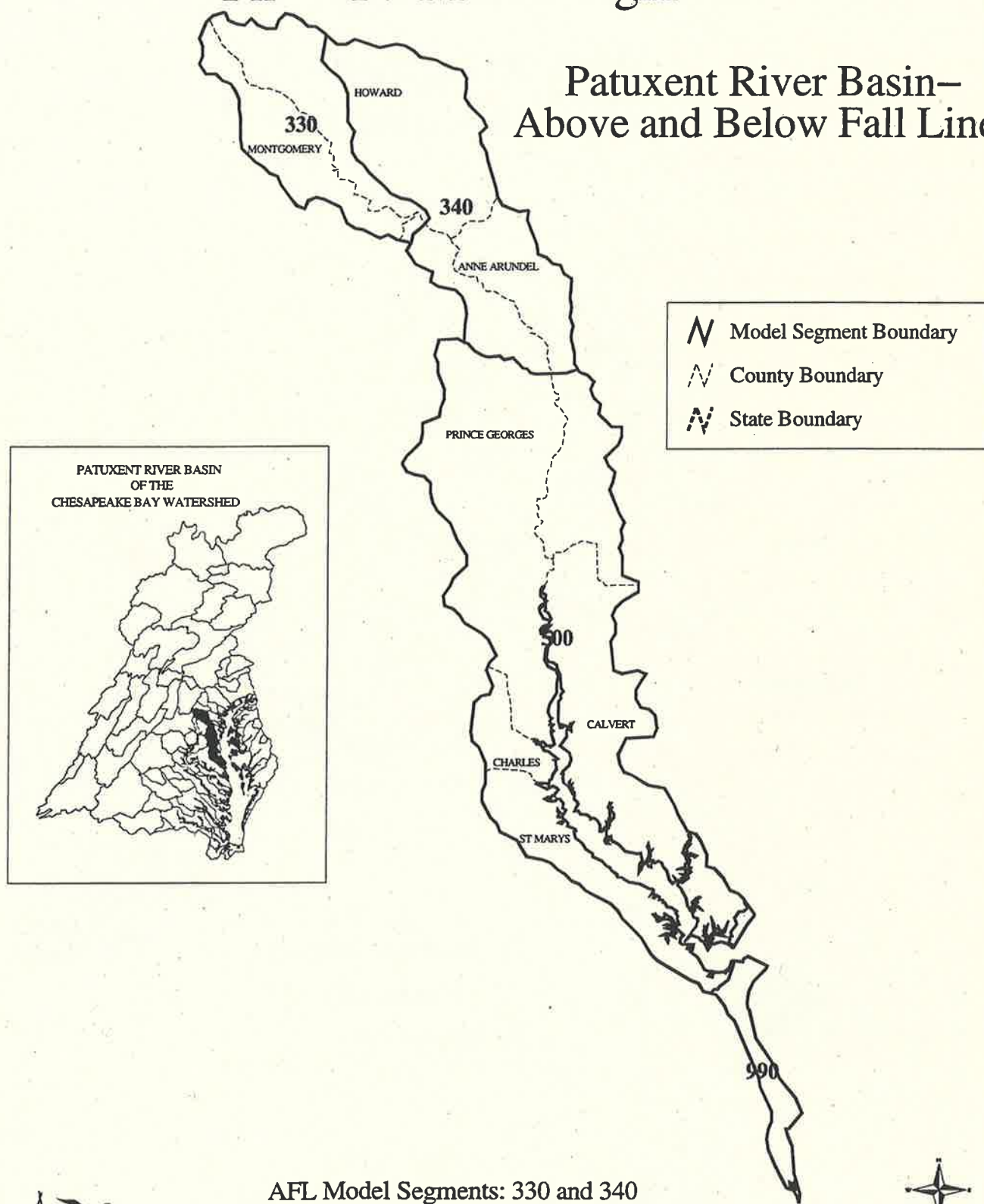
State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Rappahannock River Basin— Above and Below Fall Line



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Patuxent River Basin— Above and Below Fall Line



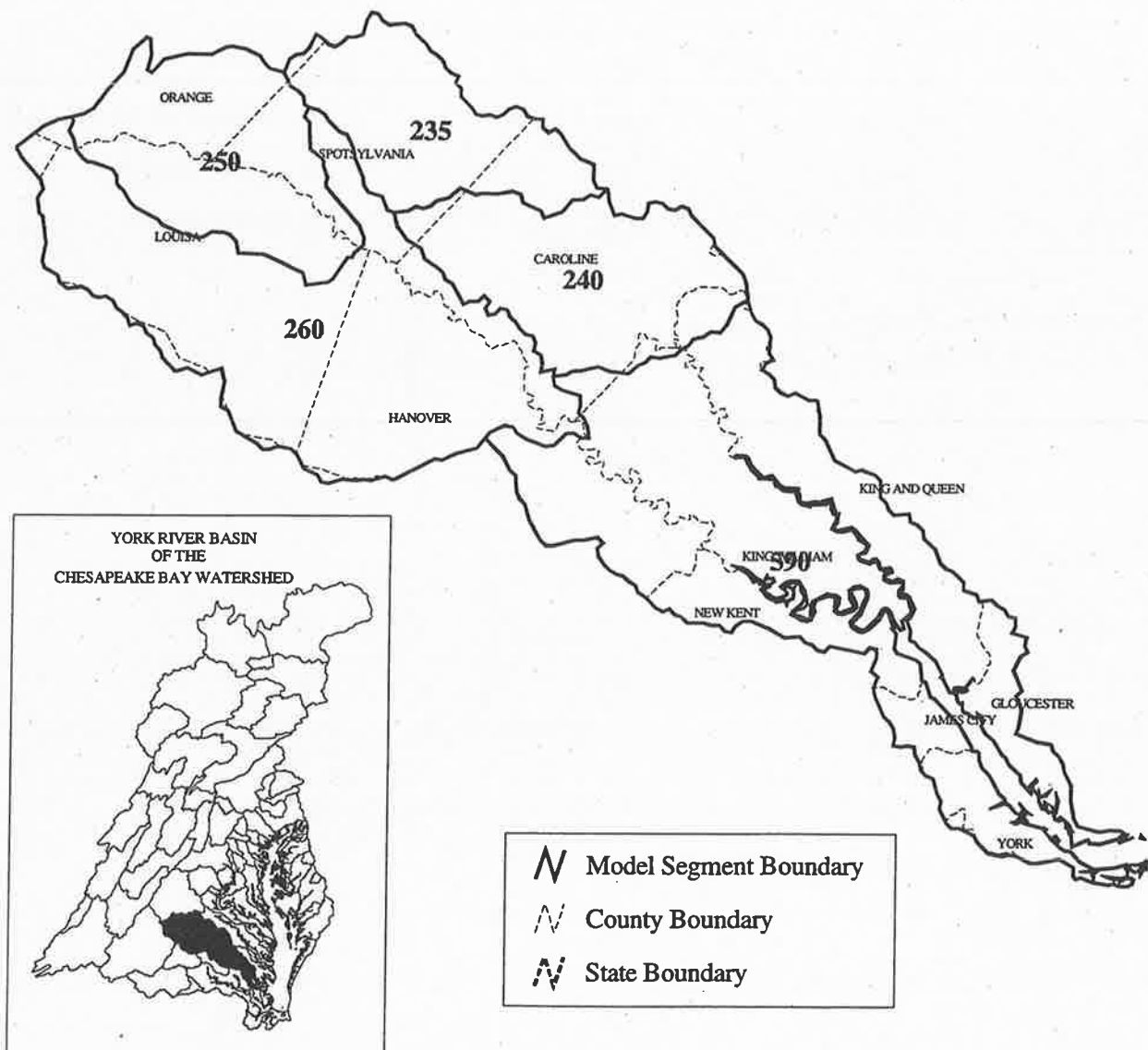
PATUXENT RIVER BASIN
OF THE
CHESAPEAKE BAY WATERSHED

AFL Model Segments: 330 and 340
BFL Model Segments: 500, and 990



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

York River Basin— Above and Below Fall Line



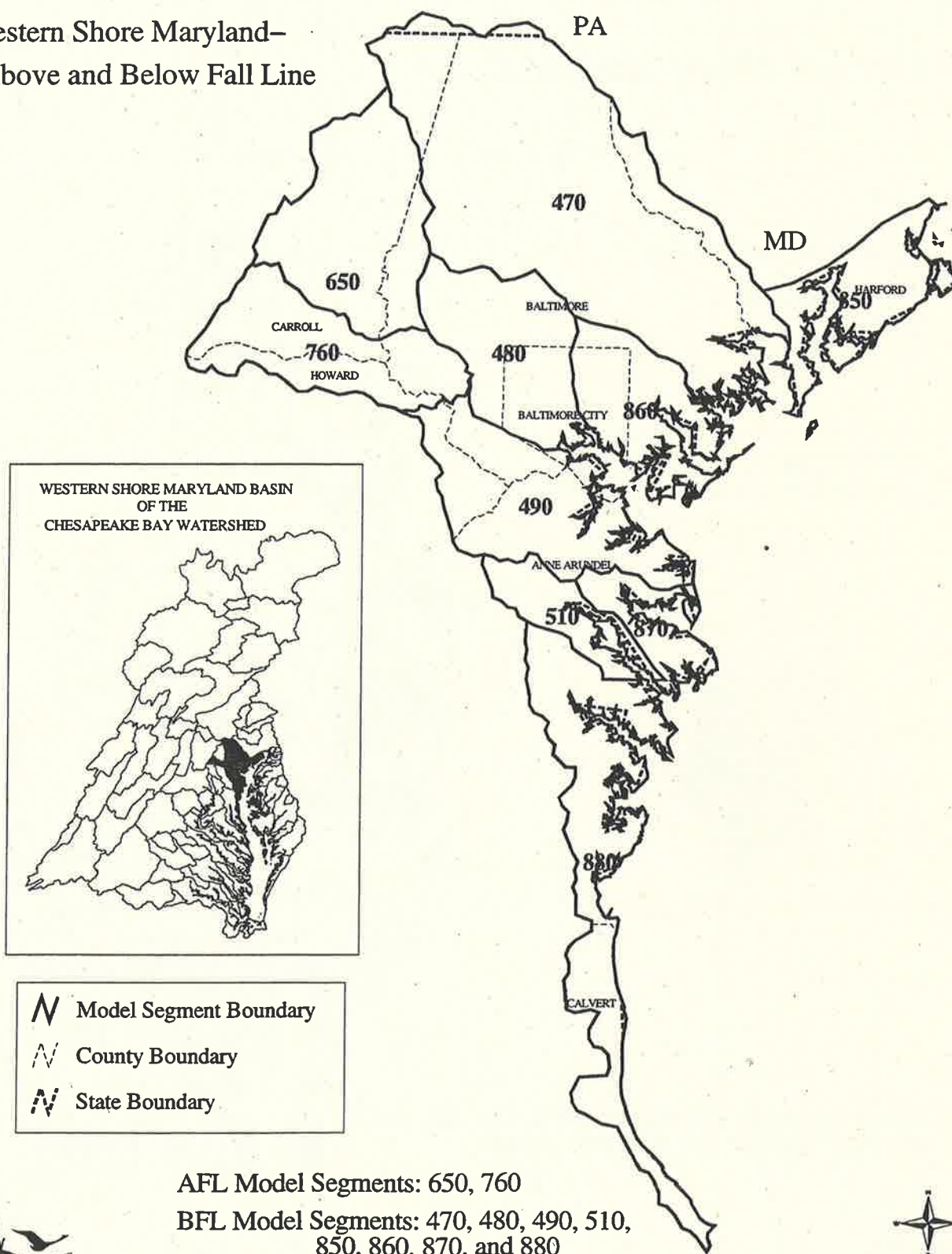
AFL Model Segments: 235, 240, 250, and 260

BFL Model Segments: 590



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Western Shore Maryland—
Above and Below Fall Line

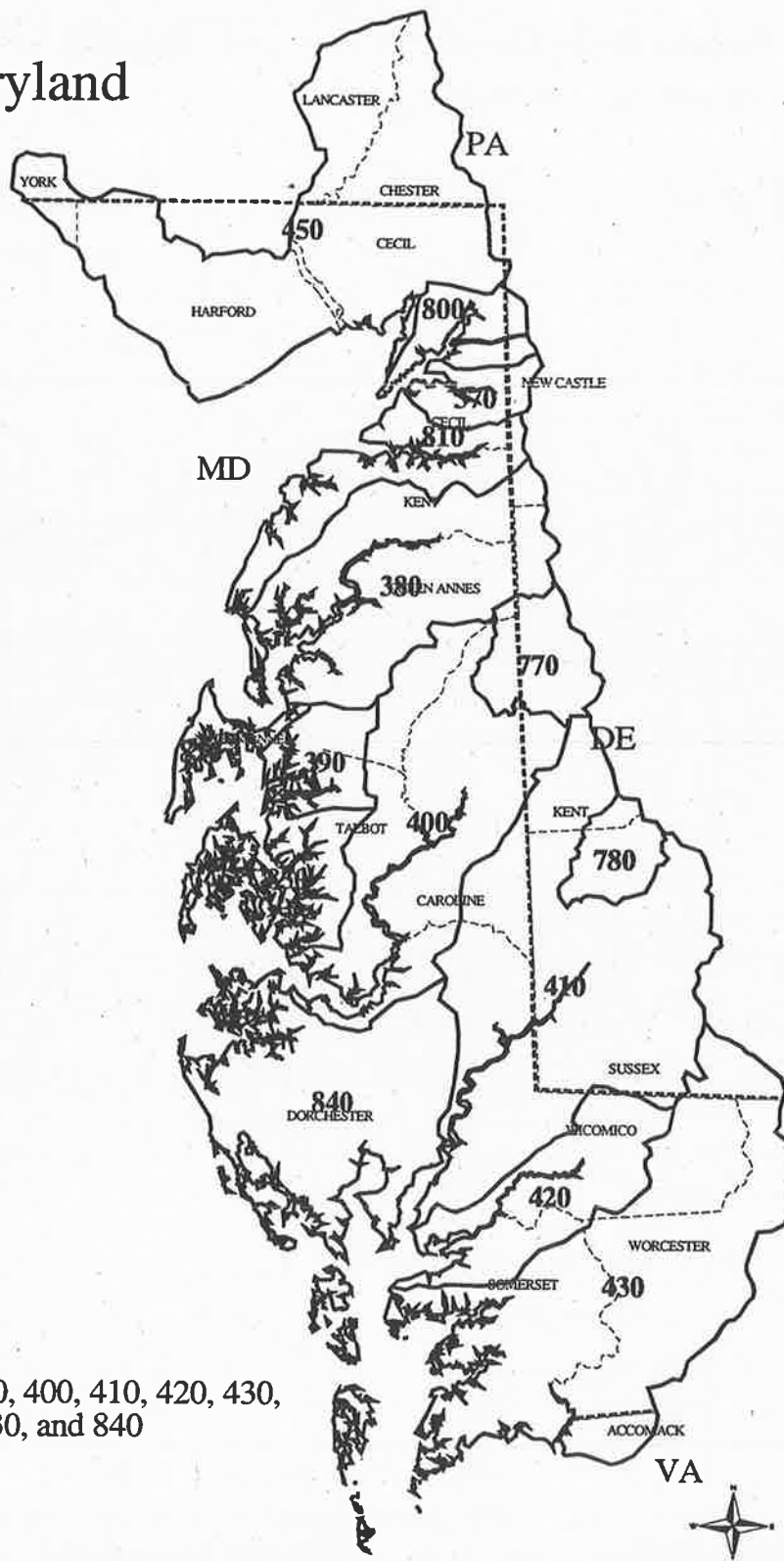


State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Eastern Shore Maryland

-  Model Segment Boundary
-  County Boundary
-  State Boundary

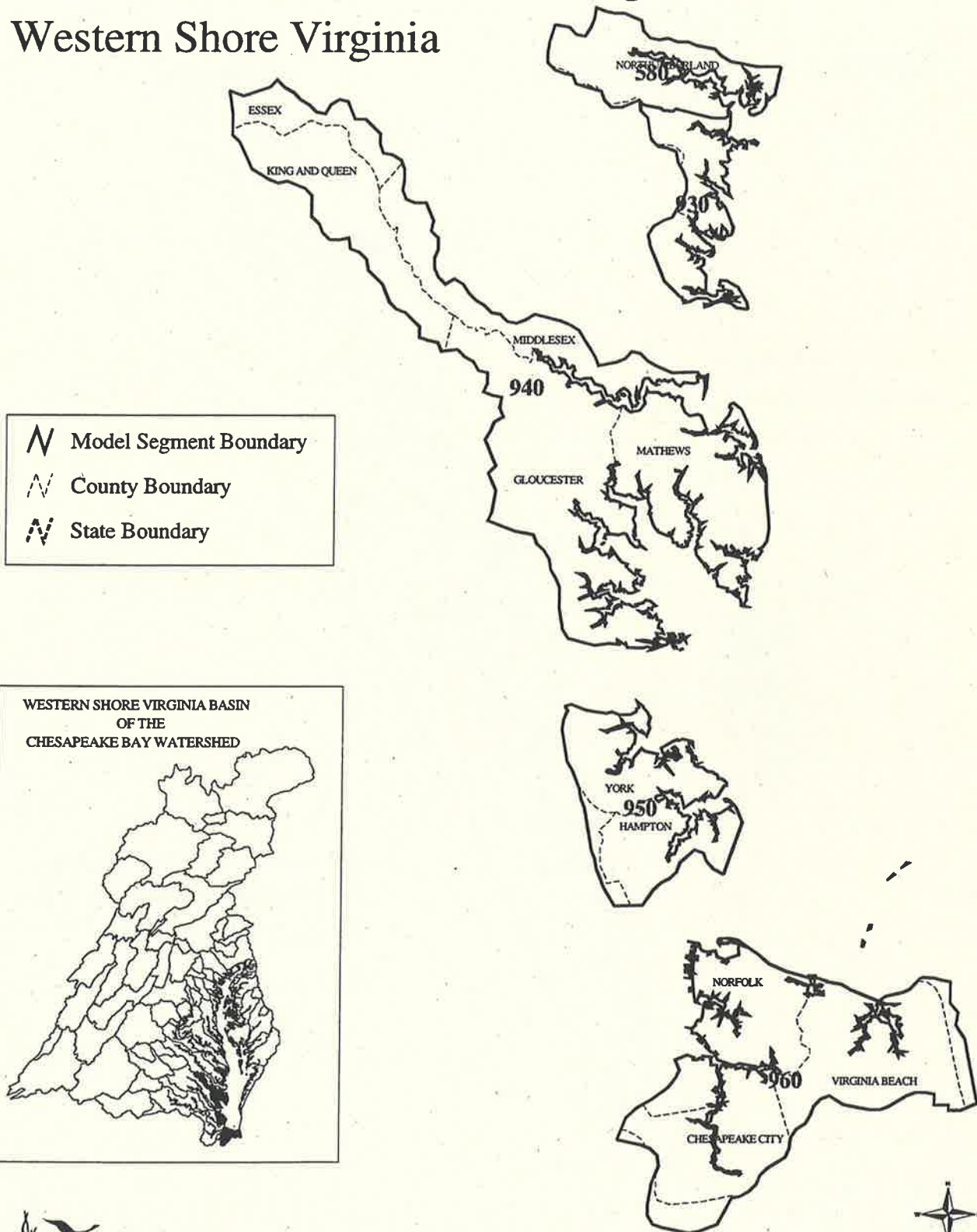
EASTERN SHORE MARYLAND BASIN
OF THE
CHESAPEAKE BAY WATERSHED



BFL Model Segments: 370, 380, 390, 400, 410, 420, 430,
450, 770, 780, 800, 810, 820, 830, and 840



State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments: Western Shore Virginia



Chesapeake Bay Program

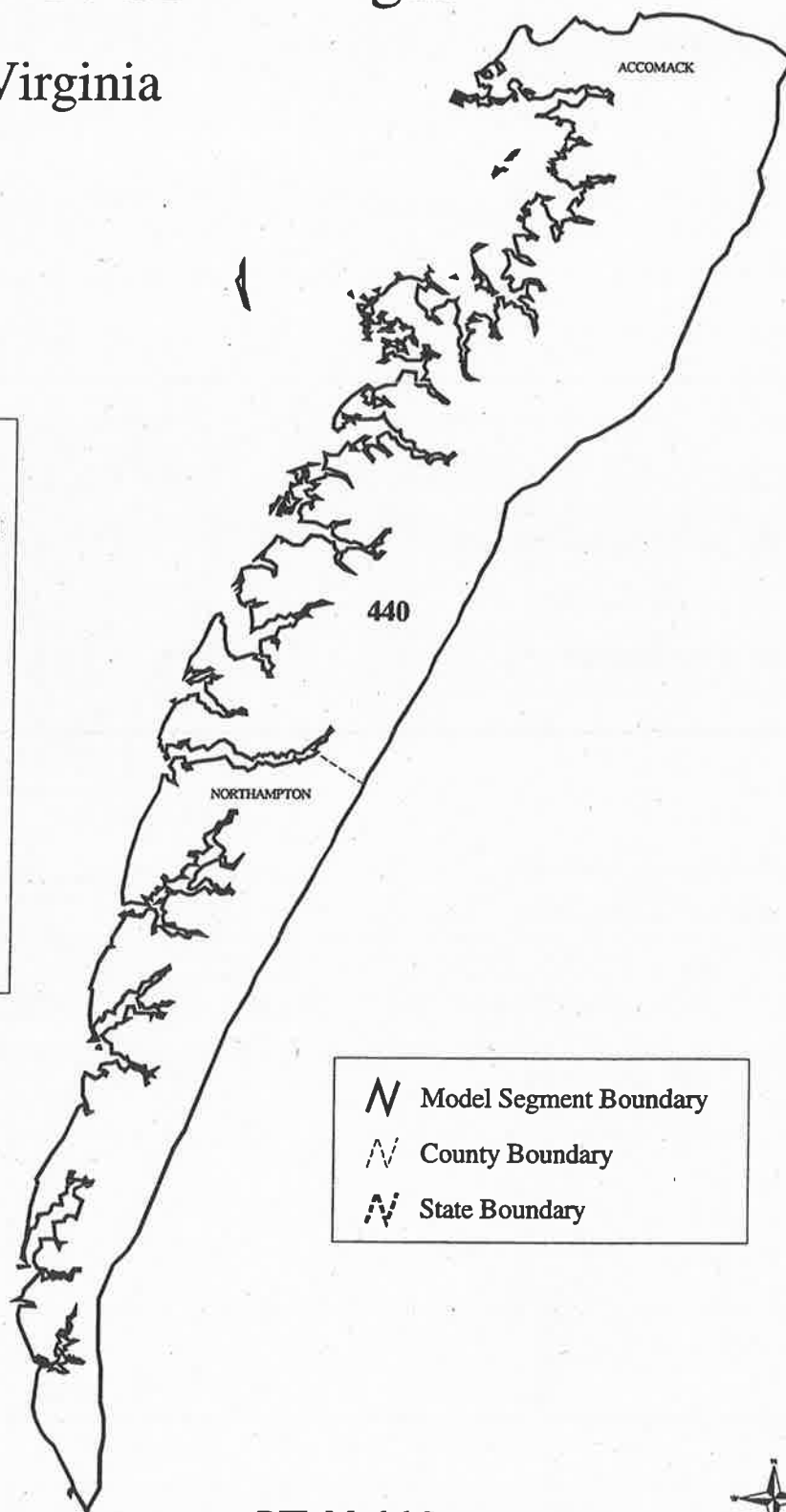
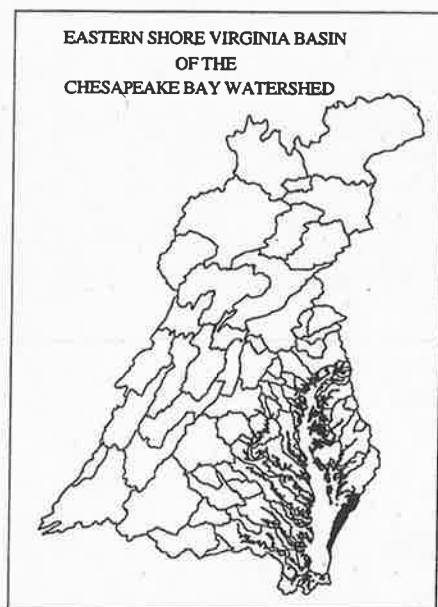
KJH Map Date: April, 1997 /usr7/hopkins/maps/appendix/psgoov_sh_vaps

BFL Model Segments: 580, 930, 940, 950, and 960

Sources: USGS and Chesapeake Bay Program Modeling Team

State and County Boundaries in Chesapeake Bay Watershed Phase IV Model Segments:

Eastern Shore Virginia



BFL Model Segments: 440



Section E.3

Counties within the Chesapeake Bay Watershed by State and Segments

This section documents the total acres and percent area of each Chesapeake Basin county by Phase IV Watershed Model segment. This information is used in allocating the distribution of agricultural land, the calculation of manure acres per individual Watershed Model Segments throughout the basin, and to the allocation of loading contribution to the Chesapeake Bay by states and counties.

In order to convert county based data (such as Census of Agriculture data) into Watershed Model segment based data, it was necessary to develop information about the percent of county land within the segments (Table E.3.1.). For example, manure acres calculations, as explained in section E.14, used county based animal population numbers from the Agricultural Census data. In order to determine animal population by Watershed Model segment, it was assumed that the distribution of livestock was proportional to the land area of each county within each model segments.

Regarding loading contribution (Table E.3.2.), the main purpose of this information was to determine the amount of land by Watershed Model segment, within signatory and non-signatory states. By overlaying the GIS coverages of the Phase IV Watershed Model Segmentation, county boundaries and state boundaries, it was possible to determine the percentage of county and state area within each Watershed Model Segment. Included is a table of counties sorted by model segment (Table E.3.1.) and a table of percent model segment in state (Table E.3.2.).

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
10	NY	SUSQUEHANA RIVER BASIN	ALLEGANY	54146.09	664613.45	8%
10	PA	SUSQUEHANA RIVER BASIN	BRADFORD	111733.03	741454.31	15%
10	NY	SUSQUEHANA RIVER BASIN	CHEMUNG	204203.85	261969.55	78%
10	NY	SUSQUEHANA RIVER BASIN	LIVINGSTON	11546.26	410016.55	3%
10	NY	SUSQUEHANA RIVER BASIN	ONTARIO	1833.35	423859.21	0%
10	PA	SUSQUEHANA RIVER BASIN	POTTER	29921.09	692407.7	4%
10	NY	SUSQUEHANA RIVER BASIN	SCHUYLER	56999.83	222814.02	26%
10	NY	SUSQUEHANA RIVER BASIN	STEUBEN	795983.01	896560.39	89%
10	NY	SUSQUEHANA RIVER BASIN	TIOGA	562.58	334039.36	0%
10	PA	SUSQUEHANA RIVER BASIN	TIOGA	416025.78	725733.75	57%
10	NY	SUSQUEHANA RIVER BASIN	YATES	8734.53	225027.13	4%
20	PA	SUSQUEHANA RIVER BASIN	BRADFORD	63814.38	741454.31	9%
20	NY	SUSQUEHANA RIVER BASIN	BROOME	403505.75	457344.51	88%
20	NY	SUSQUEHANA RIVER BASIN	CHEMUNG	35789.36	261969.55	14%
20	NY	SUSQUEHANA RIVER BASIN	CHENANGO	570429.99	572179.99	100%
20	NY	SUSQUEHANA RIVER BASIN	CORTLAND	297875.89	320109.21	93%
20	NY	SUSQUEHANA RIVER BASIN	DELAWARE	180802.85	938322.49	19%
20	NY	SUSQUEHANA RIVER BASIN	HERKIMER	59626.03	930469.54	6%
20	NY	SUSQUEHANA RIVER BASIN	MADISON	206452.41	425709.94	49%
20	NY	SUSQUEHANA RIVER BASIN	ONEIDA	32268.56	804483.45	4%
20	NY	SUSQUEHANA RIVER BASIN	ONONDAGA	33657.5	515084.21	7%
20	NY	SUSQUEHANA RIVER BASIN	OTSEGO	631275.5	648023.36	97%
20	NY	SUSQUEHANA RIVER BASIN	SCHOHARIE	25806.32	400134.14	6%
20	NY	SUSQUEHANA RIVER BASIN	SCHUYLER	26277.68	222814.02	12%
20	PA	SUSQUEHANA RIVER BASIN	SUSQUEHANNA	192278.42	534796.65	36%
20	NY	SUSQUEHANA RIVER BASIN	TIOGA	333476.75	334039.36	100%
20	NY	SUSQUEHANA RIVER BASIN	TOMPKINS	65198.73	314640.7	21%
20	PA	SUSQUEHANA RIVER BASIN	WAYNE	20274.69	481416.67	4%
30	PA	SUSQUEHANA RIVER BASIN	BRADFORD	405006.07	741454.31	55%
30	PA	SUSQUEHANA RIVER BASIN	LACKAWANNA	254078.43	295862.08	86%
30	PA	SUSQUEHANA RIVER BASIN	LUZERNE	101104.28	580118.27	17%
30	PA	SUSQUEHANA RIVER BASIN	LYCOMING	1140.97	797451.7	0%
30	PA	SUSQUEHANA RIVER BASIN	SULLIVAN	18637.44	290265.13	6%
30	PA	SUSQUEHANA RIVER BASIN	SUSQUEHANNA	342518.26	534796.65	64%
30	PA	SUSQUEHANA RIVER BASIN	TIOGA	5190.86	725733.75	1%
30	PA	SUSQUEHANA RIVER BASIN	WAYNE	18132.54	481416.67	4%
30	PA	SUSQUEHANA RIVER BASIN	WYOMING	254505.92	257991.69	99%
40	PA	SUSQUEHANA RIVER BASIN	COLUMBIA	298036.34	313133.42	95%
40	PA	SUSQUEHANA RIVER BASIN	LUZERNE	392683.95	580118.27	68%
40	PA	SUSQUEHANA RIVER BASIN	LYCOMING	3514.16	797451.7	0%
40	PA	SUSQUEHANA RIVER BASIN	MONTOUR	31432.65	85380.66	37%
40	PA	SUSQUEHANA RIVER BASIN	NORTHUMBERLAND	138557.12	305972.72	45%
40	PA	SUSQUEHANA RIVER BASIN	SCHUYLKILL	54070.77	501037.83	11%
40	PA	SUSQUEHANA RIVER BASIN	SNYDER	3434.65	212148.52	2%
40	PA	SUSQUEHANA RIVER BASIN	SULLIVAN	29436.43	290265.13	10%
40	PA	SUSQUEHANA RIVER BASIN	WYOMING	69.59	257991.69	0%
50	PA	SUSQUEHANA RIVER BASIN	BLAIR	4760.34	338911.14	1%
50	PA	SUSQUEHANA RIVER BASIN	CAMBRIA	197761.6	446932.92	44%
50	PA	SUSQUEHANA RIVER BASIN	CENTRE	115017.58	715119.02	16%
50	PA	SUSQUEHANA RIVER BASIN	CLEARFIELD	551450.25	740110.87	75%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
50	PA	SUSQUEHANA RIVER BASIN	INDIANA	45807.42	533108.01	9%
60	PA	SUSQUEHANA RIVER BASIN	BLAIR	63.7	338911.14	0%
60	PA	SUSQUEHANA RIVER BASIN	BRADFORD	74.79	741454.31	0%
60	PA	SUSQUEHANA RIVER BASIN	CAMERON	254039.17	255045.08	100%
60	PA	SUSQUEHANA RIVER BASIN	CENTRE	399642.98	715119.02	56%
60	PA	SUSQUEHANA RIVER BASIN	CLEARFIELD	116906.09	740110.87	16%
60	PA	SUSQUEHANA RIVER BASIN	CLINTON	575148.37	575417.53	100%
60	PA	SUSQUEHANA RIVER BASIN	ELK	169746.87	533879.74	32%
60	PA	SUSQUEHANA RIVER BASIN	HUNTINGDON	233.92	569952.78	0%
60	PA	SUSQUEHANA RIVER BASIN	LYCOMING	486713.77	797451.7	61%
60	PA	SUSQUEHANA RIVER BASIN	MCKEAN	13879.17	629665.87	2%
60	PA	SUSQUEHANA RIVER BASIN	POTTER	401018.05	692407.7	58%
60	PA	SUSQUEHANA RIVER BASIN	SULLIVAN	3643.56	290265.13	1%
60	PA	SUSQUEHANA RIVER BASIN	TIOGA	301936.03	725733.75	42%
60	PA	SUSQUEHANA RIVER BASIN	UNION	527.58	202858.73	0%
70	PA	SUSQUEHANA RIVER BASIN	BRADFORD	8332.42	741454.31	1%
70	PA	SUSQUEHANA RIVER BASIN	CENTRE	7329.95	715119.02	1%
70	PA	SUSQUEHANA RIVER BASIN	CLINTON	269.15	575417.53	0%
70	PA	SUSQUEHANA RIVER BASIN	COLUMBIA	13135.69	313133.42	4%
70	PA	SUSQUEHANA RIVER BASIN	LYCOMING	306082.95	797451.7	38%
70	PA	SUSQUEHANA RIVER BASIN	MONTOUR	53948.15	85380.66	63%
70	PA	SUSQUEHANA RIVER BASIN	NORTHUMBERLAND	70595.76	305972.72	23%
70	PA	SUSQUEHANA RIVER BASIN	SNYDER	962.83	212148.52	0%
70	PA	SUSQUEHANA RIVER BASIN	SULLIVAN	238547.45	290265.13	82%
70	PA	SUSQUEHANA RIVER BASIN	UNION	146704.16	202858.73	72%
70	PA	SUSQUEHANA RIVER BASIN	WYOMING	3416.12	257991.69	1%
80	PA	SUSQUEHANA RIVER BASIN	CENTRE	139464.18	715119.02	20%
80	PA	SUSQUEHANA RIVER BASIN	COLUMBIA	1961.45	313133.42	1%
80	PA	SUSQUEHANA RIVER BASIN	CUMBERLAND	234611.44	350701.78	67%
80	PA	SUSQUEHANA RIVER BASIN	DAUPHIN	234036.3	358224.08	65%
80	PA	SUSQUEHANA RIVER BASIN	FRANKLIN	88200.15	495235.35	18%
80	PA	SUSQUEHANA RIVER BASIN	JUNIATA	20288.55	251444.31	8%
80	PA	SUSQUEHANA RIVER BASIN	LEBANON	9607.53	230895.24	4%
80	PA	SUSQUEHANA RIVER BASIN	MIFFLIN	13574.62	263655.82	5%
80	PA	SUSQUEHANA RIVER BASIN	NORTHUMBERLAND	96819.55	305972.72	32%
80	PA	SUSQUEHANA RIVER BASIN	PERRY	245352.29	357583.61	69%
80	PA	SUSQUEHANA RIVER BASIN	SCHUYLKILL	118944.53	501037.83	24%
80	PA	SUSQUEHANA RIVER BASIN	SNYDER	201470.99	212148.52	95%
80	PA	SUSQUEHANA RIVER BASIN	UNION	55626.96	202858.73	27%
90	PA	SUSQUEHANA RIVER BASIN	BEDFORD	441588.87	649484.52	68%
90	PA	SUSQUEHANA RIVER BASIN	BLAIR	8259.17	338911.14	2%
90	PA	SUSQUEHANA RIVER BASIN	FULTON	23809.41	281156.82	8%
90	PA	SUSQUEHANA RIVER BASIN	HUNTINGDON	111285.95	569952.78	20%
90	PA	SUSQUEHANA RIVER BASIN	SOMERSET	15396.55	692933.23	2%
100	PA	SUSQUEHANA RIVER BASIN	BEDFORD	18021.53	649484.52	3%
100	PA	SUSQUEHANA RIVER BASIN	BLAIR	325818.04	338911.14	96%
100	PA	SUSQUEHANA RIVER BASIN	CAMBRIA	1210.7	446932.92	0%
100	PA	SUSQUEHANA RIVER BASIN	CENTRE	53664.95	715119.02	8%
100	PA	SUSQUEHANA RIVER BASIN	FRANKLIN	20345.13	495235.35	4%
100	PA	SUSQUEHANA RIVER BASIN	FULTON	70562.08	281156.82	25%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
100	PA	SUSQUEHANA RIVER BASIN	HUNTINGDON	458432.77	569952.78	80%
100	PA	SUSQUEHANA RIVER BASIN	JUNIATA	231155.76	251444.31	92%
100	PA	SUSQUEHANA RIVER BASIN	MIFFLIN	250080.97	263655.82	95%
100	PA	SUSQUEHANA RIVER BASIN	PERRY	111668.79	357583.61	31%
100	PA	SUSQUEHANA RIVER BASIN	SNYDER	6280.09	212148.52	3%
110	PA	SUSQUEHANA RIVER BASIN	ADAMS	172879.72	333412.04	52%
110	MD	SUSQUEHANA RIVER BASIN	BALTIMORE	46.46	387776.03	0%
110	PA	SUSQUEHANA RIVER BASIN	BERKS	39625.85	555021.41	7%
110	MD	SUSQUEHANA RIVER BASIN	CARROLL	5081.94	290981.62	2%
110	PA	SUSQUEHANA RIVER BASIN	CUMBERLAND	114039.78	350701.78	33%
110	PA	SUSQUEHANA RIVER BASIN	DAUPHIN	124187.79	358224.08	35%
110	PA	SUSQUEHANA RIVER BASIN	LANCASTER	35434.76	628542.69	6%
110	PA	SUSQUEHANA RIVER BASIN	LEBANON	169022.94	230895.24	73%
110	PA	SUSQUEHANA RIVER BASIN	SCHUYLKILL	86333.47	501037.83	17%
110	PA	SUSQUEHANA RIVER BASIN	YORK	385779	581372.52	66%
120	PA	SUSQUEHANA RIVER BASIN	CHESTER	5689.46	484346.47	1%
120	PA	SUSQUEHANA RIVER BASIN	LANCASTER	102191.06	628542.69	16%
120	PA	SUSQUEHANA RIVER BASIN	YORK	21183	581372.52	4%
140	MD	SUSQUEHANA RIVER BASIN	CECIL	3526.54	227936.53	2%
140	MD	SUSQUEHANA RIVER BASIN	HARFORD	30419.33	281831.24	11%
140	PA	SUSQUEHANA RIVER BASIN	LANCASTER	46998.07	628542.69	7%
140	PA	SUSQUEHANA RIVER BASIN	YORK	95776.15	581372.52	16%
160	MD	SUSQUEHANA RIVER BASIN	ALLEGANY	163842.5	270070.13	61%
160	PA	POTOMAC RIVER BASIN	BEDFORD	85998.96	649484.52	13%
160	MD	POTOMAC RIVER BASIN	GARRETT	150297.97	425686.19	35%
160	WV	POTOMAC RIVER BASIN	GRANT	159702.27	311978.89	51%
160	WV	POTOMAC RIVER BASIN	HAMPSHIRE	15958.46	413447.78	4%
160	WV	POTOMAC RIVER BASIN	HARDY	1390.33	374317.23	0%
160	WV	POTOMAC RIVER BASIN	MINERAL	211029.9	211030.3	100%
160	PA	POTOMAC RIVER BASIN	SOMERSET	76834.89	692933.23	11%
170	MD	POTOMAC RIVER BASIN	ALLEGANY	26.83	270070.13	0%
170	VA	POTOMAC RIVER BASIN	AUGUSTA	1701.74	646700.79	0%
170	WV	POTOMAC RIVER BASIN	GRANT	152217.47	311978.89	49%
170	WV	POTOMAC RIVER BASIN	HAMPSHIRE	112821.12	413447.78	27%
170	WV	POTOMAC RIVER BASIN	HARDY	165083.77	374317.23	44%
170	VA	POTOMAC RIVER BASIN	HIGHLAND	61360.24	260584.01	24%
170	WV	POTOMAC RIVER BASIN	MINERAL	0.4	211030.3	0%
170	WV	POTOMAC RIVER BASIN	PENDLETON	449765.56	451456.35	100%
170	VA	POTOMAC RIVER BASIN	ROCKINGHAM	7409.79	558280.97	1%
175	MD	POTOMAC RIVER BASIN	ALLEGANY	106200.72	270070.13	39%
175	PA	POTOMAC RIVER BASIN	BEDFORD	103814.49	649484.52	16%
175	VA	POTOMAC RIVER BASIN	FREDERICK	3631.99	272162.54	1%
175	PA	POTOMAC RIVER BASIN	FULTON	15911.44	281156.82	6%
175	WV	POTOMAC RIVER BASIN	HAMPSHIRE	283507.57	413447.78	69%
175	WV	POTOMAC RIVER BASIN	HARDY	194246.99	374317.23	52%
175	WV	POTOMAC RIVER BASIN	MORGAN	66754.81	147072.51	45%
175	VA	POTOMAC RIVER BASIN	SHENANDOAH	4170.21	328798.76	1%
175	MD	POTOMAC RIVER BASIN	WASHINGTON	27551.17	298769.02	9%
180	PA	POTOMAC RIVER BASIN	ADAMS	4886.6	333412.04	1%
180	PA	POTOMAC RIVER BASIN	FRANKLIN	62318.77	495235.35	13%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
180	MD	POTOMAC RIVER BASIN	FREDERICK	92682.38	427139.67	22%
180	WV	POTOMAC RIVER BASIN	JEFFERSON	29777.39	135309.22	22%
180	VA	POTOMAC RIVER BASIN	LOUDOUN	79801.24	334104.42	24%
180	MD	POTOMAC RIVER BASIN	WASHINGTON	139884.33	298769.02	47%
190	VA	POTOMAC RIVER BASIN	ALBEMARLE	2419.34	472700.17	1%
190	VA	POTOMAC RIVER BASIN	AUGUSTA	478026.9	646700.79	74%
190	VA	POTOMAC RIVER BASIN	GREENE	1357.26	99941.66	1%
190	VA	POTOMAC RIVER BASIN	MADISON	663.21	206713.48	0%
190	VA	POTOMAC RIVER BASIN	NELSON	2581.08	304069.9	1%
190	VA	POTOMAC RIVER BASIN	PAGE	188738.55	200531.21	94%
190	WV	POTOMAC RIVER BASIN	PENDLETON	19.81	451456.35	0%
190	VA	POTOMAC RIVER BASIN	RAPPAHANNOCK	775.98	171112.31	0%
190	VA	POTOMAC RIVER BASIN	ROCKINGHAM	313809.44	558280.97	56%
190	VA	POTOMAC RIVER BASIN	WARREN	51938.36	139189.86	37%
200	VA	POTOMAC RIVER BASIN	CLARKE	91091.76	114232.85	80%
200	VA	POTOMAC RIVER BASIN	FAUQUIER	1008.27	417542.01	0%
200	VA	POTOMAC RIVER BASIN	FREDERICK	70680.81	272162.54	26%
200	WV	POTOMAC RIVER BASIN	HARDY	13596.17	374317.23	4%
200	WV	POTOMAC RIVER BASIN	JEFFERSON	62776.67	135309.22	46%
200	VA	POTOMAC RIVER BASIN	LOUDOUN	3336.4	334104.42	1%
200	VA	POTOMAC RIVER BASIN	PAGE	10722.95	200531.21	5%
200	VA	POTOMAC RIVER BASIN	RAPPAHANNOCK	12.44	171112.31	0%
200	VA	POTOMAC RIVER BASIN	ROCKINGHAM	236556.78	558280.97	42%
200	VA	POTOMAC RIVER BASIN	SHENANDOAH	324628.72	328798.76	99%
200	VA	POTOMAC RIVER BASIN	WARREN	86350.71	139189.86	62%
210	PA	POTOMAC RIVER BASIN	ADAMS	40769.63	333412.04	12%
210	MD	POTOMAC RIVER BASIN	CARROLL	133987.55	290981.62	46%
210	PA	POTOMAC RIVER BASIN	FRANKLIN	938.19	495235.35	0%
210	MD	POTOMAC RIVER BASIN	FREDERICK	313543.16	427139.67	73%
210	MD	POTOMAC RIVER BASIN	HOWARD	76.1	162119.32	0%
210	MD	POTOMAC RIVER BASIN	MONTGOMERY	23600.78	322768.46	7%
210	MD	POTOMAC RIVER BASIN	WASHINGTON	115.85	298769.02	0%
220	VA	POTOMAC RIVER BASIN	ARLINGTON	43.97	16841.59	0%
220	VA	POTOMAC RIVER BASIN	CLARKE	170.78	114232.85	0%
220	DC	POTOMAC RIVER BASIN	DISTRICT OF COLU	2076.8	39668.82	5%
220	VA	POTOMAC RIVER BASIN	FAIRFAX	74304.22	257829.31	29%
220	VA	POTOMAC RIVER BASIN	FAUQUIER	96716.26	417542.01	23%
220	MD	POTOMAC RIVER BASIN	FREDERICK	18957.1	427139.67	4%
220	VA	POTOMAC RIVER BASIN	LOUDOUN	234696.63	334104.42	70%
220	MD	POTOMAC RIVER BASIN	MONTGOMERY	183231.51	322768.46	57%
220	VA	POTOMAC RIVER BASIN	PRINCE WILLIAM	282.99	220739.02	0%
220	VA	POTOMAC RIVER BASIN	WARREN	93.28	139189.86	0%
230	VA	POTOMAC RIVER BASIN	ALBEMARLE	2860.06	472700.17	1%
230	VA	RAPPAHANNOCK RIVER BASIN	CULPEPER	244319.69	244319.69	100%
230	VA	RAPPAHANNOCK RIVER BASIN	FAUQUIER	181834.53	417542.01	44%
230	VA	RAPPAHANNOCK RIVER BASIN	GREENE	39305.49	99941.66	39%
230	VA	RAPPAHANNOCK RIVER BASIN	MADISON	206050.25	206713.48	100%
230	VA	RAPPAHANNOCK RIVER BASIN	ORANGE	127848.06	219844.29	58%
230	VA	RAPPAHANNOCK RIVER BASIN	PAGE	1069.73	200531.21	1%
230	VA	RAPPAHANNOCK RIVER BASIN	RAPPAHANNOCK	170323.88	171112.31	100%

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Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
230	VA	RAPPAHANNOCK RIVER BASIN	ROCKINGHAM	43.45	558280.97	0%
230	VA	RAPPAHANNOCK RIVER BASIN	SPOTSYLVANIA	27511.03	268269.78	10%
230	VA	RAPPAHANNOCK RIVER BASIN	STAFFORD	24884.98	174557.02	14%
230	VA	RAPPAHANNOCK RIVER BASIN	WARREN	807.5	139189.86	1%
235	VA	RAPPAHANNOCK RIVER BASIN	CAROLINE	35078.07	341607.71	10%
235	VA	YORK RIVER BASIN	ORANGE	2813.4	219844.29	1%
235	VA	YORK RIVER BASIN	SPOTSYLVANIA	126522.98	268269.78	47%
240	VA	YORK RIVER BASIN	CAROLINE	189754.94	341607.71	56%
240	VA	YORK RIVER BASIN	ESSEX	648.08	166168.36	0%
240	VA	YORK RIVER BASIN	KING AND QUEEN	14134.97	203402.35	7%
240	VA	YORK RIVER BASIN	KING WILLIAM	4194.21	177415.02	2%
240	VA	YORK RIVER BASIN	SPOTSYLVANIA	7145.98	268269.78	3%
250	VA	YORK RIVER BASIN	LOUISA	95032.85	327162.24	29%
250	VA	YORK RIVER BASIN	ORANGE	79175.15	219844.29	36%
250	VA	YORK RIVER BASIN	SPOTSYLVANIA	39656.71	268269.78	15%
260	VA	YORK RIVER BASIN	ALBEMARLE	5311.59	472700.17	1%
260	VA	YORK RIVER BASIN	CAROLINE	32931.73	341607.71	10%
260	VA	YORK RIVER BASIN	FLUVANNA	723.21	186029.67	0%
260	VA	YORK RIVER BASIN	GOOCHLAND	8063.63	184294.55	4%
260	VA	YORK RIVER BASIN	HANOVER	172047.42	303300.19	57%
260	VA	YORK RIVER BASIN	KING WILLIAM	520.29	177415.02	0%
260	VA	YORK RIVER BASIN	LOUISA	219194.39	327162.24	67%
260	VA	YORK RIVER BASIN	ORANGE	3850.35	219844.29	2%
260	VA	YORK RIVER BASIN	SPOTSYLVANIA	28732.16	268269.78	11%
265	VA	YORK RIVER BASIN	ALLEGHANY	7391.81	288450.36	3%
265	VA	JAMES RIVER BASIN	BATH	126730.97	339012	37%
265	VA	JAMES RIVER BASIN	HIGHLAND	89535.79	260584.01	34%
270	VA	JAMES RIVER BASIN	ALLEGHANY	281043.09	288450.36	97%
270	VA	JAMES RIVER BASIN	AMHERST	90519.2	307323	29%
270	VA	JAMES RIVER BASIN	AUGUSTA	166597.23	646700.79	26%
270	VA	JAMES RIVER BASIN	BATH	212240.19	339012	63%
270	VA	JAMES RIVER BASIN	BEDFORD	36869.45	498862.3	7%
270	VA	JAMES RIVER BASIN	BOTETOURT	313081.93	351141.76	89%
270	VA	JAMES RIVER BASIN	CRAIG	184543.58	211813.65	87%
270	VA	JAMES RIVER BASIN	GILES	7566.79	232531.63	3%
270	VA	JAMES RIVER BASIN	HIGHLAND	109673.4	260584.01	42%
270	WV	JAMES RIVER BASIN	MONROE	45215.53	303626.34	15%
270	VA	JAMES RIVER BASIN	MONTGOMERY	14828.95	251246.86	6%
270	VA	JAMES RIVER BASIN	NELSON	1309.35	304069.9	0%
270	WV	JAMES RIVER BASIN	PENDLETON	1654.47	451456.35	0%
270	VA	JAMES RIVER BASIN	ROANOKE	20112.96	197831.97	10%
270	VA	JAMES RIVER BASIN	ROCKBRIDGE	388645.8	388700.83	100%
280	VA	JAMES RIVER BASIN	ALBEMARLE	462108.75	472700.17	98%
280	VA	JAMES RIVER BASIN	AMHERST	216803.82	307323	71%
280	VA	JAMES RIVER BASIN	APPOMATTOX	92922.77	215228.01	43%
280	VA	JAMES RIVER BASIN	AUGUSTA	374.09	646700.79	0%
280	VA	JAMES RIVER BASIN	BEDFORD	35200.56	498862.3	7%
280	VA	JAMES RIVER BASIN	BUCKINGHAM	353175.63	374789.25	94%
280	VA	JAMES RIVER BASIN	CAMPBELL	58670.13	324315.22	18%
280	VA	JAMES RIVER BASIN	CUMBERLAND	93788.47	191623.18	49%

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Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
280	VA	JAMES RIVER BASIN	FLUVANNA	185306.14	186029.67	100%
280	VA	JAMES RIVER BASIN	GOOCHLAND	39966.96	184294.55	22%
280	VA	JAMES RIVER BASIN	GREENE	59279.14	99941.66	59%
280	VA	JAMES RIVER BASIN	LOUISA	11311.33	327162.24	3%
280	VA	JAMES RIVER BASIN	LYNCHBURG	16496.2	16496.2	100%
280	VA	JAMES RIVER BASIN	NELSON	300179.55	304069.9	99%
280	VA	JAMES RIVER BASIN	ORANGE	6157.46	219844.29	3%
280	VA	JAMES RIVER BASIN	ROCKBRIDGE	55.04	388700.83	0%
280	VA	JAMES RIVER BASIN	ROCKINGHAM	462.43	558280.97	0%
290	VA	JAMES RIVER BASIN	CHESTERFIELD	9815.85	281840.21	3%
290	VA	JAMES RIVER BASIN	CUMBERLAND	32452.47	191623.18	17%
290	VA	JAMES RIVER BASIN	GOOCHLAND	136258.58	184294.55	74%
290	VA	JAMES RIVER BASIN	HANOVER	197.86	303300.19	0%
290	VA	JAMES RIVER BASIN	HENRICO	22833.89	153992.75	15%
290	VA	JAMES RIVER BASIN	LOUISA	1623.87	327162.24	1%
290	VA	JAMES RIVER BASIN	POWHATAN	124175.9	169873.73	73%
290	VA	JAMES RIVER BASIN	RICHMOND CITY	2000.23	39758.69	5%
300	VA	JAMES RIVER BASIN	AMELIA	215874.86	229258.48	94%
300	VA	JAMES RIVER BASIN	APPOMATTOX	62837.27	215228.01	29%
300	VA	JAMES RIVER BASIN	BUCKINGHAM	21613.65	374789.25	6%
300	VA	JAMES RIVER BASIN	CHESTERFIELD	32477.47	281840.21	12%
300	VA	JAMES RIVER BASIN	CUMBERLAND	65382.21	191623.18	34%
300	VA	JAMES RIVER BASIN	NOTTOWAY	103209.24	203015.7	51%
300	VA	JAMES RIVER BASIN	POWHATAN	40630.99	169873.73	24%
300	VA	JAMES RIVER BASIN	PRINCE EDWARD	222453.66	227218.79	98%
310	VA	JAMES RIVER BASIN	AMELIA	13383.82	229258.48	6%
310	VA	JAMES RIVER BASIN	CHESTERFIELD	30845.38	281840.21	11%
310	VA	JAMES RIVER BASIN	DINWIDDIE	49531.83	323857.96	15%
310	VA	JAMES RIVER BASIN	NOTTOWAY	7398.17	203015.7	4%
330	MD	JAMES RIVER BASIN	HOWARD	41762.82	162119.32	26%
330	MD	PATUXENT RIVER BASIN	MONTGOMERY	41992.46	322768.46	13%
330	MD	PATUXENT RIVER BASIN	PRINCE GEORGES	1334.22	311089.96	0%
340	MD	PATUXENT RIVER BASIN	ANNE ARUNDEL	37016.33	270586.03	14%
340	MD	PATUXENT RIVER BASIN	HOWARD	75156.34	162119.32	46%
340	MD	PATUXENT RIVER BASIN	PRINCE GEORGES	25328.11	311089.96	8%
370	MD	PATUXENT RIVER BASIN	CECIL	30257.02	227936.53	13%
370	DE	EASTERN SHORE MARYLAND	NEW CASTLE	7568.65	285654.12	3%
380	DE	EASTERN SHORE MARYLAND	KENT	19080.04	382698.46	5%
380	MD	EASTERN SHORE MARYLAND	KENT	106148.88	181952.57	58%
380	DE	EASTERN SHORE MARYLAND	NEW CASTLE	7336.64	285654.12	3%
380	MD	EASTERN SHORE MARYLAND	QUEEN ANNES	132612.11	240850.08	55%
390	MD	EASTERN SHORE MARYLAND	QUEEN ANNES	37044.13	240850.08	15%
390	MD	EASTERN SHORE MARYLAND	TALBOT	20486.13	175898.74	12%
400	MD	EASTERN SHORE MARYLAND	CAROLINE	147241.15	205310.23	72%
400	MD	EASTERN SHORE MARYLAND	DORCHESTER	29651.81	372730.67	8%
400	DE	EASTERN SHORE MARYLAND	KENT	14442.74	382698.46	4%
400	MD	EASTERN SHORE MARYLAND	QUEEN ANNES	41838.96	240850.08	17%
400	MD	EASTERN SHORE MARYLAND	TALBOT	68134.64	175898.74	39%
410	MD	EASTERN SHORE MARYLAND	CAROLINE	38368.48	205310.23	19%
410	MD	EASTERN SHORE MARYLAND	DORCHESTER	65988.19	372730.67	18%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
410	DE	EASTERN SHORE MARYLAND	KENT	40725.6	382698.46	11%
410	DE	EASTERN SHORE MARYLAND	SUSSEX	234320.65	602608.31	39%
410	MD	EASTERN SHORE MARYLAND	WICOMICO	83750.63	242888.02	34%
420	MD	EASTERN SHORE MARYLAND	SOMERSET	38836.55	214704.4	18%
420	DE	EASTERN SHORE MARYLAND	SUSSEX	1262.4	602608.31	0%
420	MD	EASTERN SHORE MARYLAND	WICOMICO	96074.82	242888.02	40%
420	MD	EASTERN SHORE MARYLAND	WORCESTER	426.67	291784	0%
430	VA	EASTERN SHORE MARYLAND	ACCOMACK	24673.25	304435	8%
430	MD	EASTERN SHORE MARYLAND	DORCHESTER	211.11	372730.67	0%
430	MD	EASTERN SHORE MARYLAND	SOMERSET	175867.9	214704.4	82%
430	DE	EASTERN SHORE MARYLAND	SUSSEX	27119.53	602608.31	5%
430	MD	EASTERN SHORE MARYLAND	WICOMICO	63062.85	242888.02	26%
430	MD	EASTERN SHORE MARYLAND	WORCESTER	187077.63	291784	64%
440	VA	EASTERN SHORE MARYLAND	ACCOMACK	136745.25	304435	45%
440	VA	EASTERN SHORE VIRGINIA	NORTHAMPTON	68612.04	144601	47%
450	MD	EASTERN SHORE VIRGINIA	BALTIMORE	7724.88	387776.03	2%
450	MD	EASTERN SHORE MARYLAND	CECIL	117407.79	227936.53	52%
450	PA	EASTERN SHORE MARYLAND	CHESTER	84634.67	484346.47	17%
450	MD	EASTERN SHORE MARYLAND	HARFORD	171257.33	281831.24	61%
450	PA	EASTERN SHORE MARYLAND	LANCASTER	70495.82	628542.69	11%
450	PA	EASTERN SHORE MARYLAND	YORK	17933.45	581372.52	3%
470	MD	EASTERN SHORE MARYLAND	BALTIMORE	237204.88	387776.03	61%
470	MD	WESTERN SHORE MARYLAND	CARROLL	22624.34	290981.62	8%
470	MD	WESTERN SHORE MARYLAND	HARFORD	25222.16	281831.24	9%
470	PA	WESTERN SHORE MARYLAND	YORK	5837.7	581372.52	1%
480	MD	WESTERN SHORE MARYLAND	BALTIMORE	51613.98	387776.03	13%
480	MD	WESTERN SHORE MARYLAND	BALTIMORE CITY	27429.04	52406.62	52%
490	MD	WESTERN SHORE MARYLAND	ANNE ARUNDEL	56673.07	270586.03	21%
490	MD	WESTERN SHORE MARYLAND	BALTIMORE	17395.01	387776.03	4%
490	MD	WESTERN SHORE MARYLAND	BALTIMORE CITY	5537.55	52406.62	11%
490	MD	WESTERN SHORE MARYLAND	HOWARD	19655.92	162119.32	12%
500	MD	WESTERN SHORE MARYLAND	ANNE ARUNDEL	43059.1	270586.03	16%
500	MD	PATUXENT RIVER BASIN	CALVERT	98787.98	139558.19	71%
500	MD	PATUXENT RIVER BASIN	CHARLES	16831.63	295487.14	6%
500	MD	PATUXENT RIVER BASIN	PRINCE GEORGES	130286.69	311089.96	42%
500	MD	PATUXENT RIVER BASIN	ST MARYS	44919.67	236144.01	19%
510	MD	PATUXENT RIVER BASIN	ANNE ARUNDEL	30279.68	270586.03	11%
540	DC	WESTERN SHORE MARYLAND	DISTRICT OF COLU.	9768.31	39668.82	25%
540	MD	POTOMAC RIVER BASIN	MONTGOMERY	37372.8	322768.46	12%
540	MD	POTOMAC RIVER BASIN	PRINCE GEORGES	56591.28	311089.96	18%
550	VA	POTOMAC RIVER BASIN	FAIRFAX	68739.8	257829.31	27%
550	VA	POTOMAC RIVER BASIN	FAUQUIER	135436.7	417542.01	32%
550	VA	POTOMAC RIVER BASIN	LOUDOUN	16270.12	334104.42	5%
550	VA	POTOMAC RIVER BASIN	MANASSAS	3762.12	3762.12	100%
550	VA	POTOMAC RIVER BASIN	MANASSAS_PARK	1845.67	1845.67	100%
550	VA	POTOMAC RIVER BASIN	PRINCE WILLIAM	174754.75	220739.02	79%
550	VA	POTOMAC RIVER BASIN	STAFFORD	24.04	174557.02	0%
560	VA	POTOMAC RIVER BASIN	CAROLINE	76242.28	341607.71	22%
560	VA	RAPPAHANNOCK RIVER BASIN	ESSEX	148417.7	166168.36	89%
560	VA	RAPPAHANNOCK RIVER BASIN	FREDERICKSBURG	3956.68	3956.68	100%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
560	VA	RAPPAHANNOCK RIVER BASIN	KING AND QUEEN	713.79	203402.35	0%
560	VA	RAPPAHANNOCK RIVER BASIN	KING GEORGE	41171.72	115259.57	36%
560	VA	RAPPAHANNOCK RIVER BASIN	LANCASTER	74590.1	87878.88	85%
560	VA	RAPPAHANNOCK RIVER BASIN	MIDDLESEX	49658.81	85729.11	58%
560	VA	RAPPAHANNOCK RIVER BASIN	NORTHUMBERLAND	1628.25	127889.76	1%
560	VA	RAPPAHANNOCK RIVER BASIN	RICHMOND	123838.43	124195.86	100%
560	VA	RAPPAHANNOCK RIVER BASIN	SPOTSYLVANIA	38701.62	268269.78	14%
560	VA	RAPPAHANNOCK RIVER BASIN	STAFFORD	25889.11	174557.02	15%
560	VA	RAPPAHANNOCK RIVER BASIN	WESTMORELAND	41154.49	148910.28	28%
580	VA	RAPPAHANNOCK RIVER BASIN	LANCASTER	531.55	87878.88	1%
580	VA	WESTERN SHORE MARYLAND	NORTHUMBERLAND	40708.05	127889.76	32%
580	VA	WESTERN SHORE MARYLAND	RICHMOND	175.68	124195.86	0%
590	VA	WESTERN SHORE MARYLAND	CAROLINE	7600.32	341607.71	2%
590	VA	YORK RIVER BASIN	ESSEX	783.08	166168.36	0%
590	VA	YORK RIVER BASIN	GLOUCESTER	48737.62	143215.31	34%
590	VA	YORK RIVER BASIN	HANOVER	87132.36	303300.19	29%
590	VA	YORK RIVER BASIN	JAMES CITY	21263.61	96590.53	22%
590	VA	YORK RIVER BASIN	KING AND QUEEN	142664.27	203402.35	70%
590	VA	YORK RIVER BASIN	KING WILLIAM	172700.47	177415.02	97%
590	VA	YORK RIVER BASIN	NEW KENT	64149.41	136899.91	47%
590	VA	YORK RIVER BASIN	WILLIAMSBURG	1430.32	3294.5	43%
590	VA	YORK RIVER BASIN	YORK	42234.38	81774.41	52%
600	VA	YORK RIVER BASIN	CHARLES CITY	106746.9	119303.45	89%
600	VA	JAMES RIVER BASIN	CHESTERFIELD	208701.45	281840.21	74%
600	VA	JAMES RIVER BASIN	COLONIAL HEIGHTS	1681.29	1681.29	100%
600	VA	JAMES RIVER BASIN	DINWIDDIE	9790.74	323857.96	3%
600	VA	JAMES RIVER BASIN	HAMPTON	7138.62	34140.69	21%
600	VA	JAMES RIVER BASIN	HENRICO	54074.49	153992.75	35%
600	VA	JAMES RIVER BASIN	ISLE OF WIGHT	68649.86	203826.97	34%
600	VA	JAMES RIVER BASIN	JAMES CITY	75326.91	96590.53	78%
600	VA	JAMES RIVER BASIN	NEW KENT	49428.42	136899.91	36%
600	VA	JAMES RIVER BASIN	NEWPORT NEWS	40290.27	44722.14	90%
600	VA	JAMES RIVER BASIN	NORFOLK	31.05	34373.52	0%
600	VA	JAMES RIVER BASIN	PETERSBURG	4942.35	4942.35	100%
600	VA	JAMES RIVER BASIN	POWHATAN	5066.88	169873.73	3%
600	VA	JAMES RIVER BASIN	PRINCE GEORGE	92030.37	171218.9	54%
600	VA	JAMES RIVER BASIN	RICHMOND CITY	35998.83	39758.69	91%
600	VA	JAMES RIVER BASIN	SUFFOLK	8879	261344.7	3%
600	VA	JAMES RIVER BASIN	SURRY	75971.7	178071.47	43%
600	VA	JAMES RIVER BASIN	WILLIAMSBURG	1864.19	3294.5	57%
600	VA	JAMES RIVER BASIN	YORK	7806.84	81774.41	10%
610	VA	JAMES RIVER BASIN	CHARLES CITY	12556.5	119303.45	11%
610	VA	JAMES RIVER BASIN	GOOCHLAND	5.46	184294.55	0%
610	VA	JAMES RIVER BASIN	HANOVER	43922.55	303300.19	14%
610	VA	JAMES RIVER BASIN	HENRICO	77084.42	153992.75	50%
610	VA	JAMES RIVER BASIN	NEW KENT	23322.11	136899.91	17%
610	VA	JAMES RIVER BASIN	RICHMOND CITY	1759.64	39758.69	4%
620	VA	JAMES RIVER BASIN	CHESAPEAKE	773.5	221251.38	0%
620	VA	JAMES RIVER BASIN	ISLE OF WIGHT	30467.09	203826.97	15%
620	VA	JAMES RIVER BASIN	PORTSMOUTH	6708.05	21971.39	31%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
620	VA	JAMES RIVER BASIN	SUFFOLK	89471.17	261344.7	34%
630	VA	JAMES RIVER BASIN	CHESAPEAKE	10534.25	221251.38	5%
630	VA	JAMES RIVER BASIN	PORTSMOUTH	6586.93	21971.39	30%
630	VA	JAMES RIVER BASIN	SUFFOLK	249.83	261344.7	0%
650	MD	JAMES RIVER BASIN	BALTIMORE	13172.34	387776.03	3%
650	MD	WESTERN SHORE MARYLAND	CARROLL	86578.4	290981.62	30%
700	PA	WESTERN SHORE MARYLAND	BRADFORD	152493.75	741454.31	21%
700	PA	SUSQUEHANA RIVER BASIN	TIOGA	2581.07	725733.75	0%
710	PA	SUSQUEHANA RIVER BASIN	LANCASTER	85657.9	628542.69	14%
710	PA	SUSQUEHANA RIVER BASIN	LEBANON	5733.02	230895.24	2%
710	PA	SUSQUEHANA RIVER BASIN	YORK	54863.28	581372.52	9%
720	PA	SUSQUEHANA RIVER BASIN	BERKS	19450.5	555021.41	4%
720	PA	SUSQUEHANA RIVER BASIN	CHESTER	3316.21	484346.47	1%
720	PA	SUSQUEHANA RIVER BASIN	LANCASTER	268915.38	628542.69	43%
720	PA	SUSQUEHANA RIVER BASIN	LEBANON	12108.7	230895.24	5%
730	PA	SUSQUEHANA RIVER BASIN	ADAMS	15272.02	333412.04	5%
730	PA	POTOMAC RIVER BASIN	CUMBERLAND	2050.44	350701.78	1%
730	PA	POTOMAC RIVER BASIN	FRANKLIN	299683.17	495235.35	61%
730	PA	POTOMAC RIVER BASIN	FULTON	35.46	281156.82	0%
730	PA	POTOMAC RIVER BASIN	PERRY	562.51	357583.61	0%
730	MD	POTOMAC RIVER BASIN	WASHINGTON	1265.7	298769.02	0%
740	WV	POTOMAC RIVER BASIN	BERKELEY	205945.69	205945.69	100%
740	VA	POTOMAC RIVER BASIN	CLARKE	22970.22	114232.85	20%
740	PA	POTOMAC RIVER BASIN	FRANKLIN	23749.7	495235.35	5%
740	VA	POTOMAC RIVER BASIN	FREDERICK	197849.65	272162.54	73%
740	PA	POTOMAC RIVER BASIN	FULTON	170838.42	281156.82	61%
740	WV	POTOMAC RIVER BASIN	HAMPSHIRE	1160.32	413447.78	0%
740	WV	POTOMAC RIVER BASIN	JEFFERSON	42755.29	135309.22	32%
740	WV	POTOMAC RIVER BASIN	MORGAN	80317.84	147072.51	55%
740	MD	POTOMAC RIVER BASIN	WASHINGTON	129952.13	298769.02	44%
750	PA	POTOMAC RIVER BASIN	ADAMS	99604.16	333412.04	30%
750	MD	POTOMAC RIVER BASIN	CARROLL	5744.61	290981.62	2%
750	MD	POTOMAC RIVER BASIN	FREDERICK	1956.99	427139.67	0%
760	MD	POTOMAC RIVER BASIN	BALTIMORE	51060.69	387776.03	9%
760	MD	WESTERN SHORE MARYLAND	CARROLL	36981.62	290981.62	13%
760	MD	WESTERN SHORE MARYLAND	FREDERICK	938.01	427139.67	0%
760	MD	WESTERN SHORE MARYLAND	HOWARD	30349.7	162119.32	19%
770	MD	WESTERN SHORE MARYLAND	CAROLINE	19700.61	205310.23	10%
770	DE	EASTERN SHORE MARYLAND	KENT	49211.01	382698.46	13%
770	MD	EASTERN SHORE MARYLAND	QUEEN ANNES	2488.99	240850.08	1%
780	DE	EASTERN SHORE MARYLAND	KENT	6864.81	382698.46	2%
780	DE	EASTERN SHORE MARYLAND	SUSSEX	38543.13	602608.31	6%
800	MD	EASTERN SHORE MARYLAND	CECIL	42735.05	227936.53	19%
800	DE	EASTERN SHORE MARYLAND	NEW CASTLE	8268.53	285654.12	3%
810	MD	EASTERN SHORE MARYLAND	CECIL	27917.9	227936.53	12%
810	MD	EASTERN SHORE MARYLAND	KENT	75803.7	181952.57	42%
810	DE	EASTERN SHORE MARYLAND	NEW CASTLE	4286.09	285654.12	2%
820	MD	EASTERN SHORE MARYLAND	QUEEN ANNES	26865.88	240850.08	11%
830	MD	EASTERN SHORE MARYLAND	TALBOT	87278	175898.74	50%
840	MD	EASTERN SHORE MARYLAND	DORCHESTER	276879.55	372730.67	74%

Table E.3.1

Counties Sorted by Phase IV Chesapeake Bay Watershed Model Segment

Phase IV Model Segment	State	Chesapeake Bay Watershed Subbasin	County	Acres of County in Segment	Total Acres In County	Percent of County in Segment
850	MD	EASTERN SHORE MARYLAND	HARFORD	54930.51	281831.24	19%
860	MD	WESTERN SHORE MARYLAND	BALTIMORE	39742.26	387776.03	10%
860	MD	WESTERN SHORE MARYLAND	BALTIMORE CITY	19440.35	52406.62	37%
870	MD	WESTERN SHORE MARYLAND	ANNE ARUNDEL	27259.9	270586.03	10%
880	MD	WESTERN SHORE MARYLAND	ANNE ARUNDEL	76242.85	270586.03	28%
880	MD	WESTERN SHORE MARYLAND	CALVERT	39211.95	139558.19	28%
890	DC	WESTERN SHORE MARYLAND	DISTRICT OF COLU	21444.1	39668.82	54%
890	MD	POTOMAC RIVER BASIN	MONTGOMERY	36570.94	322768.46	11%
900	VA	POTOMAC RIVER BASIN	ALEXANDRIA	9671.49	9671.47	100%
900	VA	POTOMAC RIVER BASIN	ARLINGTON	16797.67	16841.59	100%
900	VA	POTOMAC RIVER BASIN	FAIRFAX	114785.25	257829.31	45%
900	VA	POTOMAC RIVER BASIN	FALLS CHURCH	1277.57	1277.57	100%
910	MD	POTOMAC RIVER BASIN	CHARLES	61615.2	295487.14	21%
910	DC	POTOMAC RIVER BASIN	DISTRICT OF COLU	6379.69	39668.82	16%
910	MD	POTOMAC RIVER BASIN	PRINCE GEORGES	93087.11	311089.96	30%
920	MD	POTOMAC RIVER BASIN	CHARLES	217040.2	295487.14	73%
920	MD	POTOMAC RIVER BASIN	PRINCE GEORGES	4462.58	311089.96	1%
920	MD	POTOMAC RIVER BASIN	ST MARYS	171804.53	236144.01	73%
930	VA	POTOMAC RIVER BASIN	LANCASTER	12757.21	87878.88	15%
930	VA	WESTERN SHORE VIRGINIA	NORTHUMBERLAND	19042.51	127889.76	15%
940	VA	WESTERN SHORE VIRGINIA	ESSEX	16319.5	166168.36	10%
940	VA	WESTERN SHORE VIRGINIA	GLOUCESTER	94477.7	143215.31	66%
940	VA	WESTERN SHORE VIRGINIA	KING AND QUEEN	45889.32	203402.35	23%
940	VA	WESTERN SHORE VIRGINIA	MATHEWS	57905.12	57905.12	100%
940	VA	WESTERN SHORE VIRGINIA	MIDDLESEX	36070.31	85729.11	42%
950	VA	WESTERN SHORE VIRGINIA	HAMPTON	27002.08	34140.69	79%
950	VA	WESTERN SHORE VIRGINIA	NEWPORT NEWS	4431.86	44722.14	10%
950	VA	WESTERN SHORE VIRGINIA	YORK	31733.19	81774.41	39%
960	VA	WESTERN SHORE VIRGINIA	CHESAPEAKE	42180.3	221251.38	19%
960	VA	WESTERN SHORE VIRGINIA	NORFOLK	34342.47	34373.52	100%
960	VA	WESTERN SHORE VIRGINIA	PORTSMOUTH	8676.4	21971.39	39%
960	VA	WESTERN SHORE VIRGINIA	VIRGINIA BEACH	56206.43	127006.86	44%
970	VA	WESTERN SHORE VIRGINIA	PRINCE WILLIAM	36573.57	220739.02	17%
970	VA	POTOMAC RIVER BASIN	STAFFORD	153.72	174557.02	0%
980	VA	POTOMAC RIVER BASIN	FAUQUIER	2546.35	417542.01	1%
980	VA	POTOMAC RIVER BASIN	KING GEORGE	74087.87	115259.57	64%
980	VA	POTOMAC RIVER BASIN	NORTHUMBERLAND	66510.99	127889.76	52%
980	VA	POTOMAC RIVER BASIN	PRINCE WILLIAM	9127.71	220739.02	4%
980	VA	POTOMAC RIVER BASIN	RICHMOND	181.73	124195.86	0%
980	VA	POTOMAC RIVER BASIN	STAFFORD	123604.98	174557.02	71%
980	VA	POTOMAC RIVER BASIN	WESTMORELAND	107755.8	148910.28	72%
990	MD	POTOMAC RIVER BASIN	CALVERT	1558.41	139558.19	1%
990	MD	PATUXENT RIVER BASIN	ST MARYS	19419.76	236144.01	8%

Table E.3.2

Percent of Each Phase IV Chesapeake Bay Watershed Model Segment by Chesapeake Basin State

Segm.	NY	PA	MD	DC	VA	WV	DE	Segm.	NY	PA	MD	DC	VA	WV	DE
10	66.80	33.20	0.00	0.00	0.00	0.00	0.00	780	0.00	0.00	0.00	0.00	0.00	0.00	100.00
20	91.30	8.70	0.00	0.00	0.00	0.00	0.00	800	0.00	0.00	81.90	0.00	0.00	0.00	18.10
30	0.00	100.00	0.00	0.00	0.00	0.00	0.00	810	0.00	0.00	95.10	0.00	0.00	0.00	4.90
40	0.00	100.00	0.00	0.00	0.00	0.00	0.00	820	0.00	0.00	100.00	0.00	0.00	0.00	0.00
50	0.00	100.00	0.00	0.00	0.00	0.00	0.00	830	0.00	0.00	100.00	0.00	0.00	0.00	0.00
60	0.00	100.00	0.00	0.00	0.00	0.00	0.00	840	0.00	0.00	100.00	0.00	0.00	0.00	0.00
70	0.00	100.00	0.00	0.00	0.00	0.00	0.00	850	0.00	0.00	100.00	0.00	0.00	0.00	0.00
80	0.00	100.00	0.00	0.00	0.00	0.00	0.00	860	0.00	0.00	100.00	0.00	0.00	0.00	0.00
90	0.00	100.00	0.00	0.00	0.00	0.00	0.00	870	0.00	0.00	100.00	0.00	0.00	0.00	0.00
100	0.00	100.00	0.00	0.00	0.00	0.00	0.00	880	0.00	0.00	100.00	0.00	0.00	0.00	0.00
110	0.00	99.50	0.50	0.00	0.00	0.00	0.00	890	0.00	0.00	100.00	36.33	0.00	0.00	0.00
120	0.00	100.00	0.00	0.00	0.00	0.00	0.00	900	0.00	0.00	0.00	0.00	100.00	0.00	0.00
140	0.00	80.00	20.00	0.00	0.00	0.00	0.00	910	0.00	0.00	100.00	3.94	0.00	0.00	0.00
160	0.00	18.80	36.60	0.00	0.00	44.60	0.00	920	0.00	0.00	100.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	5.80	94.20	0.00	930	0.00	0.00	0.00	0.00	100.00	0.00	0.00
175	0.00	14.70	16.40	0.00	0.00	68.90	0.00	940	0.00	0.00	0.00	0.00	100.00	0.00	0.00
180	0.00	16.30	56.90	0.00	19.50	7.30	0.00	950	0.00	0.00	0.00	0.00	100.00	0.00	0.00
190	0.00	0.00	0.00	0.00	100.00	0.00	0.00	960	0.00	0.00	0.00	0.00	100.00	0.00	0.00
200	0.00	0.00	0.00	0.00	92.70	7.30	0.00	970	0.00	0.00	0.00	0.00	100.00	0.00	0.00
210	0.00	8.10	91.90	0.00	0.00	0.00	0.00	980	0.00	0.00	0.00	0.00	100.00	0.00	0.00
220	0.00	0.00	33.00	0.34	67.00	0.00	0.00	990	0.00	0.00	100.00	0.00	0.00	0.00	0.00
230	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
235	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
240	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
250	0.00	0.00	0.00	0.00	100.00	0.00	0.0								
260	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
265	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
270	0.00	0.00	0.00	0.00	97.50	2.50	0.00								
280	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
290	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
300	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
310	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
330	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
340	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
370	0.00	0.00	77.90	0.00	0.00	0.00	22.10								
380	0.00	0.00	89.30	0.00	0.00	0.00	10.70								
390	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
400	0.00	0.00	94.90	0.00	0.00	0.00	5.10								
410	0.00	0.00	40.30	0.00	0.00	0.00	59.70								
420	0.00	0.00	99.50	0.00	0.00	0.00	0.50								
430	0.00	0.00	89.50	0.00	5.10	0.00	5.40								
440	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
450	0.00	36.30	63.70	0.00	0.00	0.00	0.00								
470	0.00	1.90	98.10	0.00	0.00	0.00	0.00								
480	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
490	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
500	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
510	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
540	0.00	0.00	100.00	9.4	0.00	0.00	0.00								
550	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
560	0.00	0.00	0.00	0.00	0.00	100.00	0.00								
580	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
590	0.00	0.0	0.00	0.00	100.00	0.00	0.00								
600	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
610	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
620	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
630	0.00	0.00	0.00	0.00	100.00	0.00	0.00								
650	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
700	0.00	100.00	0.00	0.00	0.00	0.00	0.00								
710	0.00	100.00	0.00	0.00	0.00	0.00	0.00								
720	0.00	100.00	0.00	0.00	0.00	0.00	0.00								
730	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
740	0.00	9.70	15.30	0.00	37.50	37.50	0.00								
750	0.00	92.60	7.40	0.00	0.00	0.00	0.00								
760	0.00	0.00	100.00	0.00	0.00	0.00	0.00								
770	0.00	0.00	28.70	0.00	0.00	0.00	71.30								

Section E.4

Phase II Watershed Model Land Use by Model Segment.

In Phase II of the Watershed Model, land use data for 1985 were initially developed with statistical information from the 1982 Agricultural Censuses conducted by the U.S. Census Bureau, surveys conducted by the U.S. Forest Service (various years), and information obtained from the Conservation Technology Information Center (CTIC) for the 1985 year. Most of the agricultural and forest data was at the county level of aggregation. The data were then reviewed by the appropriate state or county offices of the USDA Soil Conservation Service and other appropriate state and county offices for revision and/or confirmation. The final 1985 land use database was agreed to by the CBP agencies after several rounds of revision and review with state, local and federal agencies. The Phase II watershed land use data is provided here (Table E.4.1) for purposes of comparison with the Phase IV Watershed Model land use data.

Table E.4.1

Watershed Model Land Uses for Phase II Watershed Model Segmentation in Acres

Phase II Model Segment	Convent Til	Conserv. Till	Hayland	Pasture	Animal Waste	Forest	Urban	Water	Total
10	100723	10869	226565	159325	614	984938	199187	12275	1694496
20	160951	10943	401085	300413	1716	1844310	420461	54215	3194094
30	78620	14797	240216	145469	668	875001	105210	101685	1561666
40	126240	54651	63556	29624	149	570931	96136	13399	954686
50	37257	9509	54900	73066	94	679540	56731	2887	913984
60	66122	43988	134578	139180	402	2254498	78824	10139	2727731
70	62800	44435	62979	31756	193	610012	32814	6549	851538
80	144248	133753	149693	76049	614	802377	134620	1501	1442855
90	24395	29316	71198	50173	211	394793	16180	13616	599882
100	91758	62717	148417	87849	607	1076335	74940	5163	1547786
110	173581	200603	152836	127594	792	416256	146910	11426	1229998
120	104846	85976	70578	58097	806	80692	73096	1246	475337
140	27034	37578	20404	24304	160	52115	26872	283	188750
160	17350	11180	57926	108588	145	614346	48740	5004	863279
170	7080	2998	37911	148161	108	726540	22927	2336	948061
175	13174	11118	41362	105876	128	584313	46443	2398	804812
180	84971	168939	199500	220191	925	722664	198101	8949	1604240
190	21425	49723	116083	211836	522	594668	40625	3520	1038402
200	22470	32018	88901	200709	412	503065	50154	2113	899842
210	38588	127498	97542	79147	540	189716	83164	5178	621373
220	8121	69422	71578	105951	186	209156	146032	872	611318

Table E.4.1
Watershed Model Land Uses for Phase II Watershed Model Segmentation in Acres

Phase II Model Segment	Convent. Til	Conserv. Till	Hayland	Pasture	Animal Waste	Forest	Urban	Water	Total
230	25054	37390	121214	224145	391	577312	38857	2240	1026603
235	7131	5094	8852	7370	21	123800	11106	1202	164576
240	4081	18703	2816	2337	9	176769	9702	1799	216216
250	9007	5830	14837	22253	50	146892	11153	3884	213906
260	17381	28427	28076	24010	71	335375	37553	701	471594
265	335	738	10845	19176	13	189339	2350	0	222796
270	8075	37671	162192	233212	316	1364448	58967	1841	1866722
280	25308	29341	147753	269838	331	1356569	74187	978	1913111
290	11562	14252	21120	32646	57	222413	21071	4366	327487
300	33120	37019	52912	80932	137	525824	33036	1180	764160
310	8054	2600	217	4191	8	71259	11673	3235	101237
330	2225	10233	4845	8477	23	25606	30668	3182	85259
340	4956	8806	5352	10534	26	45387	53586	9221	137868
360	58234	131680	8949	9108	71	249573	50373	44750	552738
370	2891	5875	1924	1867	12	13354	11089	1044	38056
380	26375	115199	7451	5493	72	77240	30044	6374	268248
390	10255	19856	1028	1164	10	15138	8274	2221	57946
400	80022	103255	6059	5884	49	135173	40276	2153	372871
410	74878	137165	7919	4579	37	239890	46993	0	511461
420	23068	12012	752	1249	4	81851	18478	0	137414
430	40847	79758	2839	5601	22	326226	23929	1423	480645
440	35242	23897	297	2658	2	123651	6204	14481	206432
450	40061	68763	41278	49235	321	164399	107100	189	471346
460	3883	9975	5048	7632	28	38912	28291	1477	95246
470	14662	26048	13068	22795	72	88338	126398	391	291772
480	2193	3558	1718	3540	10	14612	26055	268	51954
490	20211	36968	21148	29197	110	88664	80015	1235	277548
500	26009	12075	9760	7105	15	163992	128881	8259	356096
510	377	897	630	673	2	12270	14288	1231	30368
520	4553	5191	3353	3147	5	62007	58593	6429	143278
530	93729	56477	28398	38337	65	628468	297355	24079	1166908
540	4486	5712	3966	3532	11	33308	52442	620	104077
550	4508	23599	41292	50331	97	150755	55594	2210	328386
560	90525	38466	7942	17024	86	422678	31801	15381	623903
570	37840	11244	2045	7143	7	197054	17525	10642	283500
580	8774	3167	133	990	1	23861	2023	2648	41597
590	44936	44700	8220	12615	44	401542	59765	17003	588825
600	43813	45912	5829	18257	30	525519	105949	24767	770076
610	5661	13915	3729	4013	11	96481	32942	428	157180
620	15119	19434	349	3860	5	73812	16444	3172	132195
630	1187	1433	3	112	0	6276	3431	0	12442
640	5854	20614	213	1361	6	54841	60041	5850	148780

Section E.5

Original EMAP Level 2 Land Use Data by Phase IV Watershed Model Segment

For Phase IV of the Watershed Model, remotely sensed data for calendar year, 1990, supplied by the U.S. E.P.A.'s Environmental Monitoring and Assessment Program (EMAP) was used to determine land use^{3,4}. The EMAP Level 2 data was delivered in a raster format with each raster being approximately 660 square meters (0.165 acres). As EMAP employs two levels of detail in classification of land use, the more detailed level was chosen. The EMAP land use level 2 classification scheme is as follows:

0	Unassigned
11	High Intensity Developed
12	Low Intensity Developed
21	Woody Cultivated
22	Herbaceous Cultivated
31	Herbaceous
41	Deciduous Forest
42	Evergreen Forest
43	Mixed forest
51	Exposed Soil
52	Exposed sand
53	Exposed Rock
71	Deciduous Wetland
72	Evergreen Wetland
73	Mixed Forest Wetland
81	Herbaceous Wetland
91	Non-vegetated Wetland
100	Water

³ Chesapeake Bay Watershed Pilot Project, U.S. E.P.A., EMAP Center, Research Triangle Park, NC 27711. Publication code: EPA/620/R-94/XXX, March 1994.

⁴ Congalton, R. G. "A Review of Assessing the Accuracy of Classifications of Remotely Sensed Data." Remote Sensing of the Environment. 1991. 37(1): 35-46.

Table E.5.1

Original 1990 EMAP Land Use Data Sorted by Phase IV Chesapeake Bay Watershed Model Segments In Acres

Mod. Seg.	Not Assigned	High Int. Devel.	Low Int. Devel.	Woody Cultiv.	Herbac. Cultiv.	Herbac.	Decid. Forest	Evergr. Forest	Mixed Forest	Exposed Soil	Expose Sand	Exposed Rock	Decid. Wetland	Evergr. Wetland	Mixed Wetland	Herbac. Wetland	Nonveg. Wetland	Water	Total Area In Acres
	0	11	12	21	22	31	41	42	43	51	52	53	71	72	73	81	91	100	
10	39814.55	2558.94	66951.02	0.16	180026.26	375807.15	964578.81	49897.18	40.13	109.54	0.00	506.75	0.00	0.00	0.00	80.59	0.00	11230.35	1691601.44
20	73117.44	4580.86	90203.51	0.00	281456.84	854076.32	1481539.31	359575.54	0.00	244.74	0.00	608.08	1214.99	323.86	0.00	0.00	0.00	30036.04	3176978.50
30	12070.50	14488.25	49355.22	0.00	110048.04	346137.24	810092.76	30575.85	56.25	69.90	0.00	6588.80	79.28	0.00	0.00	93.09	64.15	20871.03	1400370.37
40	30773.23	8266.47	37263.01	0.00	90101.54	200231.16	544846.32	26840.90	3745.64	1475.20	0.00	13410.50	2.63	0.00	0.00	0.00	338.17	12214.42	969509.18
50	0.00	446.39	15626.51	0.00	33590.69	46819.15	738842.97	6499.00	8.72	11083.47	0.00	24536.57	0.00	0.00	0.00	0.00	0.00	6416.92	884060.38
60	28019.87	931.76	35204.41	0.00	113118.50	244190.37	2229888.08	41230.70	3131.16	4693.03	0.00	7631.59	0.00	0.00	0.00	0.00	0.00	17896.95	2725936.43
70	0.00	737.19	19387.44	0.00	142061.59	148659.93	511420.24	17583.46	677.32	52.30	0.00	545.08	0.00	0.00	0.00	0.00	0.00	8178.64	849303.18
80	9733.61	5114.59	42381.22	0.00	293988.70	299921.23	749513.93	19809.49	5764.44	248.20	0.00	6779.26	0.00	0.00	0.00	39.97	0.00	26812.61	1459964.48
90	6702.78	55.92	5667.23	0.00	69183.30	95737.52	398503.39	12889.27	0.00	8.39	0.00	788.67	0.00	0.00	0.00	0.00	0.00	10814.06	600350.54
100	1428.16	365.96	25913.91	0.00	209521.00	229729.03	1043151.30	27948.49	1430.79	951.34	0.00	2600.39	115.13	0.00	0.00	0.00	0.00	7382.90	1547273.52
110	5741.08	8587.36	79420.21	0.00	311579.88	300867.14	386349.17	16977.19	27.96	53.62	0.00	0.00	10.20	0.00	0.00	0.00	7.89	17670.96	1132471.57
120	6477.78	338.00	4435.79	0.00	41197.15	35872.51	34573.81	6283.20	27.96	42.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2860.59	131938.50
140	0.00	122.21	1416.97	0.00	56648.97	50533.54	55588.59	11289.73	46.05	0.00	0.00	6615.28	0.00	0.00	0.00	16.94	60.53	10130.66	185897.12
160	58694.91	317.44	24836.58	0.00	26283.65	130164.12	598333.06	13583.69	0.00	1434.57	0.00	298.36	0.00	0.00	0.00	0.00	0.00	4797.31	865060.61
170	28967.59	73.03	11378.87	255.43	39491.19	209760.98	614323.88	42005.39	795.91	229.94	0.00	169.08	0.00	0.00	0.00	0.00	0.00	2967.34	950547.90
175	0.00	6.09	8022.06	0.00	85715.42	148797.43	145114.95	3040.69	285.37	124.18	0.00	480.54	0.00	0.00	0.00	0.00	0.00	4162.92	805787.57
180	45.23	1515.00	21150.48	0.00	26214.08	121958.50	608832.14	35923.14	453.30	46.22	0.00	128.95	0.00	0.00	0.00	0.00	0.00	3096.78	409346.07
190	0.00	3201.06	32129.67	0.00	169592.31	306822.37	464140.23	54703.04	4658.82	180.93	0.00	128.95	0.00	0.00	0.00	0.00	0.00	4772.48	1040329.86
200	342.94	1033.74	19360.14	0.00	93416.74	297554.40	445328.98	33863.59	3107.47	21.71	0.00	841.30	0.00	0.00	0.00	0.00	0.00	5899.15	900768.16
210	0.00	1080.78	23675.53	0.00	124944.43	170847.60	186423.28	2824.73	80.59	147.70	0.00	1237.53	0.00	0.00	0.00	3.78	0.00	1960.08	513026.03
220	297.38	11648.78	67515.17	0.00	58036.34	225717.09	226095.56	12709.50	307.57	67.93	0.00	288.00	332.74	0.00	0.00	0.00	38.82	7522.37	610577.25
230	846.57	170.56	9005.30	0.00	93770.86	393420.21	462542.00	59619.27	3659.46	614.82	0.00	65.96	0.00	0.00	0.00	15.63	0.00	3140.04	1026870.67
235	0.00	2.63	1312.86	0.00	16849.56	26808.83	88794.93	29356.91	214.15	35.20	0.00	69.41	0.00	0.00	0.00	0.00	0.00	979.13	164423.61
240	0.00	2786.41	2786.41	5.26	28224.32	37643.45	108579.42	72721.80	278.62	630.44	0.00	0.00	43.26	0.00	0.00	0.00	0.00	1042.95	215877.23
250	335.70	42.27	1580.79	0.00	18285.12	61396.45	89887.72	27211.80	37827.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14133.71	213863.70
260	339.48	21.55	5393.38	0.00	67153.98	101346.03	227213.34	67485.07	117.77	6.25	0.00	298.03	0.00	0.00	0.00	30.26	0.00	1915.01	471369.34
265	20035.48	9.54	934.23	0.00	1298.38	43003.93	146468.93	8390.98	76.32	0.00	0.00	819.92	0.00	0.00	0.00	0.00	0.00	2618.97	223656.68
270	54911.93	1772.74	34998.02	0.00	59021.07	291822.86	1271578.65	152227.77	114.81	0.00	0.00	228.13	0.00	0.00	0.00	0.00	0.00	7293.91	1873967.89
280	27234.17	3053.19	52357.43	0.00	140805.64	424355.62	1049043.87	219794.43	746.56	28.45	0.00	375.67	0.00	0.00	0.00	50.49	58.22	14370.88	1932274.63
290	305.76	719.92	17033.44	0.00	44583.41	70089.90	159805.90	30947.57	45.72	0.00	0.00	0.00	200.50	15.63	0.00	0.00	0.00	5583.35	329372.39
300	30717.14	414.48	10441.02	0.00	108948.67	156425.24	359896.93	93136.14	155.60	0.00	0.00	36.02	0.00	0.00	0.00	0.00	0.00	4280.69	764491.57
310	7220.72	26.65	1215.98	0.00	8576.67	14514.47	52088.02	13829.42	0.00	0.00	0.00	0.00	148.03	4.11	0.00	0.00	0.00	3537.25	101161.33
330	0.00	171.39	3193.99	0.00	9260.74	32473.92	37442.13	1004.13	0.00	0.00	0.00	2.30	37.34	0.00	0.00	0.00	0.00	1494.11	85080.04
340	0.00	4745.67	34157.51	0.00	7605.93	31818.32	52637.37	6210.50	0.00	16.78	0.00	0.00	0.00	0.00	0.00	6.09	0.00	275.01	137505.25
370	11.18	8.22	263.99	0.00	24377.19	2965.20	8945.10	227.47	0.00	2.47	0.00	0.00	87.50	0.00	0.00	0.00	0.00	994.76	37831.28
380	88.49	16.45	2726.54	0.00	161718.61	20085.32	69316.86	237.47	0.00	0.00	0.00	14.31	917.62	0.00	0.00	0.00	0.00	1707.60	57527.78
390	0.00	0.00	1131.44	0.00	36475.16	3710.28	13769.72	439.48	0.00	0.00	0.00	0.00	147.21	0.00	0.00	0.00	0.00	5197.81	265178.02
400	0.00	499.35	4189.60	0.00	193303.37	15464.16	70827.42	4714.74	0.00	0.00	11.51	0.00	4190.72	195.07	298.03	3103.36	0.00	4497.14	301304.49
410	2467.82	1156.28	7532.74	0.00	229588.56	27209.49	141861.91	25862.10	0.00	45.72	4.11	0.00	11896.65	1372.23	1367.79	8217.78	0.00	4621.49	463204.68
420	0.00	1893.76	8386.70	0.00	46718.16	11976.42	40379.86	7904.29	0.00	0.00	0.00	0.00	3986.93	0.00	0.00	0.00	0.00	2354.33	136583.83
430	18553.05	108.39	3907.16	0.00	137498.00	37633.91	149279.35	63108.17	3.45	0.00	502.15	0.00	12134.98	1617.47	5.76	42789.62	0.00	10954.36	477995.80
440	0.00	206.75	2931.65	0.00	78315.25	21844.24	18828.71	48205.86	0.00	238.49	550.83	0.00	4962.12	0.00	0.00	0.00	0.00	8486.38	205385.06
450	11221.47	1880.80	22010.86	0.00	110230.44	142540.88	164552.23	14143.08	30.76	845.74	0.00	113.65	0.00	0.00	0.00	0.00	0.00	6620.87	474223.52
470	0.00	4240.23	22803.31	0.00	31749.07	89831.79	124137.83	10350.07	0.00	771.23	0.00	795.58	132.08	0.00	0.00	0.00	0.00	5106.53	290898.48
480	0.00	13681.23	29004.44	0.00	1983.93	11986.49	20752.77	1188.35	0.00	59.87	0.00	81.25	0.00	0.00	0.00	0.00	0.00	294.09	79042.41
490	0.00	10143.32	39156.97	0.00	514.16	14168.74	27931.22	5205.22	0.00	74.18	0.00	310.04	37.34	0.00	0.00	63.32	0.00	1658.45	99280.95

Table E.5.1

Original 1990 EMAP Land Use Data Sorted by Phase IV Chesapeake Bay Watershed Model Segments in Acres

Mod. Seg.	Not Assigned	High Int. Devel.	Low Int. Devel.	Woody Cultiv.	Herbac. Cultiv.	Herbac.	Decid. Forest	Evergr. Forest	Mixed Forest	Exposed Soil	Exposed Sand	Exposed Rock	Decid. Wetland	Evergr. Wetland	Mixed Wetland	Herbac. Wetland	Nonveg. Wetland	Water	Total Area In Acres
	0	11	12	21	22	31	41	42	43	51	52	53	71	72	73	81	91	100	
500	0.00	2657.95	20641.75	0.00	38230.47	88989.90	158324.13	13166.74	2.96	388.99	0.00	218.43	2673.58	0.00	0.00	3481.49	0.00	5227.58	333910.97
510	0.00	516.79	8745.43	0.00	544.26	1242.58	12707.19	3517.02	0.00	0.00	0.00	130.92	28.29	0.00	0.00	0.00	0.00	961.37	30275.85
540	0.00	11385.29	48900.94	0.00	460.87	16855.31	21141.10	3631.50	0.00	6.09	0.00	1124.86	40.79	0.00	0.00	0.00	0.00	177.47	103724.21
550	0.00	5143.70	45061.54	0.00	22762.36	147117.79	144636.29	31616.83	909.40	383.40	0.00	49.34	0.00	0.00	0.00	13.65	0.00	3132.14	400828.44
560	0.00	922.55	15436.53	11.18	135005.84	80269.74	279989.70	90085.58	2.96	184.71	145.56	0.00	3964.40	363.82	0.00	7277.80	0.00	12298.14	625958.51
580	0.00	0.00	128.62	0.00	7255.59	4099.27	20435.00	7399.84	0.00	0.00	38.49	0.00	28.95	0.00	0.00	29.77	0.00	2004.65	41420.18
590	0.00	830.45	19997.00	11.51	88200.34	89327.34	250940.36	99468.52	7.24	104.94	0.00	0.00	9016.32	1073.05	145.89	13734.03	15.46	15811.87	588684.32
600	44121.88	18339.56	115664.78	0.00	66123.37	136380.38	301866.18	103664.18	5397.95	1332.60	566.46	0.00	10909.95	6282.54	356.26	12933.18	0.00	30787.70	854416.95
610	0.00	2875.23	31189.85	0.00	11322.46	31217.48	73649.36	7247.86	0.00	11.68	0.00	0.00	114.64	0.00	0.00	2.63	0.00	1024.69	158655.88
620	28350.80	2160.58	10893.34	0.00	24431.64	25677.55	12027.24	7830.93	6985.03	98.69	11.18	0.00	2459.76	2655.32	5484.83	3842.03	1653.98	7887.51	142450.41
630	2402.85	1035.39	7851.82	0.00	316.78	2317.82	156.09	1175.85	759.72	0.00	0.00	0.00	234.22	462.18	532.91	358.40	0.00	825.51	18429.53
700	0.00	91.78	4317.37	0.00	19544.52	41420.34	85963.61	1865.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1849.55	155073.07
710	0.00	1176.32	8930.13	0.00	64830.24	33846.98	35505.90	2357.29	326.32	73.69	0.00	0.00	4.11	0.00	0.00	0.00	0.00	8087.45	155020.43
720	16043.95	5583.02	34732.03	0.00	119367.00	61626.06	59785.39	3515.38	579.29	476.49	0.00	209.05	2.80	0.00	0.00	0.00	0.00	1873.73	303794.18
730	372.05	1338.02	12316.40	0.00	79121.52	91214.39	124400.99	6107.54	2579.89	71.55	0.00	253.30	0.00	0.00	0.00	0.00	0.00	1078.81	318854.55
740	526.49	1242.13	29015.13	0.00	80524.68	30923.30	417476.35	32843.83	4116.38	0.00	0.00	427.97	0.00	0.00	0.00	0.00	0.00	5448.31	875644.57
750	0.00	247.21	5228.90	0.00	34834.83	29593.92	35892.16	765.15	0.00	13.65	0.00	128.62	0.00	0.00	0.00	0.00	0.00	632.91	107307.35
760	0.00	812.88	8943.94	0.00	26330.86	66842.30	74597.73	2693.32	0.00	232.74	0.00	210.86	0.00	0.00	0.00	0.00	0.00	2997.27	183061.69
770	1811.23	0.00	10.20	0.00	32663.57	7129.27	27746.18	1723.56	0.00	0.00	0.00	0.00	146.22	0.00	0.00	100.50	0.00	64.97	71395.69
780	0.00	41.78	492.12	0.00	26349.44	1918.46	15149.35	1428.16	0.00	0.00	0.00	0.00	34.38	0.00	0.00	0.00	0.00	0.00	45413.69
800	0.00	103.46	1815.67	0.00	17132.29	3624.92	25638.24	1245.75	0.00	124.34	0.00	0.00	40.95	0.00	0.00	22.04	0.00	1253.32	51000.98
810	0.00	0.00	1652.50	0.00	66408.40	6293.40	27907.54	483.07	0.00	0.00	0.00	0.00	296.72	0.00	0.00	476.66	0.00	4490.73	108009.01
820	0.00	0.00	3954.86	0.00	11051.40	2830.66	4491.88	843.93	0.00	0.00	19.57	0.00	184.38	0.00	0.00	1287.69	0.00	2199.56	26863.93
830	0.00	403.79	5314.76	0.00	43179.59	8719.28	18581.18	4616.39	0.00	0.00	0.00	0.00	80.10	0.00	0.00	506.26	0.00	5650.29	87051.63
840	0.00	606.43	505.44	0.00	68650.89	16982.46	38.49	27.63	0.00	0.00	365.30	0.00	44353.47	31228.99	11156.67	83009.44	0.00	19946.50	276871.70
850	0.00	862.88	7447.21	0.00	3631.00	12210.31	20668.89	1890.83	0.00	177.80	0.00	7.89	1511.05	0.00	0.00	3984.30	0.00	2540.85	54932.82
860	0.00	17344.96	26401.58	0.00	281.85	7180.26	5014.59	1045.91	0.00	0.00	0.00	0.00	102.30	0.00	0.00	210.70	0.00	1625.20	59187.35
870	0.00	578.80	9995.46	0.00	489.16	3405.18	8319.60	2597.26	0.00	0.00	0.00	0.00	33.72	0.00	0.00	45.89	18.91	1773.23	27257.19
880	0.00	2468.31	17076.21	0.00	4892.05	22117.77	59288.34	4897.64	21.38	40.63	33.22	0.00	55.10	0.00	0.00	846.73	0.00	3713.57	115450.96
890	0.00	11931.52	22584.06	0.00	888.67	8513.84	12548.47	1113.51	0.00	0.00	0.00	0.00	37.17	0.00	0.00	8.22	0.00	627.81	58253.29
900	0.00	13130.56	65904.61	0.00	0.00	24741.51	33963.59	3597.94	33.08	109.38	0.00	0.00	0.00	0.00	0.00	21.22	0.00	1031.60	142533.48
910	0.00	4987.12	30032.09	0.00	1843.30	38351.03	73535.05	11381.28	2.80	110.04	0.00	0.00	0.00	0.00	0.00	16.45	0.00	845.41	161084.57
920	0.00	1035.22	13818.57	0.00	61303.36	69112.25	181702.94	53320.28	0.00	300.01	112.01	0.00	1386.54	0.00	0.00	3361.26	0.00	7862.18	393314.62
930	0.00	0.00	137.34	0.00	7155.26	4464.74	9704.17	6666.43	0.00	0.00	184.87	0.00	346.22	0.00	0.00	666.30	0.00	2475.55	31800.88
940	0.00	97.37	6358.70	16.61	29637.35	39968.99	68297.59	89180.44	122.70	73.36	544.75	0.00	227.80	0.00	16.12	7705.77	0.00	9405.15	250652.69
950	0.00	3979.37	25625.58	0.00	90.79	6783.87	3089.05	7862.48	2147.58	5.10	6.25	0.00	85.53	1333.91	241.78	7191.12	0.00	4732.34	63164.75
960	19511.13	20139.93	68209.60	0.00	619.59	15122.87	1416.48	9986.57	4398.78	125.33	298.86	0.00	237.34	1021.08	2455.32	1590.83	0.00	9626.86	154760.56
970	0.00	395.24	4145.65	0.00	27.14	3673.27	22594.92	5538.94	0.00	101.15	0.00	0.00	0.00	0.00	0.00	5.78	0.00	251.49	36733.56
980	0.00	407.74	11874.28	0.00	58616.78	52932.44	191853.01	54719.49	0.00	152.14	227.80	0.00	1078.48	0.00	0.00	1549.21	10.36	10393.82	383815.55
990	0.00	825.51	841.47	0.00	2844.97	3037.08	7325.82	3347.28	0.00	0.00	122.21	0.00	155.27	0.00	0.00	198.20	0.00	2279.99	20977.80

Section E.6

Corrected EMAP Level 2 Land Use Data by Phase IV Watershed Model Segment

The data as delivered by EMAP had areas within the Chesapeake Bay watershed which were unassigned for land use (see section E.5., Table E.5.1, Column 2). To correct this discrepancy, a GIS function was applied. The function incrementally changed selected rasters based upon the value of the nearest neighboring raster, with proximity determined by least Euclidean distance. Thirty-seven out of the eighty-seven Phase IV Watershed Model segments had areas within their bounds which were unassigned. The percent area corrected is equal to the percent area unclassified as detailed in Table E.6.1 below. The corrected EMAP land use data sorted by Phase IV Watershed Model segments is provided in Table E.6.2.

Table E.6.1
Percentage of Phase IV Chesapeake Bay Watershed Model Segment Unassigned for EMAP Level 2 Land Use

Mod Segm.	Percent Mod Segm Unassig.	Percent Mod Segm.	Percent Mod Segm. Unassig.	Percent Mod Segm.	Percent Mod Segm. Unassig.	Mod Segm.	Mod Segm Unassig.
10	2.35%	260	0.070%	550	0.01%	880	0.00%
20	2.30%	265	8.96%	560	0.00%	890	0.00%
30	0.86%	270	2.93%	580	0.00%	900	0.00%
40	3.17%	280	1.41%	590	0.00%	910	0.00%
50	0.00%	290	0.09%	600	5.16%	920	0.00%
60	1.03%	300	4.02%	610	0.00%	930	0.00%
70	0.00%	310	7.14%	620	19.90%	940	0.00%
80	0.67%	330	0.00%	630	13.04%	950	0.00%
90	1.12%	340	0.00%	700	0.00%	960	12.61%
100	0.09%	370	0.03%	710	0.00%	970	0.00%
110	0.51%	380	0.03%	720	5.28%	980	0.00%
120	4.91%	390	0.00%	730	0.12%	990	0.00%
140	0.00%	400	0.00%	740	0.06%		
160	6.79%	410	0.53%	750	0.00%		
170	3.05%	420	0.00%	760	0.00%		
175	0.00%	430	3.88%	770	2.54%		
180	0.01%	440	0.00%	780	0.00%		
190	0.00%	450	2.37%	800	0.00%		
200	0.04%	470	0.00%	810	0.00%		
210	0.00%	480	0.00%	820	0.00%		
220	0.05%	490	0.00%	830	0.00%		
230	0.08%	500	0.00%	840	0.00%		
235	0.00%	510	0.00%	850	0.00%		
240	0.00%	530	0.00%	860	0.00%		
250	0.16%	540	0.00%	870	0.00%		

Table E.6.2

Corrected 1990 EMAP Land Use Data Sorted by Phase IV Chesapeake Bay Watershed Model Segments in Acres

Model Seg.	High Int Devel.	Low Int. Devel.	Woody Cultiv	Herbac. Cultiv.	Herbac.	Decid. Forest	Evergr. Forest	Mixed Forest	Exposed Soil	Exposed Sand	Exposed Rock	Decid. Wetland	Evergr. Wetland	Mixed Wetland	Herbac. Wetland	Nonveg. Wetland	Water	Total Area In Acres
	11	12	21	22	31	41	42	43	51	52	53	71	72	73	81	91	100	
10	2558.94	67690.18	118.59	193541.86	382679.51	981565.87	51301.81	40.13	109.54	0.00	506.75	0.00	0.00	0.00	80.59	0.00	11526.08	1691719.87
20	4580.86	90584.61	0.00	292391.95	875891.78	1516034.16	364887.76	0.00	244.74	0.00	609.06	1214.99	323.86	0.00	0.00	0.00	30234.73	3176978.50
30	14638.65	49821.02	0.00	110077.48	346746.96	820827.21	30575.85	56.25	69.90	0.00	6588.80	79.28	0.00	0.00	93.09	64.15	20731.72	1400370.37
40	8535.55	37537.19	0.00	90223.09	200328.53	555521.40	27526.94	3745.64	1475.20	0.00	13693.57	2.63	0.00	0.00	0.00	338.17	12308.99	951236.90
50	446.39	16053.98	0.00	38790.84	49642.73	760066.47	6508.70	8.72	11199.27	0.00	25699.59	0.00	0.00	0.00	0.00	0.00	6416.92	914833.61
60	931.76	35714.46	0.00	113264.89	245379.21	2256026.50	41243.69	3132.80	4700.43	0.00	7640.80	0.00	0.00	0.00	0.00	0.00	17901.88	2725936.43
70	737.19	19387.44	0.00	142061.59	148659.93	511420.24	17593.46	677.32	52.30	0.00	545.08	0.00	0.00	0.00	0.00	0.00	8178.64	849303.18
80	5177.25	42514.12	0.00	293991.66	299928.47	754321.60	20347.17	7213.81	248.20	0.00	9501.37	0.00	57.24	0.00	39.97	0.00	26623.63	1459964.48
90	55.92	5717.40	0.00	69211.43	96389.51	404475.89	12889.27	0.00	8.39	0.00	788.67	0.00	0.00	0.00	0.00	0.00	10814.06	600350.54
100	365.96	25926.24	0.00	209630.71	229905.35	1044228.47	27983.85	0.00	320.90	50.82	1470.59	0.00	0.00	0.00	0.00	0.00	7390.63	1547273.52
110	8616.15	79740.61	0.00	314465.31	303307.16	386415.62	16977.19	1430.79	951.34	0.00	2600.39	115.13	0.00	0.00	180.93	0.00	17670.96	1132471.57
120	338.00	4435.79	0.00	42717.57	37623.55	37323.70	6539.62	27.96	53.62	0.00	0.00	10.20	0.00	0.00	0.00	7.89	2860.59	131938.50
140	122.21	1416.97	0.00	56648.97	50533.54	55588.59	11289.73	46.05	42.93	0.00	7148.19	0.00	0.00	0.00	16.94	60.53	10130.66	185897.12
160	317.44	25476.89	0.00	28184.52	139757.10	643076.00	14358.88	0.00	1837.21	0.00	298.36	0.00	0.00	0.00	0.00	0.00	4904.39	865060.61
170	73.03	11381.34	255.43	39491.19	211922.21	639077.23	44055.93	795.91	229.94	0.00	169.08	0.00	0.00	0.00	0.00	0.00	2967.34	950547.90
175	6.09	8022.06	0.00	26214.08	121958.50	608832.14	35923.18	453.30	46.22	0.00	460.54	0.00	0.00	0.00	0.00	0.00	4162.92	805787.57
180	1515.00	21150.48	0.00	85725.45	148821.12	145126.46	3040.69	285.37	124.18	0.00	128.95	0.00	0.00	0.00	0.00	0.00	3096.78	409346.07
190	3201.06	32129.67	0.00	169592.31	306822.37	464140.23	54703.04	4658.82	180.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4772.48	1040329.86
200	1035.71	19396.98	0.00	93499.48	297656.71	445437.83	33867.38	3109.94	21.71	0.00	841.30	0.00	0.00	0.00	0.00	0.00	5901.12	900768.16
210	1080.78	23675.53	0.00	124944.43	170647.60	186423.28	2824.73	80.59	147.70	0.00	1237.53	0.00	0.00	0.00	3.78	0.00	1960.08	513026.03
220	11648.78	67518.30	0.00	58081.74	225903.28	226155.75	12709.83	307.57	67.93	0.00	288.00	332.74	0.00	0.00	0.00	38.82	7524.51	610577.25
230	170.56	9012.70	0.00	93869.39	393840.62	462788.72	59688.19	3661.76	615.97	0.00	65.96	0.00	0.00	0.00	15.63	0.00	3141.19	1026870.67
235	2.63	1312.86	0.00	16849.56	26808.83	88794.93	29356.91	214.15	35.20	0.00	69.41	0.00	0.00	0.00	0.00	0.00	979.13	164423.61
240	0.00	2786.41	5.26	28224.32	37643.45	108579.42	37527.98	0.00	0.00	0.00	0.00	43.26	0.00	0.00	24.18	0.00	1042.95	215877.23
250	42.27	1582.77	0.00	18311.43	61492.67	90053.51	27238.94	278.62	631.10	0.00	0.00	0.00	0.00	0.00	81.75	0.00	14150.65	213863.70
260	21.55	5398.48	0.00	67210.23	101417.75	227378.97	67525.86	117.77	6.25	0.00	298.03	0.00	49.18	0.00	30.26	0.00	1915.01	471369.34
265	9.54	934.23	0.00	1386.87	45770.60	162467.64	8857.77	76.32	0.00	0.00	1534.74	0.00	0.00	0.00	0.00	0.00	2618.97	223656.68
270	1772.74	35542.41	0.00	60389.19	300222.39	1315137.70	153266.61	114.81	0.00	0.00	228.13	0.00	0.00	0.00	0.00	0.00	7293.91	1873967.89
280	3214.05	57984.37	0.00	143729.55	429523.17	1061592.84	219972.72	746.56	28.45	0.00	375.67	0.00	0.00	0.00	50.49	58.22	14998.53	1932274.63
290	719.92	17036.90	0.00	44616.30	70159.31	159977.12	30968.13	45.72	0.00	0.00	0.00	200.50	15.63	0.00	41.28	0.00	5591.57	329372.39
300	414.48	11295.65	0.00	114732.68	163185.91	373197.55	96829.65	155.60	0.00	0.00	36.02	0.00	0.00	0.00	39.64	0.00	4604.38	764491.57
310	26.65	1678.16	0.00	9126.03	16690.84	55387.93	14467.43	0.00	0.00	0.00	0.00	148.03	4.11	0.00	0.00	0.00	3632.15	101161.33
330	171.39	3193.99	0.00	9260.74	32473.92	37442.13	1004.13	0.00	0.00	0.00	2.30	37.34	0.00	0.00	0.00	0.00	1494.11	85080.04
340	4745.67	34157.51	0.00	0.00	31818.32	52637.37	6210.50	0.00	16.78	0.00	0.00	17.76	0.00	0.00	6.09	0.00	275.01	129899.31
370	8.22	263.99	0.00	24388.38	2965.20	8845.10	227.47	0.00	2.47	0.00	0.00	87.50	0.00	0.00	48.19	0.00	994.76	37831.28
380	16.45	2726.54	0.00	161739.01	20105.55	69364.72	2821.45	0.00	0.00	7.73	0.00	917.62	0.00	0.00	2281.14	0.00	5197.81	265178.02
390	0.00	1131.44	0.00	36475.16	3710.28	13769.72	439.48	0.00	0.00	0.00	0.00	147.21	0.00	0.00	146.88	0.00	1707.60	57527.78
400	499.35	4199.60	0.00	193303.37	15464.16	70827.42	4714.74	0.00	45.72	11.51	0.00	4190.72	195.07	298.03	3103.36	0.00	4497.14	301304.49
410	1156.28	7549.18	0.00	229990.22	27229.07	143555.04	26199.11	0.00	0.00	4.11	0.00	11896.65	1372.23	1367.79	8217.78	0.00	4621.49	463204.68
420	1893.76	8386.70	0.00	46718.16	11976.42	40379.86	7904.29	0.00	0.00	0.00	0.00	3986.93	0.00	0.00	12993.38	0.00	2354.33	136583.83
430	108.39	3909.79	0.00	143183.33	39154.17	158116.23	65516.11	3.45	0.00	502.15	0.00	12134.98	1617.47	5.76	42789.62	0.00	10954.36	477995.80
440	206.75	2931.65	0.00	78315.25	21844.24	18282.71	48205.86	0.00	238.49	550.83	0.00	4982.12	0.00	0.00	20814.78	0.00	8486.38	205385.06
450	1880.80	22258.89	0.00	114265.73	146107.73	167759.54	14307.07	30.76	845.74	0.00	113.65	32.73	0.00	0.00	0.00	0.00	6620.87	474223.52
470	4240.23	22803.31	0.00	31749.07	89831.79	124137.83	10350.07	0.00	771.23	0.00	795.58	132.08	0.00	0.00	981.77	0.00	5106.53	290899.48

Table E.6.2

Corrected 1990 EMAP Land Use Data Sorted by Phase IV Chesapeake Bay Watershed Model Segments in Acres

Model Seg.	High Int. Dev.	Low Int. Dev.	Woody Cultiv.	Herbac. Cultiv.	Herbac.	Decid. Forest	Evergr. Forest	Mixed Forest	Exposed Soil	Exposed Sand	Exposed Rock	Decid. Wetland	Evergr. Wetland	Mixed Wetland	Herbac. Wetland	Nonveg. Wetland	Water	Total Area In Acres
	11	12	21	22	31	41	42	43	51	52	53	71	72	73	81	91	100	
480	13681.23	29004.44	0.00	1983.93	11996.49	20752.77	1188.35	0.00	59.87	0.00	81.25	0.00	0.00	0.00	0.00	0.00	294.09	79042.41
490	10143.32	39156.97	0.00	514.16	14168.74	27931.22	5205.22	0.00	74.18	0.00	310.04	37.34	0.00	0.00	63.32	0.00	1656.45	99260.95
500	3483.47	21483.21	0.00	41075.43	91933.98	165649.90	16514.02	2.96	388.99	122.21	218.43	2828.85	0.00	0.00	3679.69	0.00	7507.57	354888.69
510	516.79	8745.43	0.00	544.26	3124.58	12707.19	3517.02	0.00	0.00	0.00	130.92	28.29	0.00	0.00	0.00	0.00	961.37	30275.85
530	1.32	186.52	0.00	0.00	39.15	55.76	52.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.47	8.22	304.28	687.52
540	11385.29	48900.94	0.00	460.87	16855.31	21141.10	3631.50	0.00	6.09	0.00	1124.86	40.79	0.00	0.00	0.00	0.00	177.47	103724.21
550	5143.70	45061.54	0.00	22762.36	147117.79	144638.29	31616.83	909.40	383.40	0.00	49.34	0.00	0.00	0.00	13.65	0.00	3132.14	400828.44
560	922.55	15436.53	11.18	135005.84	80269.74	279989.70	90085.58	2.96	184.71	145.56	0.00	3964.40	363.82	0.00	7277.80	0.00	12298.14	625958.51
580	0.00	128.62	0.00	7255.59	4099.27	20435.00	7399.84	0.00	0.00	38.49	0.00	28.95	0.00	0.00	29.77	0.00	2004.65	41420.18
590	830.45	19997.00	11.51	88200.34	89327.34	250940.36	99468.52	7.24	104.94	0.00	0.00	9016.32	1073.05	145.89	13734.03	15.46	15811.87	586684.32
600	18682.99	119098.57	0.00	70889.26	149181.82	319139.76	108452.94	5387.95	1332.60	566.46	0.00	10909.95	6282.54	378.46	12633.18	0.00	31480.97	854417.44
610	2875.23	31189.85	0.00	11322.46	31217.48	73649.36	7247.86	0.00	11.68	0.00	0.00	114.64	0.00	0.00	2.63	0.00	1024.69	158655.88
620	3448.93	16135.07	0.00	29911.86	34304.06	13538.63	9316.00	7741.46	98.69	11.18	0.00	2761.25	4110.62	7422.86	3842.03	1653.98	8153.80	142450.41
630	1035.39	8118.60	0.00	450.17	3637.42	156.09	1175.85	826.83	0.00	0.00	0.00	251.16	871.40	666.96	360.21	0.00	879.46	18429.53
700	91.78	4317.37	0.00	19544.52	41420.34	85963.61	1885.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1849.55	155073.07
710	1178.32	8930.13	0.00	64830.24	33846.98	35505.90	2357.29	326.32	73.69	0.00	0.00	4.11	0.00	0.00	0.00	0.00	8067.45	155020.43
720	5583.02	35322.67	0.00	122407.03	65856.09	69587.68	4728.23	579.29	527.97	0.00	209.05	2.80	0.00	0.00	0.00	0.00	1990.34	303794.18
730	1338.02	12319.03	0.00	79242.58	91325.91	124525.34	6120.04	2579.99	71.55	0.00	253.30	0.00	0.00	0.00	0.00	0.00	1078.81	318854.55
740	1242.13	29028.45	0.00	80609.55	304179.55	417614.84	32851.40	4116.38	0.00	0.00	427.97	0.00	0.00	0.00	0.00	0.00	5474.30	875544.57
750	247.21	5228.90	0.00	34834.83	29593.92	35862.16	765.15	0.00	13.65	0.00	128.62	0.00	0.00	0.00	0.00	0.00	632.91	107307.35
760	812.68	8943.94	0.00	26330.86	66842.30	74597.73	2893.32	0.00	232.74	0.00	210.86	0.00	0.00	0.00	0.00	0.00	2997.27	183061.69
770	0.00	10.20	0.00	32984.79	7328.29	28886.67	1874.06	0.00	0.00	0.00	0.00	146.22	0.00	0.00	100.50	0.00	64.97	71395.69
780	41.78	492.12	0.00	26349.44	1918.46	15149.35	1428.16	0.00	0.00	0.00	0.00	34.38	0.00	0.00	0.00	0.00	0.00	45413.69
800	103.46	1815.67	0.00	17132.29	3624.92	25638.24	1245.75	0.00	124.34	0.00	0.00	40.95	0.00	0.00	22.04	0.00	1253.32	51000.98
810	0.00	1652.50	0.00	66408.40	6293.40	27907.54	483.07	0.00	0.00	0.00	0.00	296.72	0.00	0.00	476.66	0.00	2199.56	26863.93
820	0.00	3954.86	0.00	11051.40	2830.66	4491.88	4616.39	0.00	0.00	19.57	0.00	184.38	0.00	0.00	1287.69	0.00	5650.29	87051.63
830	403.79	5314.76	0.00	43179.59	8719.28	18581.18	27.63	0.00	0.00	365.30	0.00	80.10	0.00	1156.67	83009.44	0.00	19946.50	276871.70
840	606.43	505.44	0.00	66650.89	16982.46	38.49	27.63	0.00	177.80	0.00	0.00	1511.05	31228.99	0.00	3964.30	0.00	54932.82	54932.82
850	862.68	7447.21	0.00	3631.00	12210.31	20668.89	1890.83	0.00	0.00	0.00	7.89	102.30	0.00	0.00	210.70	0.00	1625.20	59187.35
860	17344.96	26401.58	0.00	261.85	7180.26	5014.59	1045.91	0.00	0.00	0.00	0.00	33.72	0.00	0.00	45.89	18.91	1773.23	27257.19
870	578.80	9995.46	0.00	489.16	3405.18	8319.60	2597.26	0.00	0.00	0.00	0.00	55.10	0.00	0.00	846.73	0.00	3713.57	115450.96
880	2468.31	17076.21	0.00	4892.05	22117.77	59288.34	4997.64	21.38	40.63	33.22	0.00	37.17	0.00	0.00	8.22	0.00	627.81	58253.29
890	11931.52	22584.06	0.00	888.67	8513.84	12548.47	1113.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1031.60	142533.48
900	13130.56	65904.61	0.00	0.00	24741.51	33963.59	3597.94	33.06	109.38	0.00	0.00	0.00	0.00	0.00	21.22	0.00	971.73	197808.24
910	5382.36	34204.39	0.00	1874.38	42048.97	96179.31	16910.91	2.80	211.19	0.00	0.00	0.00	0.00	0.00	22.20	0.00	17770.63	776435.10
920	1441.15	25507.15	0.00	119952.54	122048.47	373549.37	107993.39	0.00	452.97	342.11	0.00	2470.94	0.00	0.00	4904.06	2.30	2475.55	31800.88
930	0.00	137.34	0.00	7155.26	4464.74	9704.17	6666.43	0.00	0.00	184.87	0.00	346.22	0.00	0.00	666.30	0.00	9036.55	250108.27
940	97.37	6358.70	16.61	29631.92	39968.99	68297.59	88176.49	122.70	73.36	544.75	0.00	224.02	0.00	16.12	7543.10	0.00	4732.34	63164.75
950	3979.37	25625.58	0.00	90.79	6783.87	3089.05	7852.48	2147.58	5.10	6.25	0.00	85.53	1333.91	241.78	7191.12	0.00	11050.08	154760.07
960	22011.68	72525.32	0.00	3301.39	19427.08	1563.85	11023.60	7838.33	125.33	298.86	0.00	237.34	1282.27	2455.32	1619.61	0.00		

Section E.7

Corrected 1990 EMAP Level 2 Land Use Data Aggregated in Final Database Categories

EMAP's final documentation for the Chesapeake Bay watershed study showed that using the aggregation scheme detailed below, overall thematic accuracy for the data set was eighty percent and non-transition site (pixels not located on a land use border) accuracy was ninety percent⁵. In accordance with the findings of this analysis, the following aggregation scheme was employed.

<i>Original EMAP Land Use Level 2 Classification Scheme</i>		<i>Final Chesapeake Bay Land Use Database Category</i>	
11	High Intensity Developed	11	High Intensity Developed
12	Low Intensity Developed	12	Low Intensity Developed
21	Woody Cultivated	30	Woody
22	Herbaceous Cultivated	20	Herbaceous
31	Herbaceous	20	Herbaceous
41	Deciduous Forest	30	Woody
42	Evergreen Forest	30	Woody
43	Mixed Forest	40	Exposed
52	Exposed Sand	40	Exposed
53	Exposed Rock	40	Exposed
71	Deciduous Wetland	30	Woody
72	Evergreen Wetland	30	Woody
73	Mixed Forest Wetland	30	Woody
81	Herbaceous Wetland	20	Herbaceous
91	Non-vegetated Wetland	40	Exposed
100	Water	60	Water

⁵ Documentation of this EMAP data collection and interpretation procedure can be found in the Chesapeake Bay Watershed Pilot Project, available from the U.S. E.P.A., EMAP Center, Research Triangle Park, NC 27711. Publication code: EPA/620/R-94/XXX, March 1994.

Table E.7.1.

Aggregated EMAP Land Use Data, Sorted by Model Segments in Acres.

Model Seg.	High Intensity Developed 11	Low Intensity Developed 12	Herbaceous 20	Woody 30	Exposed 40	Water 60	Total Area in Acres
10	2558.94	67690.18	576301.96	1033026.40	616.29	11526.08	1691719.85
20	4580.86	90584.61	1168283.73	1882440.77	853.80	30234.73	3176978.50
30	14638.65	49821.02	456917.53	851538.59	6722.85	20731.72	1400370.36
40	8535.55	37537.19	290551.62	586796.61	15506.94	12308.99	951236.90
50	446.39	16053.98	88433.57	766583.89	36898.86	6416.92	914833.61
60	931.76	35714.46	358644.10	2300402.99	12341.23	17901.88	2725936.42
70	737.19	19387.44	290721.52	529681.02	597.38	8178.64	849303.19
80	5177.25	42514.12	593960.10	781939.82	9749.57	26623.63	1459964.49
90	55.92	5717.40	165600.94	417365.16	797.06	10814.06	600350.54
100	365.96	25926.24	439536.06	1072212.32	1842.31	7390.63	1547273.52
110	8616.15	79740.61	617953.40	404938.73	3551.73	17670.96	1132471.58
120	338.00	4435.79	80341.12	43901.48	61.51	2860.59	131938.49
140	122.21	1416.97	107199.45	66924.37	103.46	10130.66	185897.12
160	317.44	25476.89	167941.62	657434.88	8985.40	4904.39	865060.62
170	73.03	11381.34	251413.40	684184.50	528.30	2967.34	950547.91
175	6.09	8022.06	148172.58	645208.62	215.30	4162.92	805787.57
180	1515.00	21150.48	234546.57	148452.52	584.72	3096.78	409346.07
190	3201.06	32129.67	476414.68	523502.09	309.88	4772.48	1040329.86
200	1035.71	19396.98	391156.19	482415.15	863.01	5901.12	900768.16
210	1080.78	23675.53	295595.81	189328.60	1385.23	1960.08	513026.03
220	11648.78	67518.30	283985.02	239505.89	394.75	7524.51	610577.25
230	170.56	9012.70	487725.64	526138.67	681.93	3141.19	1026870.69
235	2.63	1312.86	43658.39	118365.99	104.61	979.13	164423.61
240	0.00	2786.41	65891.95	146155.92	0.00	1042.95	215877.23
250	42.27	1582.77	79885.85	117571.07	631.10	14150.65	213863.71
260	21.55	5398.48	168658.24	295071.78	304.28	1915.01	471369.34
265	9.54	934.23	47157.47	171401.73	1534.74	2618.97	223656.68
270	1772.74	35542.41	360611.58	1468519.12	228.13	7293.91	1873967.89
280	3214.05	57984.37	573303.21	1282312.12	462.34	14998.53	1932274.62
290	719.92	17036.90	114816.89	191207.10	0.00	5591.57	329372.38
300	414.48	11295.65	277958.23	470182.80	36.02	4604.38	764491.56
310	26.65	1678.16	25816.87	70007.50	0.00	3632.15	101161.33
330	171.39	3193.99	41734.66	38483.60	2.30	1494.11	85080.05
340	4745.67	34157.51	31824.41	58865.63	31.09	275.01	129899.32
370	8.22	263.99	27401.77	9160.07	2.47	994.76	37831.28
380	16.45	2726.54	184125.70	73103.79	7.73	5197.81	265178.02
390	0.00	1131.44	40332.32	14356.41	0.00	1707.60	57527.77
400	499.35	4199.60	211870.89	80225.98	11.51	4497.14	301304.47
410	1156.28	7549.18	265437.07	184390.82	49.83	4621.49	463204.67
420	1883.76	8386.70	71687.96	52271.08	0.00	2354.33	136583.83
430	108.39	3909.79	225127.12	237394.00	502.15	10954.36	477995.81
440	206.75	2931.65	120974.27	71996.69	789.32	8486.38	205385.06
450	1880.80	22258.89	260373.46	182130.10	959.39	6620.87	474223.51

Table E.7.1.

Aggregated EMAP Land Use Data, Sorted by Model Segments in Acres.

Model Seg.	High Intensity Developed 11	Low Intensity Developed 12	Herbaceous 20	Woody 30	Exposed 40	Water 60	Total Area in Acres
470	4240.23	22803.31	122562.63	134619.98	1566.81	5106.53	290899.49
480	13681.23	29004.44	13980.42	21941.12	141.12	294.09	79042.42
490	10143.32	39156.97	14746.22	33173.78	384.22	1656.45	99260.96
500	3483.47	21483.21	136689.10	184995.73	729.63	7507.57	354888.71
510	516.79	8745.43	3668.84	16252.50	130.92	961.37	30275.85
530	1.32	186.52	78.62	108.56	8.22	304.28	687.52
540	11385.29	48900.94	17316.18	24813.39	1130.95	177.47	103724.22
550	5143.70	45061.54	169893.80	177164.52	432.74	3132.14	400828.44
560	922.55	15436.53	222553.38	374417.64	330.27	12298.14	625958.51
580	0.00	128.62	11384.63	27863.79	38.49	2004.65	41420.18
590	830.45	19997.00	191261.71	360662.89	120.40	15811.87	588684.32
600	18682.99	119098.57	232704.26	450551.60	1899.06	31480.97	854417.45
610	2875.23	31189.85	42542.57	81011.86	11.68	1024.69	158655.88
620	3448.93	16135.07	68057.95	44890.82	1763.85	8153.80	142450.42
630	1035.39	8118.60	4447.80	3948.29	0.00	879.46	18429.54
700	91.78	4317.37	60964.86	87849.51	0.00	1849.55	155073.07
710	1178.32	8830.13	98677.22	38193.62	73.69	8067.45	155020.43
720	5583.02	35322.67	188263.12	71898.00	737.02	1990.34	303794.17
730	1338.02	12319.03	170568.49	133225.37	324.85	1078.81	318854.57
740	1242.13	29028.45	384789.10	454582.62	427.97	5474.30	875544.57
750	247.21	5228.90	64428.75	36627.31	142.27	632.91	107307.35
760	812.68	8343.94	93173.16	77291.05	443.60	2997.27	183061.70
770	0.00	10.20	40413.58	30906.95	0.00	64.97	71395.70
780	41.78	492.12	28267.90	16611.89	0.00	0.00	45413.69
800	103.46	1815.67	20779.25	26924.94	124.34	1253.32	51000.98
810	0.00	1652.50	73178.46	28687.33	0.00	4490.73	108009.02
820	0.00	3954.86	15169.75	5520.19	19.57	2199.56	26863.93
830	403.79	5314.76	52405.13	23277.67	0.00	5650.29	87051.64
840	606.43	505.44	168642.79	86805.25	365.30	19946.50	276871.71
850	862.68	7447.21	19825.61	24070.77	185.69	2540.85	54932.81
860	17344.96	26401.58	7652.81	6162.80	0.00	1625.20	59187.35
870	578.80	9995.46	3940.23	10950.58	18.91	1773.23	27257.21
880	2468.31	17076.21	27856.55	64262.46	73.85	3713.57	115450.95
890	11931.52	22584.06	9410.73	13699.15	0.00	627.81	58253.27
900	13130.56	65904.61	24762.73	37594.59	109.38	1031.60	142533.47
910	5382.36	34204.39	43945.55	113093.02	211.19	971.73	197808.24
920	1441.15	25507.15	246905.07	484013.70	797.38	17770.63	776435.08
930	0.00	137.34	12286.30	16716.82	184.87	2475.55	31800.88
940	97.37	6358.70	77144.01	156853.53	618.11	9036.55	250108.27
950	3979.37	25625.58	14065.78	14750.33	11.35	4732.34	63164.75
960	22011.68	72525.32	24348.08	24400.71	424.19	11050.08	154760.06

Section E.8

Chesapeake Bay Program Land Use by Phase IV Chesapeake Bay Watershed Model Segment

The Phase IV Watershed Model's Chesapeake Bay Program Land Use (CBPLU) database is a combination of Environmental Monitoring and Assessment Program (EMAP)⁶, NOAA's Coastal Change Assessment Program (C-CAP)⁷ and USGS' Geographic Information Retrieval and Analysis System (GIRAS)⁸ land use databases (Table E.8.1.). The EMAP database is the primary source of land use data. A GRID:NIBBLE edge expansion algorithm was performed on the EMAP data to fill data gaps where the EMAP basin boundary did not agree with the CBP watershed model basin boundary (See Section E.6.).

GIRAS data was used to fill small data gaps around the basin edge wherever they occurred, due to a mismatch of EMAP and CBP watershed boundaries. The GIRAS data was clipped to fill the areas with missing data, reclassified to EMAP land use categories, converted to grid data, and then merged with the EMAP data. This placed the GIRAS data on top of the EMAP nibbled data whenever the EMAP data was not classified.

C-CAP herbaceous emergent wetland types (C-CAP classifications 10 and 11) were selected out of the 1989-90 grid and then merged with the EMAP/GIRAS data with the C-CAP data having priority over the EMAP data. This enhancement was performed so as to more accurately present herbaceous cover types as those that are associated with agriculture.

Urban land use categories 11, 12, 13, 15, 16, and 17 in GIRAS were then selected out, converted to a grid and merged with the EMAP/GIRAS/C-CAP grid. Herbaceous and woody areas in EMAP that fell within the selected GIRAS urban categories were selected out and classified as Herbaceous Urban and Woody Urban, respectively. This enhancement was performed so as to capture rural residential areas where natural covers dominated the landscape, resulting in them being classified as an undeveloped land use. GIRAS class 14

⁶ Chesapeake Bay Watershed Pilot Project, EMAP Center, Research Triangle Park, NC 27711. Publication code: EPA/620/R-94/XXX, March 1994.

⁷ Documentation for C-Cap is available from Dr. Kent Hughes, NOAA/NESDID/NODC, 1825 Connecticut Ave., NW., Washington, D.C. 20235

⁸ Anderson, et. al. A Land Use and Land Cover Classification System for Use with Remote Sensor Data. 1976.

was not used because EMAP captures transportation networks well in its Low Intensity Urban category and double counting was considered undesirable.

The following is the final CBPLU Classification Scheme:

EMAP High Intensity Urban	→	CBPLU High Intensity Urban
EMAP Low Intensity Urban	→	CBPLU Low Intensity Urban
GIRAS Urban + EMAP Herbaceous	→	CBPLU Herbaceous Urban
GIRAS Urban + EMAP Woody	→	CBPLU Woody Urban
EMAP Herbaceous	→	CBPLU Herbaceous
EMAP Woody	→	CBPLU Woody
EMAP Exposed	→	CBPLU Exposed
EMAP Water	→	CBPLU Water
C-CAP Emergent Herb. Wetlands	→	CBPLU Herbaceous Wetlands

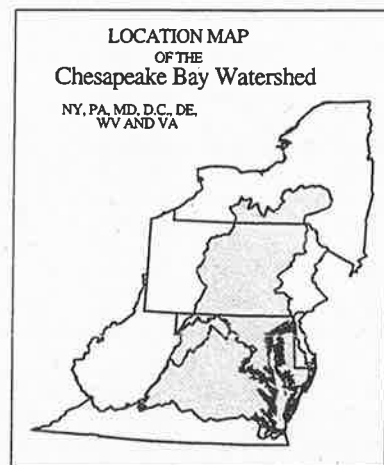
Table E.8.1

Chesapeake Bay Program Land Use in Acres by Phase IV Watershed Model Segment										
Phase IV Model Segment	High Intensity Urban	Low Intensity Urban	Herbaceous Urban	Woody Urban	Herbaceous	Woody	Exposed	Water	Herbaceous Wetland	Total Acreage
	11	12	13	14	20	30	40	60	70	
10	2556.97	67658.43	14873.20	5499.96	557877.54	1030639.51	649.52	11287.92	0.00	1691043.04
20	4849.12	92910.32	34240.57	11837.44	1126474.40	1874602.28	872.22	30627.50	0.00	3176413.85
30	14492.76	49473.65	18057.81	35982.55	438649.52	816205.40	6794.56	20686.98	0.00	1400343.23
40	8304.46	37729.63	9500.21	13915.45	281845.00	572062.56	15612.52	12267.05	0.00	951236.90
50	464.81	15903.98	2313.70	5564.27	88934.90	753228.49	41547.98	6470.87	0.00	914428.99
60	932.26	35300.47	7484.87	5467.39	357700.66	2288217.19	12389.75	17914.55	0.00	2725407.14
70	737.68	19399.94	5101.27	1948.23	285509.56	527834.76	597.38	8174.36	0.00	849303.18
80	5218.54	42932.88	11623.78	6723.01	582321.18	773519.08	11008.14	26616.55	0.00	1459963.16
90	55.92	5663.94	3318.33	1351.18	165887.78	412209.29	792.12	10811.76	0.00	600090.33
100	365.96	25937.92	11626.25	7133.06	426408.29	1065093.08	1849.05	7391.12	0.00	1547229.60
110	8617.46	79902.29	23244.27	6216.92	594364.05	398894.68	3550.90	17672.11	0.00	1132462.69
120	337.67	4432.67	878.14	329.78	78925.30	44106.59	61.51	2866.84	0.00	131938.50
140	122.86	1425.36	462.02	309.38	106739.25	66282.74	103.46	10033.12	418.92	185897.12
160	369.25	24966.02	4090.39	4770.83	162364.84	654476.59	8775.36	4795.17	0.00	864608.46
170	73.03	11371.14	2236.23	711.36	249821.25	682491.53	528.47	2965.20	0.00	950198.22
175	6.09	8014.00	1316.64	1064.99	146962.19	644044.12	215.30	4164.24	0.00	805787.57
180	1522.07	21189.46	3704.85	995.91	231020.34	147168.78	584.39	3093.66	66.61	409346.07
190	3197.60	32116.35	49980.73	10098.75	426408.29	513445.95	309.88	4772.31	0.00	1040329.86
200	1038.51	19398.46	27855.56	11015.38	363398.65	471283.15	868.28	5898.98	11.18	900768.16
210	1072.72	23644.12	4777.57	1539.18	290621.85	187946.51	1378.65	1951.85	93.59	513026.03
220	11566.21	67392.64	20280.72	20105.22	263519.26	219572.55	389.81	7524.68	226.16	610577.25
230	169.74	8992.31	31099.71	10580.83	456222.45	515688.59	666.79	3124.25	325.99	1026870.67
235	2.63	1301.02	1627.01	1018.28	42016.74	117306.76	104.61	975.84	70.73	164423.61
240	0.00	2773.09	2119.46	1422.24	63721.34	144674.15	0.00	1033.41	133.56	215877.23
250	42.93	1594.94	2559.60	1613.03	77335.95	115915.28	630.44	14144.23	27.30	213863.70
260	21.38	5371.01	6669.39	3931.50	161894.44	291146.53	304.28	1902.84	127.96	471369.34
265	9.54	932.42	631.43	179.28	43974.51	174232.71	829.13	2612.07	0.00	223401.09
270	1883.92	36369.57	16648.57	10440.20	340292.70	1460218.93	240.79	7299.67	0.00	1873394.35
280	3351.23	62330.52	32483.96	28824.00	538121.17	1252138.08	501.82	14367.76	0.00	1932118.54
290	715.81	16967.49	4548.29	5523.97	110253.31	185626.39	0.00	5539.76	197.37	329372.39
300	828.14	12040.40	7052.63	4021.97	267736.30	467874.03	238.82	4294.34	110.86	764197.48
310	25.33	1262.86	329.28	191.78	24793.65	70951.27	0.00	3531.99	56.74	101142.90
330	171.22	3196.29	1755.80	1257.43	39972.28	37200.02	3.13	1491.48	32.40	85080.04
340	4721.65	34069.35	7215.95	5952.93	32212.24	52849.88	35.53	271.22	176.48	137505.24
370	7.89	247.54	221.72	50.49	26911.13	8303.81	2.47	650.51	1435.72	37831.28
380	15.95	2660.92	2683.94	1096.41	178883.14	69702.56	7.73	4292.04	5835.33	265178.02
390	0.00	1080.78	1708.43	349.84	38135.23	13698.01	0.00	1499.87	1055.62	57527.78
400	485.37	4157.00	5994.87	1753.49	202083.34	75035.41	9.38	3297.61	8488.02	301304.49
410	1128.97	7470.73	8045.41	3284.45	249471.74	177425.38	49.84	3360.60	12967.56	463204.68
420	1861.72	8271.24	5643.05	2304.33	54060.10	48608.99	0.00	1859.58	13974.82	136583.83
430	106.42	3951.40	6751.30	3010.59	179283.65	226576.16	382.41	7325.66	50524.16	477911.76
440	224.68	2890.53	5284.82	2590.19	96556.12	67967.65	793.60	6923.51	22153.95	205385.06
450	1960.90	22045.56	7508.06	6194.22	245761.46	180975.13	962.69	6513.30	2302.19	474223.52
470	4234.63	22712.19	6872.85	5575.13	115011.64	128748.95	1570.27	5086.30	1087.52	290899.48
480	13633.70	28973.02	6085.50	7316.78	7904.78	14628.29	143.10	292.61	64.64	79042.41
490	10036.90	38877.85	5416.24	5037.45	9316.99	28007.37	383.23	1679.31	505.60	99260.95
500	2645.29	20538.13	33317.36	18560.12	94918.09	152791.27	605.11	5098.96	5436.64	333910.98
510	516.13	8727.66	931.27	3275.07	2737.73	12951.28	130.92	974.69	31.09	30275.85
540	11444.34	48889.26	9851.87	8061.53	7418.26	16684.75	1125.03	200.99	48.19	103724.21
550	5116.07	44905.78	33920.67	18648.78	135890.07	158337.29	430.44	3091.19	488.17	400828.44
560	921.07	15207.09	13535.83	6158.69	201622.14	364030.74	313.33	9839.53	14330.09	625958.51
580	0.00	125.83	1280.29	792.12	9949.73	26644.02	35.86	1637.21	955.12	41420.18
590	824.36	19754.06	7858.40	5360.32	171457.98	352165.83	108.39	10232.96	20922.02	588684.32
600	20950.31	116835.53	26017.03	21553.94	204616.45	412884.30	1954.48	23748.56	25576.40	854137.01
610	2883.95	31194.45	10308.29	6826.31	32203.52	74120.26	11.68	1008.41	99.02	158655.88
620	2348.57	13644.88	6177.44	2425.05	50778.45	53389.85	1728.00	7034.04	4709.32	142235.61
630	1014.66	8531.11	1294.93	976.50	1802.18	3434.62	0.00	561.69	804.13	18419.82
650	555.93	3893.02	2057.28	958.41	52303.65	41404.88	223.03	1336.87	59.38	102792.45
700	91.78	4315.56	415.14	145.89	60531.46	87722.04	0.00	1851.19	0.00	155073.07
710	1179.63	8840.50	2631.97	697.88	96001.01	37534.23	73.52	8061.69	0.00	155020.43
720	5832.53	34947.50	7292.27	2360.74	179427.07	71268.38	734.56	1906.62	0.00	303769.67
730	1334.57	12306.69	3213.89	2145.44	167265.94	131181.41	324.84	1078.97	2.80	318854.55
740	1236.71	29003.45	9410.74	2141.00	375137.24	452669.74	427.97	5468.87	48.85	875544.57

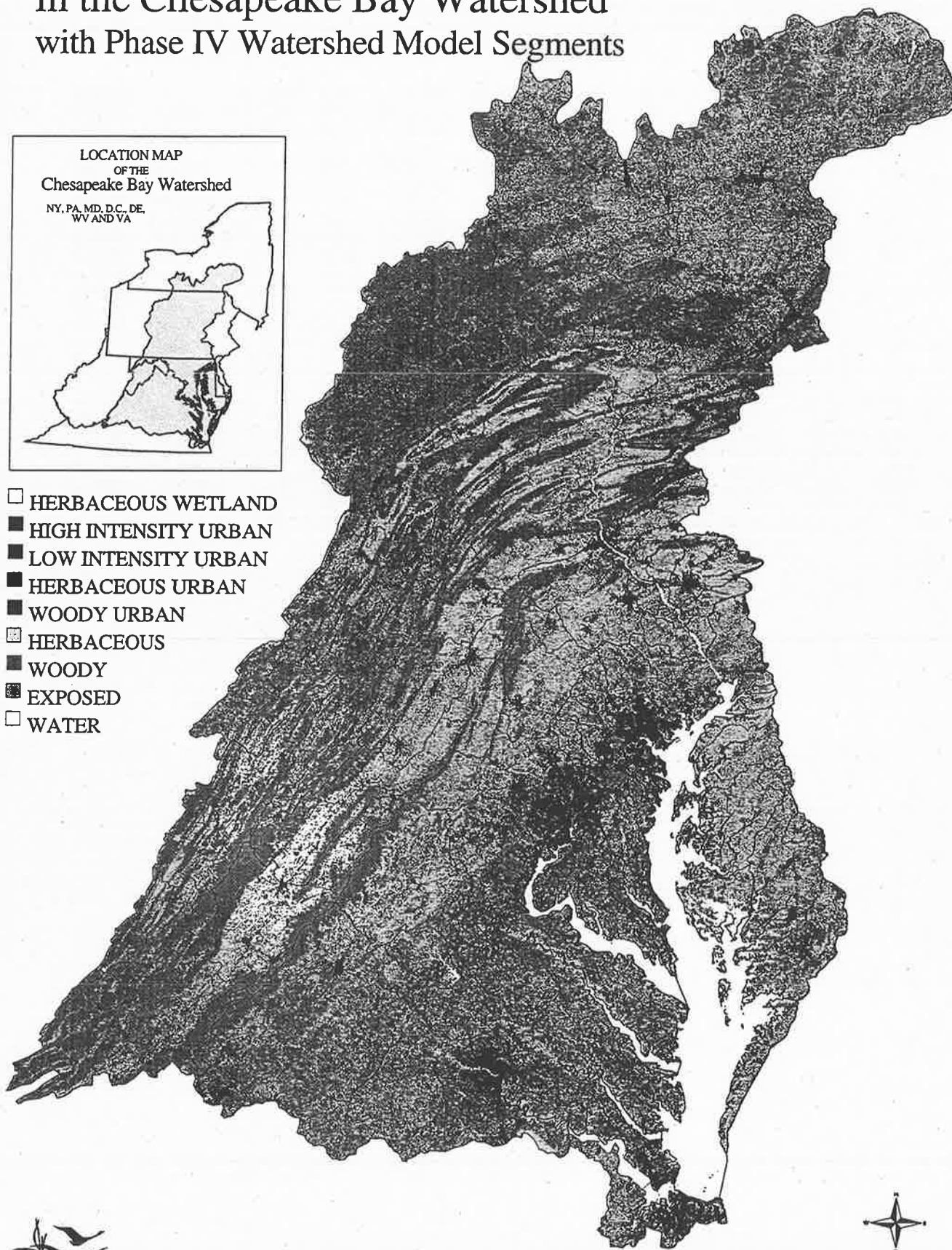
Table E.8.1

Phase IV Model Segment	High Intensity Urban 11	Low Intensity Urban 12	Herbaceous Urban 13	Woody Urban 14	Herbaceous 20	Woody 30	Exposed 40	Water 60	Herbaceous Wetland 70	Total Acreage
750	247.05	5225.12	802.98	152.96	63540.41	36549.67	142.27	632.09	14.80	107307.35
760	253.62	4408.16	1740.99	921.90	37068.11	33965.57	210.20	1633.92	63.32	80265.79
770	0.00	10.20	1585.07	319.42	38942.32	30319.10	0.00	56.25	163.33	71395.69
780	41.94	492.77	1312.53	155.60	26971.99	16415.01	0.00	0.00	23.85	45413.69
800	96.38	1726.68	1345.75	1222.72	19168.52	24716.68	121.88	977.16	1625.20	51000.98
810	0.00	1575.69	796.24	363.33	71027.92	25860.78	0.00	3786.60	4598.46	108009.01
820	0.00	3895.32	1695.60	928.15	12393.21	4418.52	24.51	2113.04	1395.59	26863.93
830	395.24	5209.33	4993.86	2007.12	46116.34	20925.47	0.00	5365.91	2038.37	87051.63
840	469.75	484.88	3699.43	919.10	92435.47	80732.25	304.45	15407.09	82419.29	276871.70
850	844.59	7183.06	5832.86	2107.12	10763.24	19687.94	190.96	1752.01	6571.04	54932.82
860	17331.97	26268.52	4788.92	1612.37	2738.22	4443.36	0.00	1740.50	263.49	59187.35
870	564.65	9934.76	1109.89	2624.89	2797.92	8280.61	17.27	1747.57	179.61	27257.19
880	2421.93	16876.53	7001.97	6123.16	20374.14	57774.16	65.79	3354.85	1458.42	115450.96
890	11923.62	22561.36	3355.01	4724.94	6050.14	8970.60	0.00	648.37	19.24	58253.29
900	13119.05	65934.05	16807.45	19753.08	7914.65	17549.74	109.21	996.90	349.35	142533.48
910	4970.84	29977.16	18531.50	14561.18	21576.47	69851.41	110.04	994.59	502.97	161076.16
920	1027.33	13641.75	23788.20	15117.28	106900.60	219749.36	406.26	7875.34	4793.36	393299.49
930	0.00	139.15	847.22	420.40	10826.23	16143.62	168.42	2017.97	1237.86	31800.88
940	93.59	6293.56	2430.48	1668.79	69902.23	153943.77	518.10	7053.78	8748.39	250652.69
950	3924.27	25363.56	3059.94	1003.15	6208.20	13640.11	11.35	3535.28	6418.89	63164.75
960	21305.41	70518.69	10005.49	7563.16	12606.70	19825.78	903.31	8114.49	3836.76	154679.80
970	388.00	4108.48	972.72	1412.70	2724.90	26612.94	101.15	248.69	162.50	36732.08
980	394.58	11649.60	12088.59	12647.32	99772.48	233291.77	366.62	9138.86	4473.29	383823.12
990	815.48	854.79	1716.16	1993.79	4182.33	8702.01	97.70	2100.21	515.31	20977.78
Total	251071.91	1773300.65	733746.92	467511.81	13466159.86	23670396.96	128837.77	485780.33	327873.48	41304679.80

Chesapeake Bay Program Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments



- ☐ HERBACEOUS WETLAND
- ☒ HIGH INTENSITY URBAN
- ☒ LOW INTENSITY URBAN
- ☒ HERBACEOUS URBAN
- ☒ WOODY URBAN
- ☒ HERBACEOUS
- ☒ WOODY
- ☒ EXPOSED
- ☐ WATER



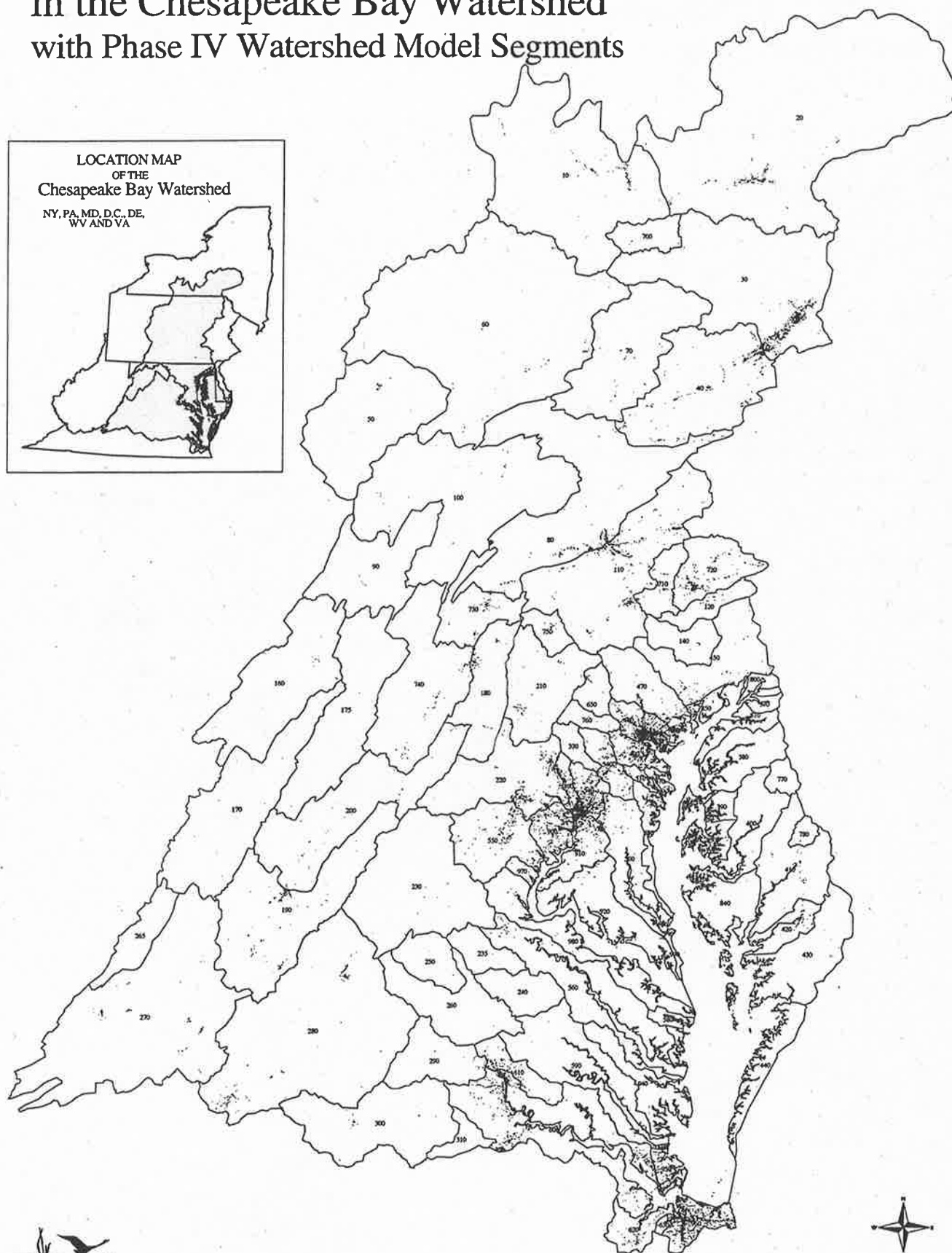
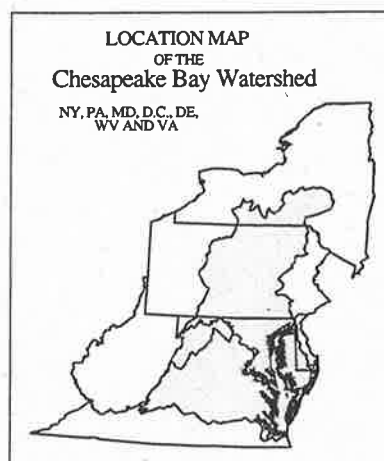
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Source: U.S. E.P.A., Chesapeake Bay Program

High Intensity Urban Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

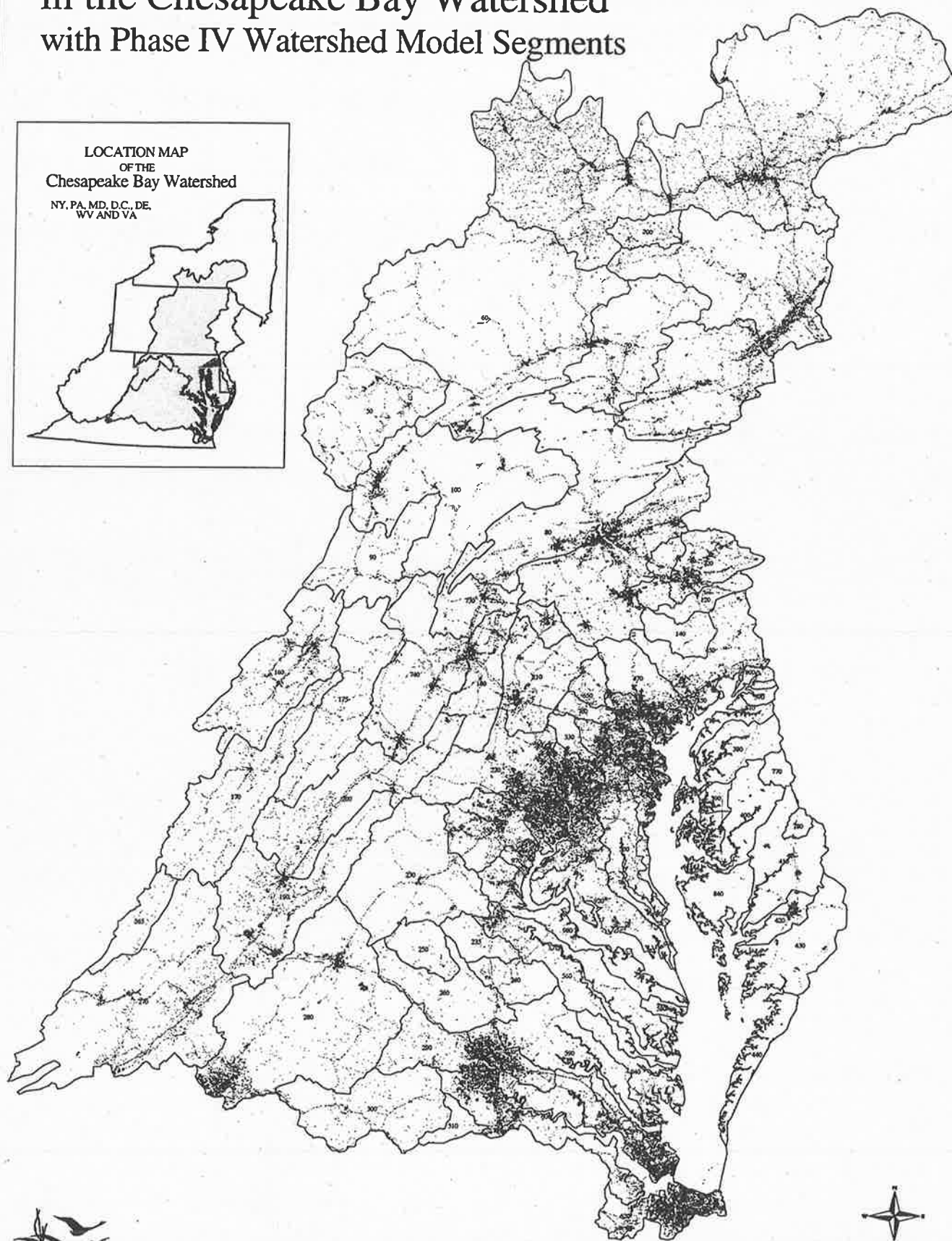
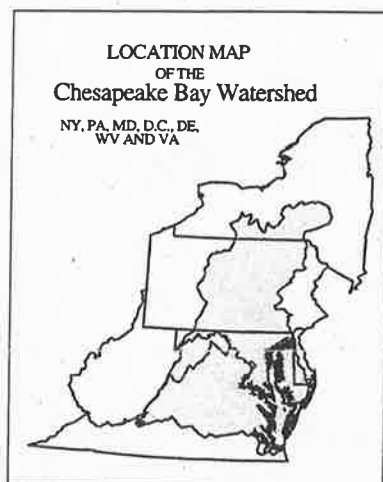


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Source: U.S. E.P.A., Chesapeake Bay Program

Low Intensity Urban Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

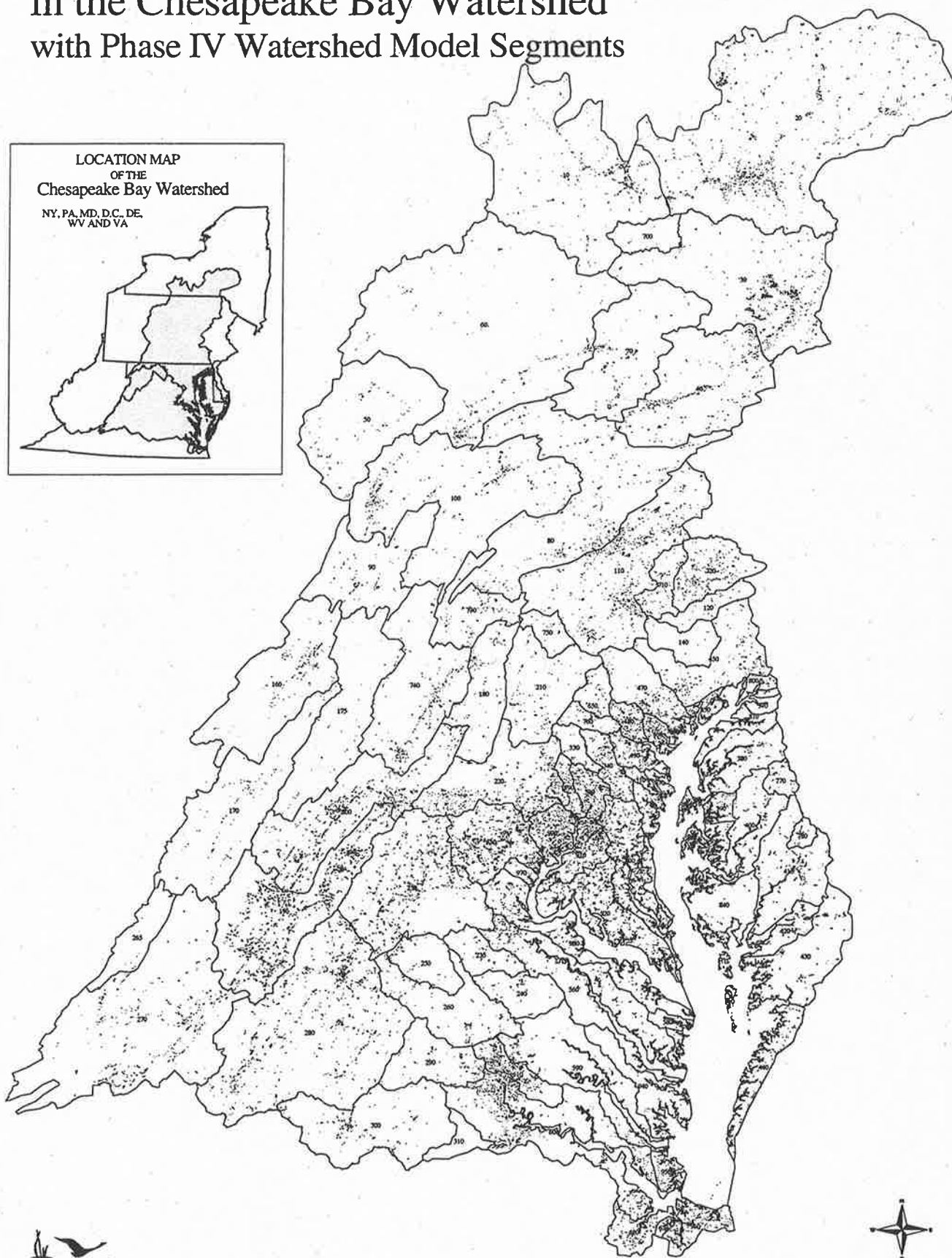


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Source: U.S. E.P.A., Chesapeake Bay Program

Herbaceous Urban Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments



Chesapeake Bay Program
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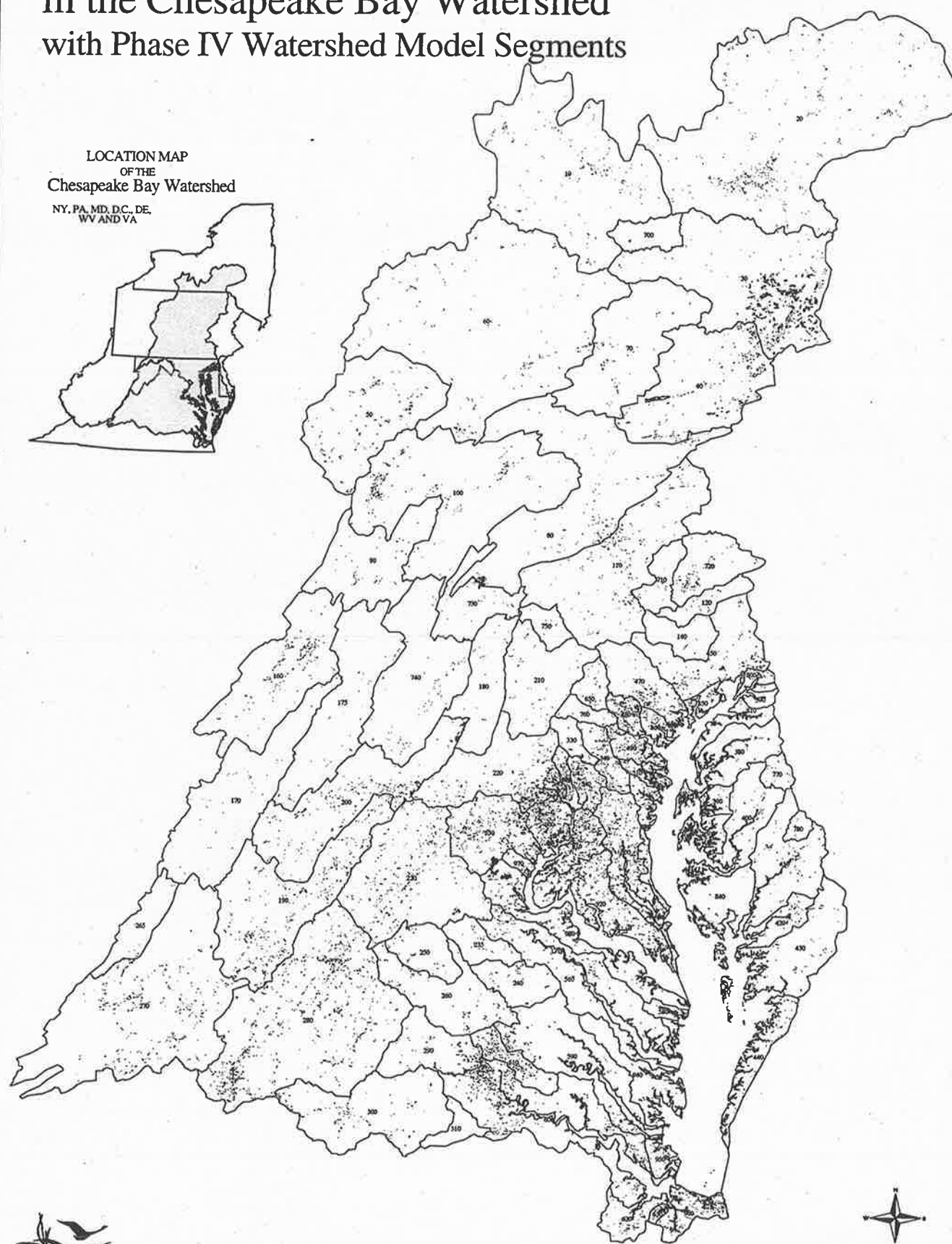
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Source: U.S. E.P.A., Chesapeake Bay Program

Woody Urban Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

LOCATION MAP
OF THE
Chesapeake Bay Watershed
NY, PA, MD, DC, DE,
WV AND VA



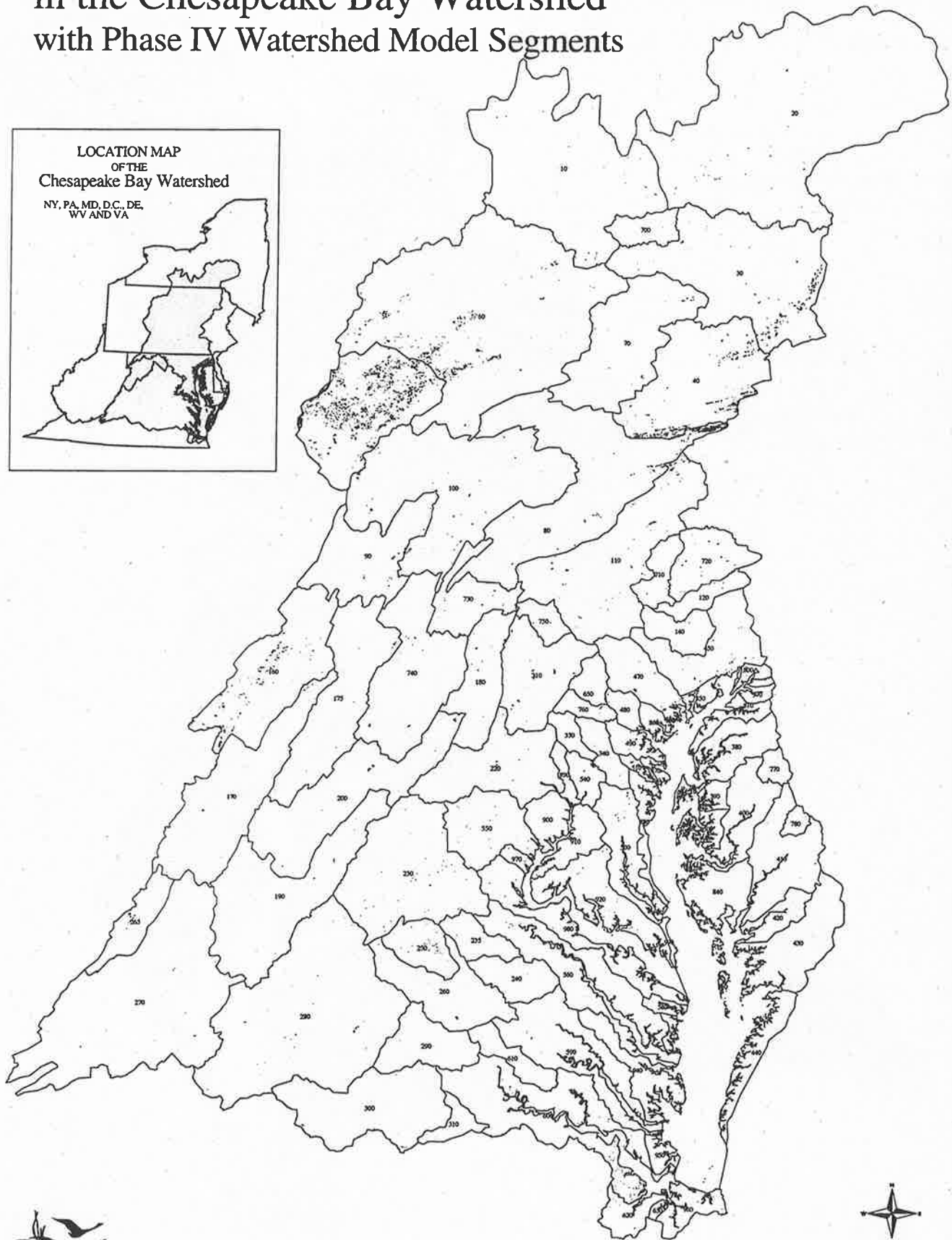
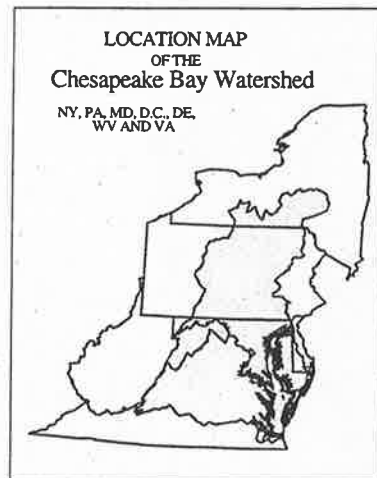
Chesapeake Bay Program
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Source: U.S. E.P.A., Chesapeake Bay Program

Exposed Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

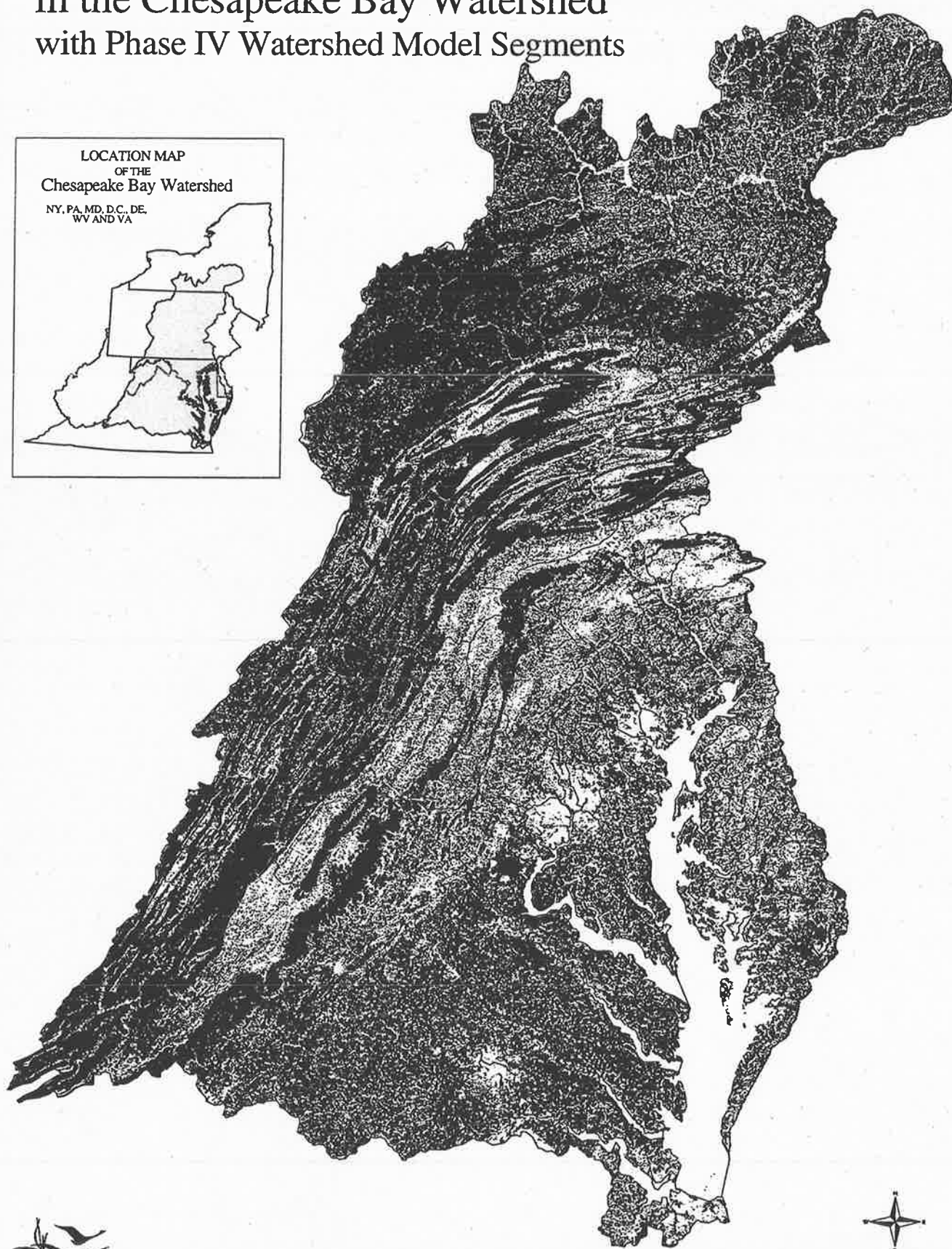
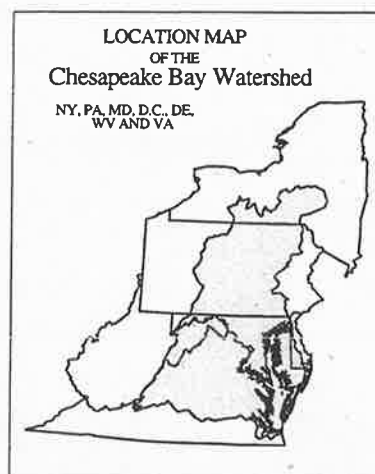


Chesapeake Bay Program
KJH Map Date: June, 1997

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Source: U.S. E.P.A., Chesapeake Bay Program

Woody Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

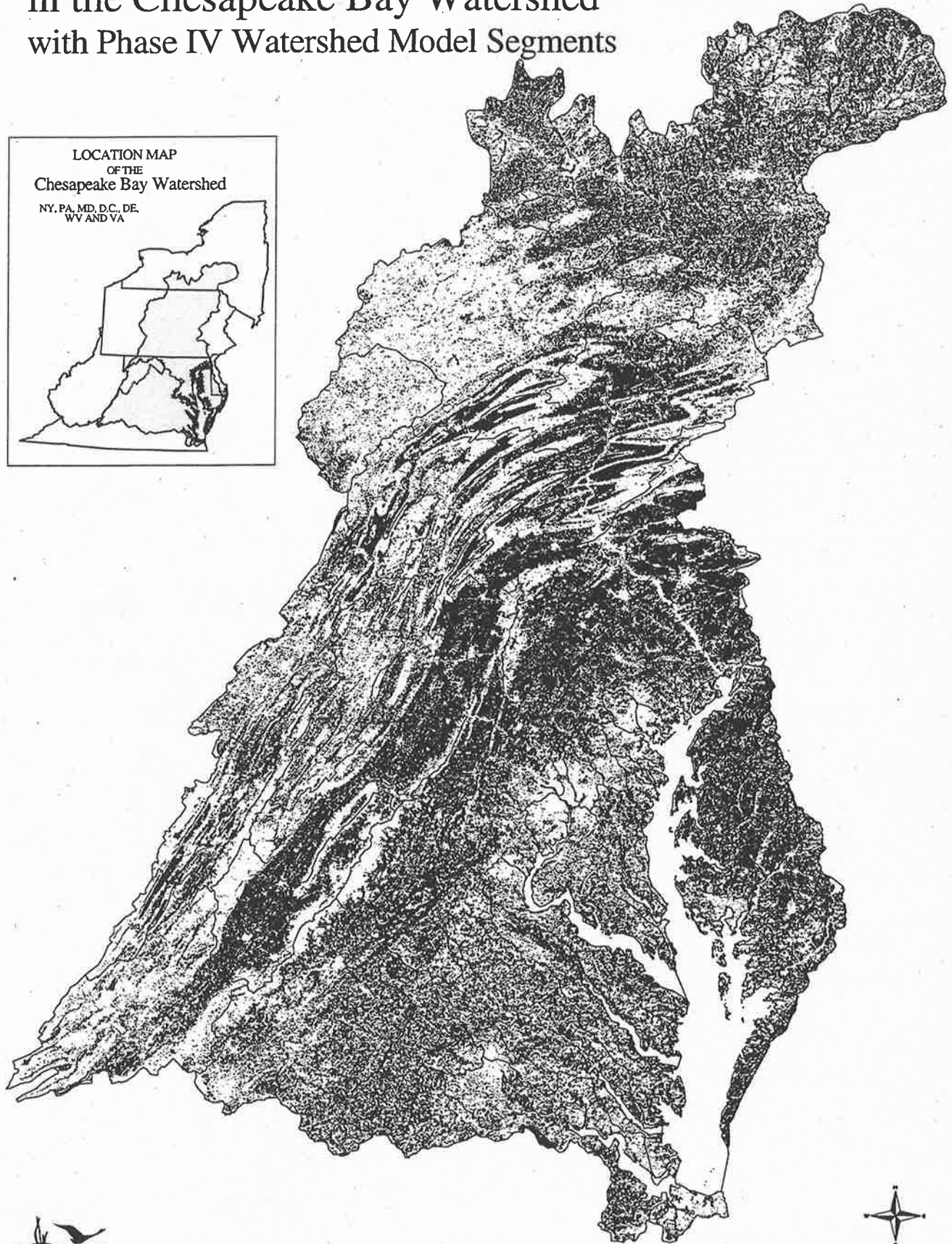
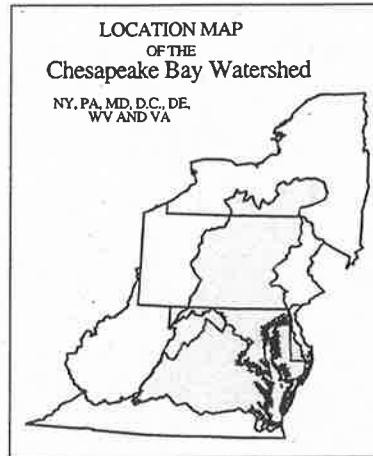


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Herbaceous Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

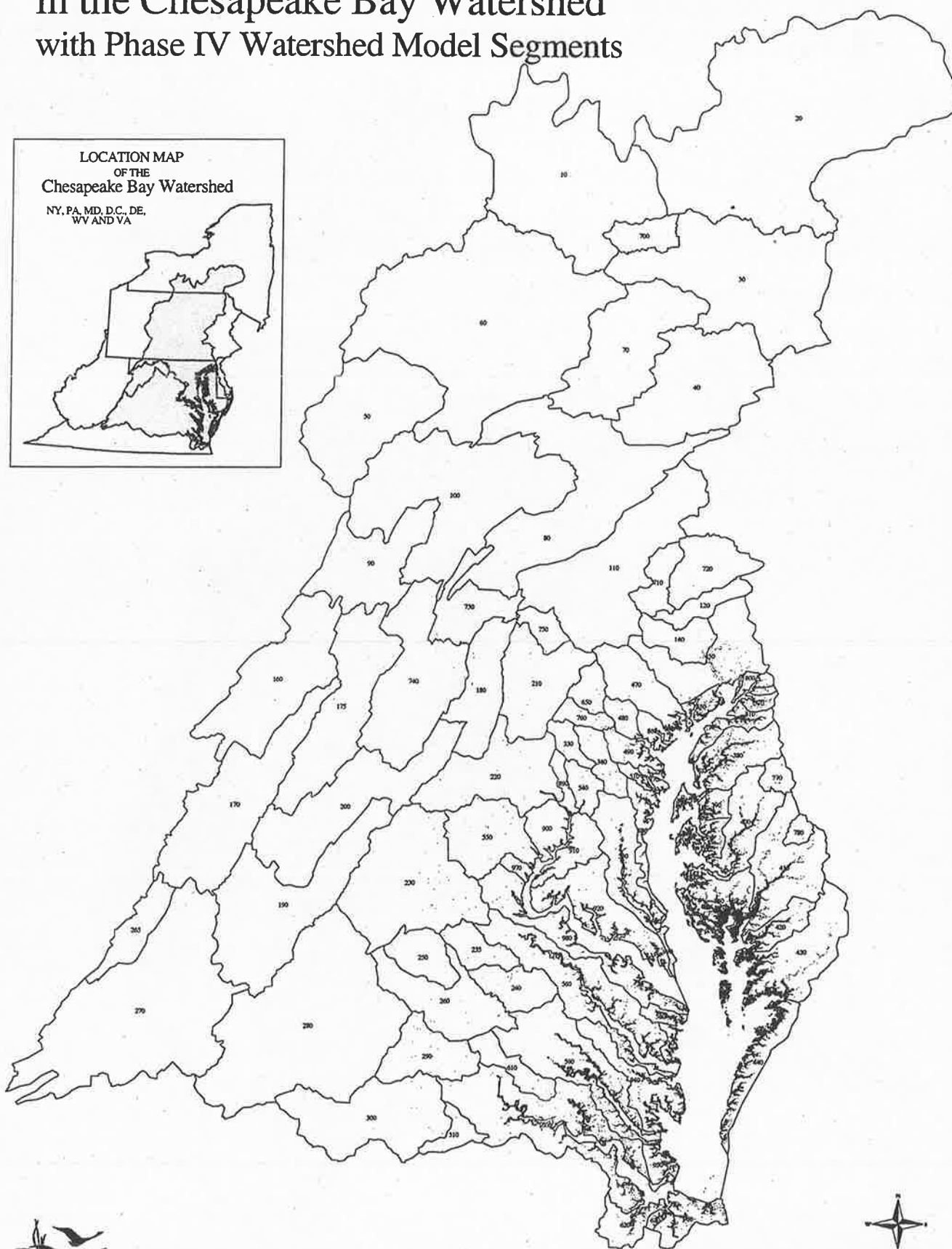
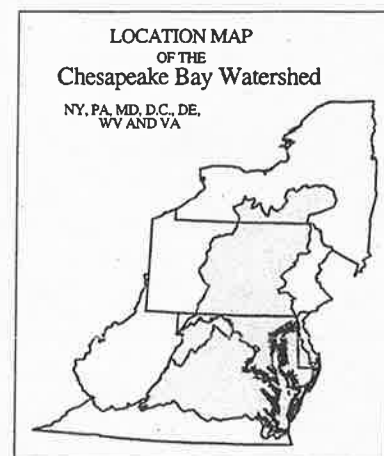


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Herbaceous Wetland Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

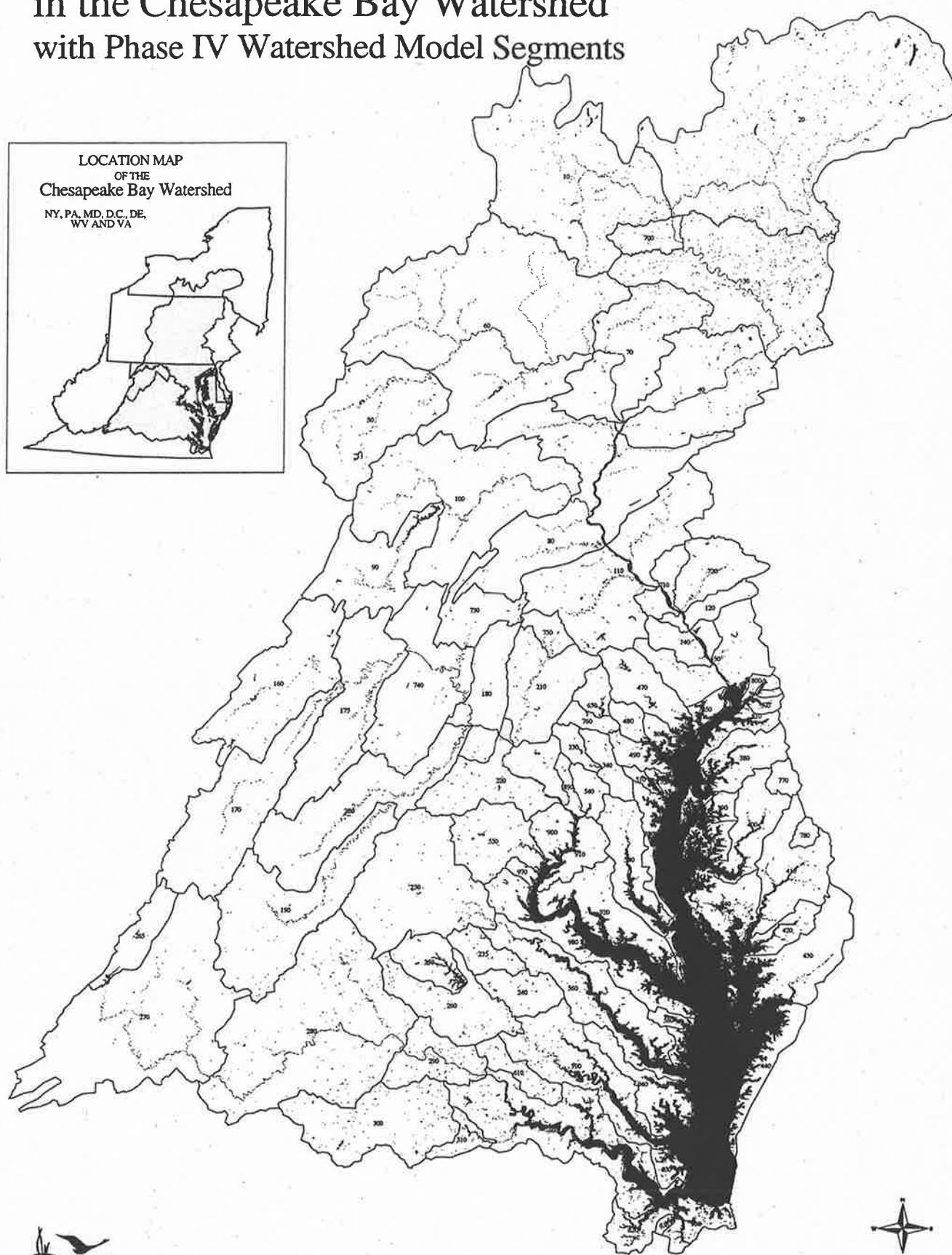
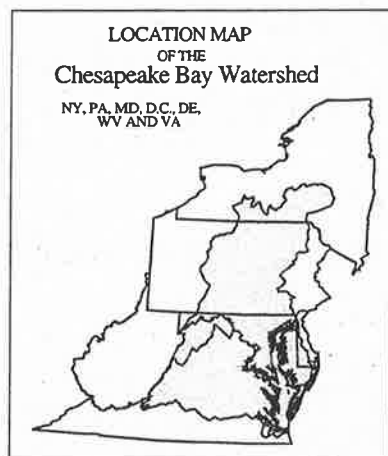


Chesapeake Bay Program
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/s/v7/fchoplins/appendix/pcbplu70.ps

Source: U.S. E.P.A., Chesapeake Bay Program

Water Land Use in the Chesapeake Bay Watershed with Phase IV Watershed Model Segments



KJH Map Date: June, 1997

/srv7/hhopkins/appendize/pcbptu60.ps

Source: U.S. E.P.A., Chesapeake Bay Program



Section E.9

Phase IV Watershed Model Land Use Classification

The Phase IV Chesapeake Bay Watershed Model land use classification encompasses a more detailed accounting of agricultural land uses than the classification method used in the CBPLU data. The following calculations were applied to determine part of the Phase IV Watershed Model Land Use, using the CBPLU land use data. The referenced Phase II land use represents the Phase II Watershed Model land use⁹ described in section E.4.

Forest = CBPLU Woody + CBPLU Herbaceous Wetlands

Pervious Urban = (CBPLU High Intensity Urban * 0.15) + (CBPLU Low Intensity Urban * 0.6) + (CBPLU Herbaceous Urban * 0.9) + (CBPLU Woody Urban * 0.9) + (CBPLU Exposed * 0.6)

Impervious Urban = (CBPLU High Intensity Urban * 0.85) + (CBPLU Low Intensity Urban * 0.4) + (CBPLU Herbaceous Urban * 0.1) + (CBPLU Woody Urban * 0.1) + (CBPLU Exposed * 0.4)

Water = CBPLU Water

For Phase IV Watershed Model segments 40, 50, 60, 80 and 160, Exposed Land is added to Pasture rather than Urban.

Agricultural land use for the Phase IV Watershed Model (Table E.9.1), was calculated using the CBPLU land use category of Herbaceous. The following description briefly explains how the splits among the agricultural land use was performed. The Phase IV Watershed Model land use data set is classified into eight categories; four of which are agricultural in origin: Conventional Till, Conservation till, Hayland and Pasture. For the Phase II 1985 CBPLU land use database, the number of acres of each of land use was derived by securing cropland acres from the counties, then using information from the Conservation Technology Information Center (CTIC)¹⁰ and information from the 1982 US

⁹ Hannawald, Jim. Land Use for the Chesapeake Bay Watershed Model, March 1990, U.S. EPA Chesapeake Bay Program, CBP/TRS 39/90

¹⁰ Conservation Technology Information Center, West Lafayette, IN

Census Bureau Agricultural Census¹¹ to determine the breakdown into High Till, Low Till, and Hayland for 1985. The Phase IV Watershed Model used 1991 CBPLU, thus the number of acres of each of land use was derived from the more recent 1987 US Census Bureau Agricultural.¹² For the Phase IV Watershed Model, agricultural statistics from the 1987 Agricultural Census were applied to the CBPLU Herbaceous land use. In addition, precise definitions of cropland and pasture were adopted and applied to the 1987 Agricultural Census data that was entered in the Phase IV Watershed Model land use data base.

The Phase II Watershed Model land use split of conventional and conservation tillage of four crops was determined by data obtained from the 1985 Crop Tillage Data Base.¹³ The Phase IV Watershed Model Conservation Till land use area was calculated in the same manner. The Phase II Watershed Model land use split for Hayland and Pasture was determined by 1982 Census of Agriculture. The Phase IV Watershed Model Hayland and Pasture land use area were calculated in the same manner using the 1987 Census of Agriculture information. The Phase IV Manure acres per model segment, as described in section E.10, are deducted from the Pasture land use.

Given the limited number of land uses within the Phase IV Watershed Model, wetlands were grouped with Forested land, as was done in Phase II. The Forest land use category was chosen because simulation of forest nutrient cycling more accurately represents wetland nutrient cycling than developed or agricultural land use nutrient cycling. Accordingly, the Phase IV Watershed Model forest land use was calculated by summing the CBPLU Woody land use category with CBPLU Herbaceous Wetland land use category.

The Phase IV Watershed Model Urban Pervious and Impervious land uses were calculated, as in Phase II, by summing fractional CBPLU land use categories of High Intensity Developed, Low Intensity Developed, Herbaceous Urban, Woody Urban and the Exposed land use category. The Exposed land use category was included on the assumption that it is a human impacted land use and is best represented in the model as an Urban land. For the most part, the CBPLU Exposed land use category represents bare land cleared for construction that would ultimately be converted to Low Intensity Urban. In these cases, these lands are more accurately simulated as an urban land use. Strip mines and quarries are the dominant source of Exposed land in Model segments 40, 50, 60, 80, and 160 (marked with an asterisk in the Impervious Urban column of the table E.6.1). In these instances, the

¹¹ 1982 Census of Agriculture, Volume 1, Geographic Area Series, published by the U.S. Department of Commerce, Washington, D.C

¹² 1987 Census of Agriculture, Volume 1, Geographic Area Series, published by the U.S. Department of Commerce, Washington, D.C

¹³ Conservation Technology Information Center, West Lafayette, IN

Exposed land use category is grouped with Pasture land use, as the state of Pennsylvania requires all surface mined coal operations to be backfilled and graded within sixty days and re-vegetated¹⁴. Pasture land use was selected for this aggregation because it is the least managed herbaceous cover land use.

Water land use for the Phase IV Watershed Model was calculated, as in Phase II, using the CBPLU land use category of Water. This land use represents non-tidal, inland water bodies. While tidal water bodies do exist in the CBPLU database, these water bodies are external to Phase IV Watershed Model boundary so they are not counted.

¹⁴ 1993 Pennsylvania Code. Title 25. Environmental Resources, Chapter 87. Surface Mining of Coal pages 8, 7-31 through 8, 7-35

Table E.9.1

1990 Phase IV Chesapeake Bay Watershed Model Land Use in Acres by Model Segment

Phase IV Model Segment	Conven. Till	Conserv. Till	Hayland	Pasture	Forest	Pervious Urban	Impervious Urban	Water	Total
10	110860	9019	240230	197768	1030640	59704	31534	11288	1691043
20	171400	14040	511789	429246	1874602	98467	46243	30628	3176414
30	55816	11978	203619	167237	816205	84571	40230	20687	1400343
40	87427	57216	69767	83048	572063	44958	24492	12267	951237
50	29732	11713	49746	39292	753229	16702	7544	6471	914429
60	68905	49932	137116	114138	2288217	32977	16208	17915	2725407
70	73835	54763	86166	70745	527835	18454	9331	8174	849303
80	162050	134294	165139	131847	773519	43055	23444	26617	1459963
90	26746	20185	65811	53146	412209	8085	3097	10812	600090
100	92809	64826	155815	114384	1065093	33610	13302	7391	1547230
110	188619	155298	135008	115439	398895	77880	43652	17672	1132463
120	37092	10247	17828	13760	44107	3834	2205	2867	131939
140	29224	34090	20792	22633	66702	1630	793	10033	185897
160	15625	7620	50990	96906	654477	23010	11186	4795	864608
170	7487	2784	41968	197582	682492	9804	5117	2965	950198
175	16995	7526	36129	86312	644044	7082	3535	4164	805788
180	47876	47870	61057	74218	147235	17523	10473	3094	409346
190	10781	47739	104824	263064	513446	74007	21696	4772	1040330
200	25855	38598	93613	205332	471294	47300	12877	5899	900768
210	69933	78274	77291	65123	188040	20860	11553	1952	513026
220	35292	44854	58592	124782	219799	78752	40983	7525	610577
230	20747	44546	125513	265416	516015	43333	8176	3124	1026871
235	9575	4824	9963	17655	117378	3225	829	976	164424
240	31492	11160	5571	15498	144808	4851	1463	1033	215877
250	5160	9266	22298	40612	115943	5097	1344	14144	213864
260	23910	31329	39450	67205	291275	12949	3348	1903	471369
265	330	413	8010	35221	174233	1788	794	2612	223401
270	4129	13869	77251	245045	1460219	46629	18954	7300	1873394
280	30049	25562	147275	335235	1252138	93379	34112	14368	1932118
290	17247	8866	28197	55820	185824	19353	8403	5540	329249
300	21648	44761	65169	136158	467985	17459	6723	4294	764198
310	2312	9201	3170	10111	71008	1230	579	3532	101143
330	2938	15500	7078	14456	37232	4657	1727	1491	85080
340	4340	10144	5691	12038	53026	33023	18972	271	137505
370	10455	6542	3460	6453	9740	396	134	651	37831
380	76040	63381	7611	31852	75538	5006	1459	4292	265178
390	12050	18314	1124	6647	14754	2501	638	1500	57528
400	109017	60522	5754	26791	83523	9546	2854	3298	301305
410	137103	80011	5760	26597	190393	14879	5101	3361	463205
420	38080	8012	1094	6874	62584	12395	5686	1860	136584
430	129989	21422	3756	24117	277100	11402	2800	7326	477912
440	68170	17297	463	10626	90122	9332	2452	6924	205385
450	66384	62558	52147	64673	183277	26431	12240	6513	474224
470	24815	33868	19249	37079	129837	26408	14557	5086	290900
480	1809	2048	1194	2567	14693	31577	24575	293	78756
490	3230	2320	1464	2303	28513	34471	25281	1679	99261
500	37871	9855	12776	34416	158228	59772	15894	5099	333911
510	764	517	473	984	12982	9178	4403	975	30276
540	1731	1653	1168	2552	16733	47847	31525	201	103410
550	11569	14543	36765	72719	158826	75282	27740	3091	400535
560	96178	46352	13032	45687	378361	27175	8961	9840	625586
580	8483	108	123	1235	27599	1962	272	1637	41420
590	68199	54168	12367	36691	373088	23938	9968	10233	588652
600	67000	66818	14220	56579	438461	117230	70081	23749	854137
610	11645	7799	3488	9254	74219	34577	16647	1008	158639

Table E.9.1

1990 Phase IV Chesapeake Bay Watershed Model Land Use in Acres by Model Segment

Phase IV Model Segment	Conven. Till	Conserv. Till	Hayland	Pasture	Forest	Pervious Urban	Impervious Urban	Water	Total
620	24862	14177	818	10258	58099	17318	9006	7034	141572
630	1157	116	32	315	4239	7315	4502	562	18238
650	11429	16179	10902	13712	41471	5276	2395	2585	103950
700	9492	699	30029	20311	87722	3108	1860	1851	155073
710	39999	18401	20530	17070	37534	8522	4901	8062	155020
720	90750	16825	41890	29962	71268	30972	20196	1907	303770
730	34273	43370	56703	32920	131184	12603	6723	1079	318855
740	56956	55143	95439	167600	452719	28241	13979	5469	875545
750	22324	10724	15631	14861	36564	4118	2453	632	107307
760	9638	5947	9891	11574	34027	5199	2360	386	79021
770	16294	16418	1474	4756	30482	1720	195	56	71396
780	14378	9161	715	2717	16439	1623	380	0	45414
800	7489	4681	2426	4572	26342	3435	1078	977	51001
810	38989	11898	5573	14568	30459	1989	746	3787	108009
820	3422	6409	401	2162	5814	4713	1830	2113	26864
830	17639	19308	1141	8028	22964	9486	3120	5366	87052
840	32590	48093	851	10901	163152	4701	1177	15407	276872
850	407	4607	2022	3726	26259	11697	4462	1752	54933
860	618	700	408	877	4707	24122	25880	1741	59053
870	780	528	483	1006	8460	9417	4834	1748	27257
880	6448	3461	3132	7334	59233	22341	10148	3355	115451
890	392	2462	1035	2052	8990	22597	19968	648	58144
900	1053	233	1361	4632	17899	74498	41225	997	141899
910	7265	2851	2944	8318	70354	48581	19569	995	160878
920	33820	24351	10551	38179	224543	43598	10383	7875	393300
930	8713	318	109	1686	17381	1325	250	2018	31801
940	23379	28757	3122	14644	162692	7790	3214	7054	250653
950	271	2180	1250	2386	20059	19470	13892	3535	63043
960	8309	1332	78	1973	23663	61861	48435	8114	153765
970	329	290	899	1207	26775	4731	2252	249	36732
980	56914	11843	8608	22407	237765	29531	7615	9139	383823
990	2056	510	388	1228	9217	4033	1445	2100	20978
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
	2958309	3068805	3113345	4482919	24102614	2084353	1004066	485780	41300191

Section E.10

Land Use Classification, by Major Basins of the Chesapeake Bay Watershed

Ten major sub-basins are part of the Chesapeake Bay Watershed: Susquehanna River basin, Western Shore Maryland basin, Patuxent River basin, Potomac River basin, Rapahannock River basin, York River basin, James River basin, Western Shore Virginia basin, Eastern Shore Maryland basin, and Eastern Shore Virginia basin. Table E.10.1 is a compilation of the Chesapeake Bay Land Use data by Phase IV Watershed Model segment and major basin. Figure E.10.1 shows the major basins of the Chesapeake Bay Watershed with Phase IV model segments

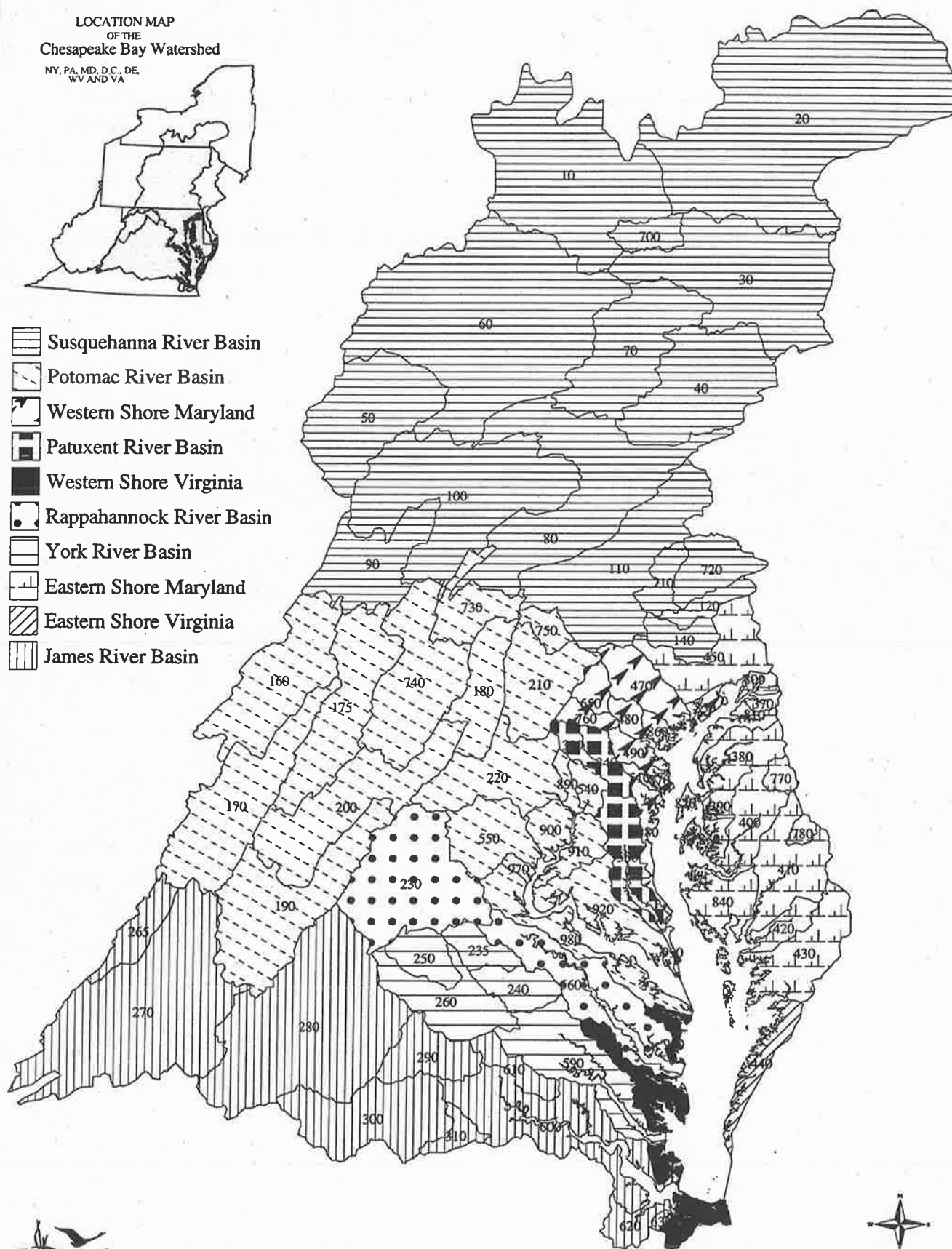
Major Basins of the Chesapeake Bay Watershed with Phase IV Watershed Model Segments

LOCATION MAP
OF THE
Chesapeake Bay Watershed

NY, PA, MD, D.C., DE,
WV AND VA



-  Susquehanna River Basin
-  Potomac River Basin
-  Western Shore Maryland
-  Patuxent River Basin
-  Western Shore Virginia
-  Rappahannock River Basin
-  York River Basin
-  Eastern Shore Maryland
-  Eastern Shore Virginia
-  James River Basin



KJH Map Date: July, 1997

/modgis/khopkins/maps/pmajbasins.ps

Source: U.S. E.P.A. Chesapeake Bay Program

Table E.10.1

Phase IV Chesapeake Bay Watershed Model Land Use Sorted by the Ten Major Subbasins' Data (in acres)

Bay Watershed Subbasin	Phase IV Model Segment	Conven. Till	Conserv. Till	Hayland	Pasture	Forest	Pervious Urban	Impervious Urban	Water	Total
East.Shore MD	370	10455	6542	3460	6453	9740	396	134	651	37831
East.Shore MD	380	76040	63381	7611	31852	75538	5006	1459	4292	265178
East.Shore MD	390	12050	18314	1124	6647	14754	2501	638	1500	57528
East.Shore MD	400	109017	60522	5754	26791	83523	9546	2854	3298	301305
East.Shore MD	410	137103	80011	5760	26597	190393	14879	5101	3361	463205
East.Shore MD	420	38080	8012	1094	6874	62584	12395	5686	1860	136584
East.Shore MD	430	129989	21422	3756	24117	277100	11402	2800	7326	477912
East.Shore MD	450	66384	62558	52147	64673	183277	26431	12240	6513	474224
East.Shore MD	770	16294	16418	1474	4756	30482	1720	195	56	71396
East.Shore MD	780	14378	9161	715	2717	16439	1623	380	0	45414
East.Shore MD	800	7489	4681	2426	4572	26342	3435	1078	977	51001
East.Shore MD	810	38989	11898	5573	14568	30459	1989	746	3787	108009
East.Shore MD	820	3422	6409	401	2162	5814	4713	1830	2113	26864
East.Shore MD	830	17639	19308	1141	8028	22964	9486	3120	5366	87052
East.Shore MD	840	32590	48093	851	10901	163152	4701	1177	15407	276872
SUBBASIN TOTAL		709920	436731	93288	241707	1192561	110223	39438	56505	2880372
East.Shore VA	440	68170	17297	463	10626	90122	9332	2452	6924	205385
SUBBASIN TOTAL		68170	17297	463	10626	90122	9332	2452	6924	205385
James VA	265	330	413	8010	35221	174233	1788	794	2612	223401
James VA	270	4129	13869	77251	245045	1460219	46629	18954	7300	1873394
James VA	280	30049	25562	147275	335235	1252138	93379	34112	14368	1932118
James VA	290	17247	8866	28197	55820	185824	19353	8403	5540	329249
James VA	300	21648	44761	65169	136158	467985	17459	6723	4294	764198
James VA	310	2312	9201	3170	10111	71008	1230	579	3532	101143
SUBBASIN TOTAL		75715	102672	329071	817591	3611406	179838	69565	37646	5223503
James VA	600	67000	66818	14220	56579	438461	117230	70081	23749	854137
James VA	610	11645	7799	3488	9254	74219	34577	16647	1008	158639
James VA	620	24862	14177	818	10258	58099	17318	9006	7034	141572
James VA	630	1157	116	32	315	4239	7315	4502	562	18238
SUBBASIN TOTAL		104664	88909	18558	76406	575018	176441	100236	32353	1172586
Potomac MD	160	15625	7620	50990	96906	654477	23010	11186	4795	864608
Potomac MD, VA	170	7487	2784	41968	197582	682492	9804	5117	2965	950198
Potomac MD, PA	175	16995	7526	36129	86312	644044	7082	3535	4164	805788
Potomac MD, PA	180	47876	47870	61057	74218	147235	17523	10473	3094	409346
Potomac VA, WV	190	10781	47739	104824	263064	513446	74007	21696	4772	1040330
Potomac VA, WV	200	25855	38598	93613	205332	471294	47300	12877	5899	900768
Potomac MD, PA	210	69933	78274	77291	65123	188040	20860	11553	1952	513026
Potomac MD, VA	220	35292	44854	58592	124782	219799	78752	40983	7525	610577
Potomac MD, PA	730	34273	43370	56703	32920	131184	12603	6723	1079	318855
Potomac MD, PA	740	56956	55143	95439	167600	452719	28241	13979	5469	875545
Potomac MD, PA	750	22324	10724	15631	14861	36564	4118	2453	632	107307
SUBBASIN TOTAL		343396	384501	692237	1328701	4141294	323298	140574	42346	7396348
Potomac DC, MD	540	1731	1653	1168	2552	16733	47847	31525	201	103410
Potomac VA	550	11569	14543	36765	72719	158826	75282	27740	3091	400535
Potomac MD	890	392	2462	1035	2052	8990	22597	19968	648	58144
Potomac VA	900	1053	233	1361	4632	17899	74498	41225	997	141899
Potomac DC, MD	910	7265	2851	2944	8318	70354	48581	19569	995	160878
Potomac MD	920	33820	24351	10551	38179	224543	43598	10383	7875	393300
Potomac VA	970	329	290	899	1207	26775	4731	2252	249	36732
Potomac VA	980	56914	11843	8608	22407	237765	29531	7615	9139	383823
SUBBASIN TOTAL		113073	58227	63331	152066	761885	346666	160277	23195	1678720
Rappahannock VA	230	20747	44546	125513	265416	516015	43333	8176	3124	1026871
Rappahannock VA	560	96178	46352	13032	45687	378361	27175	8961	9840	625586
SUBBASIN TOTAL		116925	90899	138546	311103	894375	70509	17137	12964	1652457
Susquehanna NY, PA	10	110860	9019	240230	197768	1030640	59704	31534	11288	1691043
Susquehanna NY, PA	20	171400	14040	511789	429246	1874602	98467	46243	30628	3176414

Table E.10.1

Phase IV Chesapeake Bay Watershed Model Land Use Sorted by the Ten Major Subbasins' Data (in acres)

Bay Watershed Subbasin	Phase IV Model Segment	Conven. Till	Conserv. Till	Hayland	Pasture	Forest	Pervious Urban	Impervious Urban	Water	Total
Susquehanna PA	30	55816	11978	203619	167237	816205	84571	40230	20687	1400343
Susquehanna PA	40	87427	57216	69767	83048	572063	44958	24492	12267	951237
Susquehanna PA	50	29732	11713	49746	39292	753229	16702	7544	6471	914429
Susquehanna PA	60	68905	49932	137116	114138	2288217	32977	16208	17915	2725407
Susquehanna PA	70	73835	54763	86166	70745	527835	18454	9331	8174	849303
Susquehanna PA	80	162050	134294	165139	131847	773519	43055	23444	26617	1459963
Susquehanna PA	90	26746	20185	65811	53146	412209	8085	3097	10812	600090
Susquehanna PA	100	92809	64826	155815	114384	1065093	33610	13302	7391	1547230
Susquehanna MD, PA	110	188619	155298	135008	115439	398895	77880	43652	17672	1132463
Susquehanna PA	120	37092	10247	17828	13760	44107	3834	2205	2867	131939
Susquehanna MD, PA	140	29224	34090	20792	22633	66702	1630	793	10033	185897
Susquehanna PA	700	9492	699	30029	20311	87722	3108	1860	1851	155073
Susquehanna PA	710	39999	18401	20530	17070	37534	8522	4901	8062	155020
Susquehanna PA	720	90750	16825	41890	29962	71268	30972	20196	1907	303770
SUBBASIN TOTAL		1274755	663526	1951274	1620026	10819839	566529	289033	194640	17379621
West.Shore MD	470	24815	33868	19249	37079	129837	26408	14557	5086	290900
West.Shore MD	480	1809	2048	1194	2567	14693	31577	24575	293	78756
West.Shore MD	490	3230	2320	1464	2303	28513	34471	25281	1679	99261
West.Shore MD	510	764	517	473	984	12982	9178	4403	975	30276
West.Shore MD	760	9638	5947	9891	11574	34027	5199	2360	386	79021
West.Shore MD	850	407	4607	2022	3726	26259	11697	4462	1752	54933
West.Shore MD	860	618	700	408	877	4707	24122	25880	1741	59053
West.Shore MD	870	780	528	483	1006	8460	9417	4834	1748	27257
West.Shore MD	880	6448	3461	3132	7334	59233	22341	10148	3355	115451
SUBBASIN TOTAL		48509	797786	38315	67451	318711	174410	116500	17013	834907
West.Shore MD	330	2938	15500	7078	14456	37232	4657	1727	1491	85080
West.Shore MD	340	4340	10144	5691	12038	53026	33023	18972	271	137505
West.Shore MD	500	37871	9855	12776	34416	158228	59772	15894	5099	333911
West.Shore MD	990	2056	510	388	1228	9217	4033	1445	2100	20978
SUBBASIN TOTAL		47205	36009	25933	62138	257704	101486	38038	8962	577474
West.Shore VA	580	8483	108	123	1235	27599	1962	272	1637	41420
West.Shore VA	650	11429	16179	10902	13712	41471	5276	2395	2585	103950
West.Shore VA	930	8713	318	109	1686	17381	1325	250	2018	31801
West.Shore VA	940	23379	28757	3122	14644	162692	7790	3214	7054	250653
West.Shore VA	950	271	2180	1250	2386	20059	19470	13892	3535	63043
West.Shore VA	960	8309	1332	78	1973	23663	61861	48435	8114	153765
SUBBASIN TOTAL		60584	48874	15586	35635	292866	97685	68458	24944	644632
York VA	235	9575	4824	9963	17659	117378	3225	829	976	164424
York VA	240	31492	11160	5571	15498	144808	4851	1463	1033	215877
York VA	250	5160	9266	22298	40612	115943	5097	1344	14144	213864
York VA	260	23910	31329	39450	67205	291275	12949	3348	1903	471369
York VA	590	68199	54168	12367	36691	373088	23938	9968	10233	588652
SUBBASIN TOTAL		138335	110748	89650	177661	1042490	50060	16952	28289	1654186

Section E.11

Patapsco Basin

As a consequence of Phase IV Watershed Model improvements regarding processes simulation, a reevaluation of the Patapsco River basin watershed model segmentation was performed. The new approach took into consideration the fact that, almost 100% of the water stored at Liberty reservoir serves as Baltimore City water supply, and consequently no loading is released below the reservoir into the Patapsco. Segment 760 containing the Liberty Reservoir was re-segmented into segment 650 and a new segment 760. Segment 650 includes the area upstream of Liberty Reservoir, and loads from this segment's land uses are not added to the Patapsco River. Segment 760 and segment 490 are the remaining area within the Patapsco River basin, which includes the west branch of the Patapsco River and the Patapsco River basin downstream of the reservoir.

The re-segmentation was developed by applying GIS methodologies. Through editing the segments cover, and using streams covers in the area as backdrops, it was possible to digitize an appropriate re-segmentation for the basin. The total area in the basin is the same as it was previously, but the simulated area is different. The benefit of this approach is to have a more accurate accounting for loading and flow in the segments.

Table E.11.1

Phase IV Watershed Model Land Use for the Above Fall Line

Phase IV Watershed Model Segments - Patapsco River Basin

Segment	Pasture	Cons.Till	Conv.Till	Hay	Forest	P.Urban	I.Urban	Water	Total
650	17939.39	17966.3	6776.22	9622.22	41464.26	5267.14	2420.53	1336.95	102793.01
760	12713.88	12732.95	4802.397	6819.39	34028.89	5205.66	2329.214	1634.05	80266.431
Total	30653.27	30699.25	11578.617	16441.61	75493.15	10472.8	4749.744	2971	183059.441

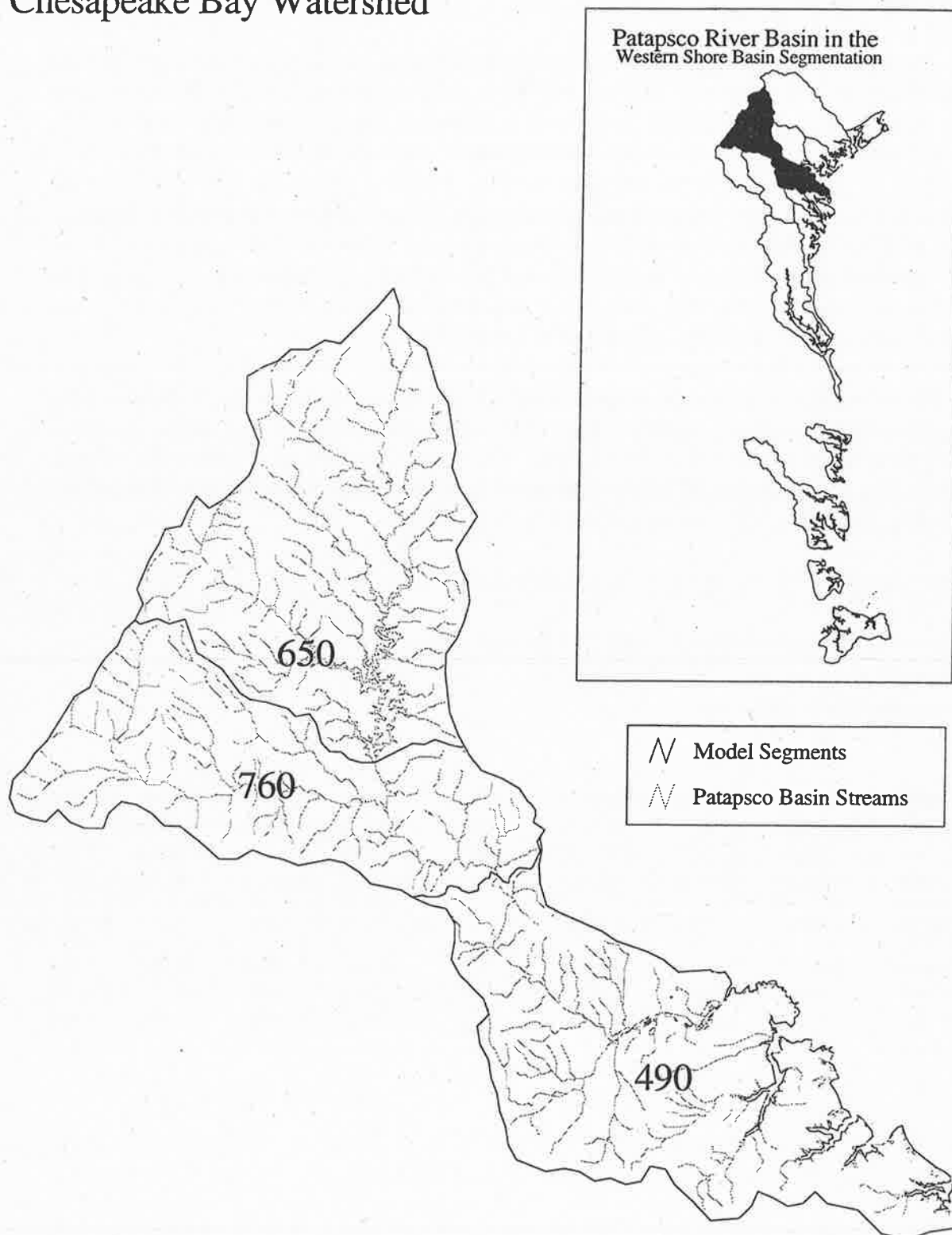
Ratios

Segment	Pasture	Cons.Till	Conv.Till	Hay	Forest	P.Urban	I.Urban	Water
650	0.5852	0.5852	0.5852	0.5852	0.5492	0.5029	0.5096	0.4500
760	0.4148	0.4148	0.4148	0.4148	0.4508	0.4971	0.4904	0.5500
Total	1	1	1	1	1	1	1	1

Patapsco River Basin

Phase IV Watershed Model Segments

Chesapeake Bay Watershed

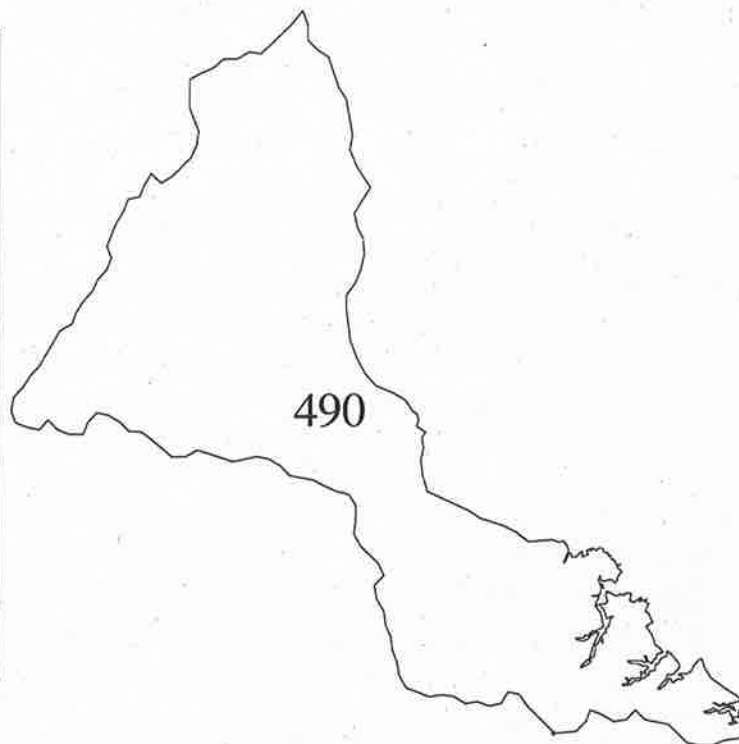


KJH Map Date: July, 1997

/modgis/khopkins/maps/ppatap.ps

Source: U.S. E.P.A. Chesapeake Bay Program Modeling Team

Patapsco Basin Segmentation—Phase II

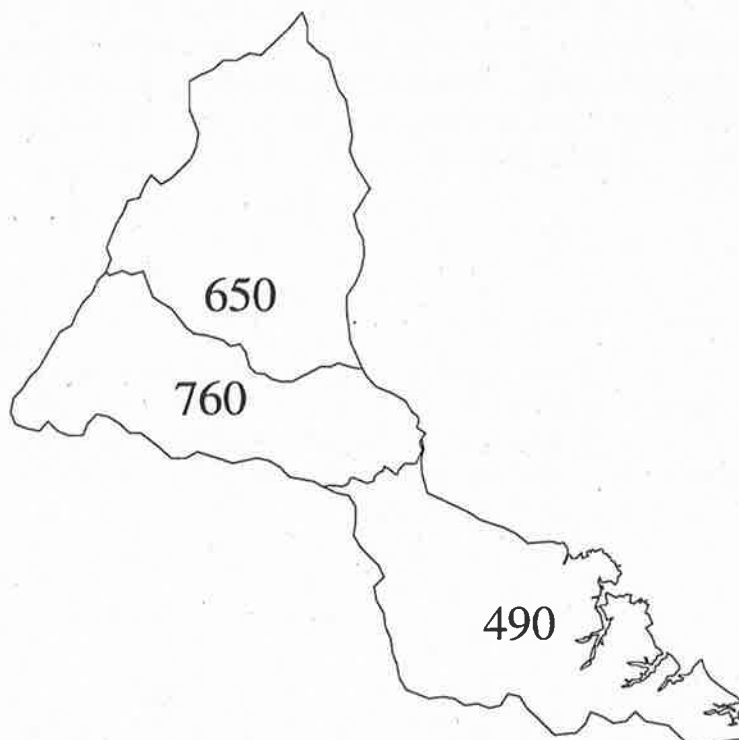
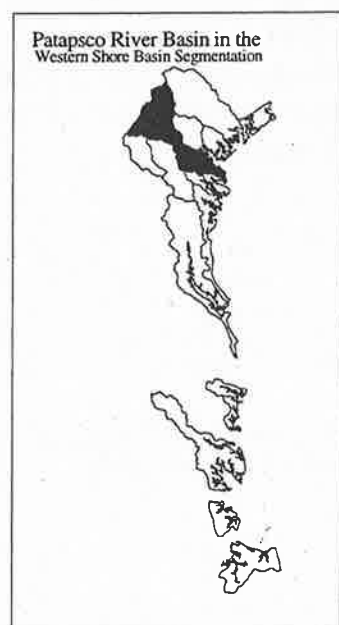


KJH

Map Date: July, 1997

Source: U.S. E.P.A. Chesapeake Bay Program Modeling Team

Patapsco Basin Segmentation—Phase IV



KJH

Map Date: July, 1997

Source: U.S. E.P.A. Chesapeake Bay Program Modeling Team

/modgis/khopkins/maps/appendix/ppatap24.ps

Section E.12

Phase IV Chesapeake Bay Watershed Model Land Use Estimation and Projection Methodologies

This section illustrates the methodologies used to create Phase IV Watershed Model land use data sets for years projected and backcasted from 1990 Phase IV Chesapeake Bay Watershed Model land use data base. Population projections developed by the Chesapeake Bay Program Office, are documented in the report: *Population Estimates and Projections for States, Counties, and Modeling Segments in the Chesapeake Bay Watershed*¹⁵, and are used as part of the basic information in the development of these land use databases. Two methodologies were employed to project land use data sets from 1990. These methodologies are explained in greater detail in the report *Land Use Estimation and Projection Methodologies for Phase IV of the Chesapeake Bay Program Watershed Model*¹⁶. The first methodology, termed hindcast in this report, was used to create the 1985 land use data set and further modified to create the 1985 "All Forest" data set. The second methodology was used to create forecasted land use data sets for the years 1991, 1993, 1995, 2000, 2005, 2010, 2015, and 2020.

For the incorporation of manure acres into the hindcasted and forecasted land use database, it was necessary to develop estimates and projections of manure through time, as explained in section E.15. These values were then subtracted from the corresponding year and segment value for the pasture land use.

The "all forest" and "1985 reference" scenarios were used to define controllable loads under the Phase IV Watershed Model. To develop the 40% controllable loads, it was necessary to determine the loading contribution by the CBPO signatory states. Loading from non-Signatory States, are considered uncontrollable loads. This 40% controllable load is obtained by getting 40% out of the subtraction between the Reference Scenario loads and the All Forest Scenario loads. In order to obtain these controllable loads, it was necessary to develop a land use distribution data between signatory and non-signatory states.

¹⁵ Burch, B. ed. Population Estimates and Projections for States, Counties and Modeling Segments Within the Chesapeake Bay Watershed. Chesapeake Bay Program Data Center. 1996.

¹⁶ Land Use Estimation and Projection Methodologies for Phase IV of the Chesapeake Bay Program Watershed Model. Chesapeake Bay Program. Technology Transfer Report. 68. DRAFT. April, 1997.

When the land contained in a WSM segment is 100% within a signatory state all land uses in the segment are simulated as forest. However, parameterization of each of the land uses remains as original. When a portion of land contained in a WSM segment, is within a non-signatory state, the methodology described above is applied to the signatory state area while the non-signatory state area remains as is.

The information contained in this table was developed through the combination of the Chesapeake Bay Program Land Use data (CBPLU_gurb), the states' boundary cover and the PIV Watershed Model (WSM) segmentation cover. For the distribution of agricultural land use, ratios for crop land were developed on the basis of 1985 land use, and applied to the "all forest" scenario land.

Table E.12.1

**Phase IV Chesapeake Bay Watershed Model
Hindcasted 1985 Land Use**

	1985	1985	1985	1985	1985	1985	1985	1985	1985	1985
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Land Use
10	1030311	141286	13462	173557	60036	228834	561	31709	11288	1691053
20	1875262	244841	12890	373334	97748	494100	1707	45905	30628	3176434
30	815071	64111	14022	161028	85753	198367	511	40792	20687	1400373
40	571435	125103	51598	52491	45575	67782	157	24829	12267	951277
50	752445	38268	6910	37011	17336	48071	87	7831	6471	914479
60	2288762	78436	60825	101775	32552	128767	376	15999	17915	2725467
70	527985	84676	62370	61045	18300	77265	236	9253	8174	849373
80	774542	164182	158937	112921	41884	157394	680	22806	26617	1460043
90	412307	25047	29845	50545	7986	60287	203	3059	10812	600180
100	1064972	111329	75127	102936	33732	137778	615	13350	7391	1547330
110	400488	172501	203746	94701	75337	125190	600	42227	17672	1132573
120	44259	26688	23263	12168	3565	16849	229	2051	2867	132058
140	66757	27341	41272	19011	1534	19060	143	746	10033	186037
160	653824	15266	9893	99444	23564	46238	128	11456	4795	864768
170	682746	12674	5088	192860	9575	39259	34	4998	2965	950368
175	644384	16104	11925	86195	6803	32700	116	3396	4164	805963
180	147859	23393	86631	69883	16521	51843	248	9874	3094	409526
190	516156	22841	49697	273079	70171	82738	305	20572	4772	1040520
200	473858	33535	57023	200685	43731	73897	235	11905	5899	900968
210	189483	35613	116323	74690	18495	65843	384	10243	1952	513236
220	226598	10640	101047	114778	68918	45122	84	35865	7525	610797
230	518789	42317	59725	248081	38935	108416	136	7346	3124	1027101
235	117924	10694	10967	12289	2634	8253	10	677	976	164659
240	144987	7364	41735	10668	4653	4029	4	1404	1033	216117
250	116295	12997	7358	37517	4633	19680	18	1221	14144	214114
260	292159	22616	41130	64376	11856	34240	25	3066	1903	471629
265	174067	365	709	35336	1932	7522	1	858	2612	223666
270	1459340	3243	15676	261779	47399	59302	89	19267	7300	1873664
280	1255376	26535	43973	341088	89989	127837	79	32874	14368	1932398
290	187292	16271	19540	50339	17723	24825	26	7695	5540	329539
300	468344	45767	54635	118875	17052	48582	82	6566	4294	764497
310	71072	12296	2765	7006	1172	2743	6	551	3532	101453
330	37643	4087	19876	12272	4036	4164	13	1496	1491	85410
340	57021	6018	12532	10230	28945	5844	15	16629	271	137845
370	9749	6297	12783	4640	368	3209	8	125	651	38201
380	75685	30839	131641	10021	4621	6671	61	1347	4292	265558
390	14854	12079	23293	1911	2214	1103	9	565	1500	57918
400	83684	85165	103179	9278	9123	4805	46	2727	3298	301704
410	190917	87661	143792	14457	13977	4160	88	4792	3361	463615
420	63234	31496	17516	4848	11563	736	25	5304	1860	137004
430	277727	58758	105878	11830	10574	3135	88	2597	7326	478342
440	90021	54689	38171	3062	9496	522	5	2495	6924	205825
450	184706	51282	92358	54925	24145	48832	281	11181	6513	474674
470	130647	23727	41251	32351	25422	18354	48	14014	5086	291369
480	14098	1530	2482	2163	32085	1128	6	24970	293	79236
490	31124	1665	4014	2940	32472	1544	6	23816	1679	99751
500	161676	39689	18107	31225	55415	7956	9	14735	5099	334411
510	13724	499	1189	831	8572	375	0	4112	975	30786
540	19735	2348	2802	2801	45269	421	7	29826	201	103950
550	167413	6129	32838	68897	63649	35026	38	23454	3091	401085
560	381134	117567	51347	23302	23981	10483	26	7907	9840	626146
580	27654	7005	2498	399	1897	67	0	263	1637	42000
590	375487	74208	67379	21108	21465	9805	28	8938	10233	589242
600	446048	83496	75684	36039	110266	12904	34	65917	23749	854737
610	77035	7150	15715	7453	31852	3085	5	15335	1008	159249
620	58651	19162	26638	4387	16642	390	14	8654	7034	142192
630	4626	757	908	69	6983	34	1	4298	562	18868
650	41793	11757	20209	11428	4776	9234	0	2168	2585	104600
700	87676	11560	319	20163	3157	28383	75	1890	1851	155773
710	37750	30873	31245	14936	8034	19290	209	4621	8062	155730

Table E.12.1

**Phase IV Chesapeake Bay Watershed Model
Hindcasted 1985 Land Use**

	1985	1985	1985	1985	1985	1985	1985	1985	1985	1985
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Land Use
720	72297	65234	48550	27396	28782	40233	603	18768	1907	304490
730	131448	36846	47837	33042	12211	49598	281	6514	1079	319585
740	454577	25895	54715	217281	25967	78584	202	12854	5469	876285
750	36721	11627	30311	8271	3849	13563	41	2292	632	108057
760	34371	7321	13246	10626	4705	6161	69	2136	386	79781
770	30535	13224	22686	1807	1612	1280	12	182	56	72166
780	16489	6472	18580	1494	1516	498	10	355	0	46194
800	26536	4543	9211	3273	3180	2271	12	998	977	51801
810	30496	5905	53361	6918	1901	4896	32	713	3787	108819
820	6074	3680	8228	655	4127	379	5	1603	2113	27684
830	23303	17094	26142	2254	8718	1298	11	2867	5366	87882
840	163128	35566	51677	4048	4730	1110	21	1184	15407	277712
850	27398	1453	4688	3195	10534	1879	15	4018	1752	55783
860	4429	513	832	723	24331	378	5	26103	1741	59913
870	9168	523	1245	871	8795	393	0	4515	1748	28127
880	61223	4796	7762	6221	20502	2279	1	9312	3355	116331
890	9565	351	3872	1996	22090	98	5	19519	648	59034
900	26245	947	1532	5841	66940	2352	1	37042	997	142798
910	72181	11294	1270	7530	46883	1836	4	18885	995	161788
920	229068	47268	22734	30628	38203	8402	23	9098	7875	394219
930	17415	7651	2471	644	1279	81	0	241	2018	32731
940	163492	45478	13485	8672	6981	2604	6	2880	7054	251593
950	21573	2749	1006	1686	18318	1105	0	13070	3535	63993
960	29549	4171	9626	548	56928	229	27	44573	8114	154725
970	27818	112	872	1148	3952	697	3	1882	249	37702
980	241184	54163	25735	14973	25673	6331	5	6621	9139	384803
990	9668	1600	1383	1062	3550	340	2	1272	2100	21968

Table E.12.2

**Phase IV Chesapeake Bay Watershed Model
Land Use for the "All Forested Watershed
Signatory Jurisdictions" Scenario for the**

Area of Model Segments within Non-Signatory States

Segment	Forest	Conven. Till	Conserv. Till	Pasture	Hay	Pervious Urban	Imperv. Urban	Manure
10	687479	91374	8706	112213	147994	48859	25806	394
20	1700169	225208	11856	343192	454481	91405	42926	1777
60	286674	8192	5309	53403	24813	10262	4022	32
70	632325	11495	4614	174918	35607	9271	4839	29
75	429161	11767	8713	63014	23892	5543	2767	48
80	6337	2226	8243	6661	4933	726	3021	12
200	30069	3544	6026	21207	7810	22717	1278	27
270	40871	71	343	5720	1297	93	38	4
370	1028	1725	3501	1273	879	44	15	1
380	14617	2505	10693	819	542	2239	93	4
400	5415	4196	50842	457	237	123	37	2
410	107796	54211	88922	8995	2573	9386	3218	60
420	125	272	151	42	6	86	40	0
430	15119	3738	6735	758	199	82	6	20
740	161764	13702	30096	77114	31879	9015	4463	14
770	22753	9184	15755	1251	889	937	119	8
780	16489	6472	18580	1494	498	1516	355	10
800	2968	1451	2941	1048	725	298	94	1
810	1556	326	2947	384	270	71	27	0

Table E.12.3

Phase IV Chesapeake Bay Watershed Model

Land Use for the "All Forested Watershed-Signatory Jurisdictions" Scenario for the Area of Model Segments within Signatory States

Seg	Forest	Conven. Till	Conserv. Till	Pasture	Hay	Pervious Urban	Imperv. Urban	Manure
10	342832	49912	4756	61511	80840	17080	0	0
20	175093	19633	1034	30072	39619	9322	0	0
30	815071	64111	14022	161540	198367	126546	0	0
40	571435	125103	51598	52648	67782	70403	0	0
50	752445	38268	6910	37099	48071	25166	0	0
60	2288762	78361	60767	102179	128871	48552	0	0
70	527985	84676	62370	61281	77265	27553	0	0
80	774542	164182	158937	113601	157394	64691	0	0
90	412307	25047	29845	50748	60287	11045	0	0
100	1064972	111329	75127	103551	137778	47082	0	0
110	400488	172501	203746	95301	125190	117564	0	0
120	44259	26688	23263	12398	16849	5616	0	0
140	66757	27341	41272	19155	19060	2280	0	0
160	367150	7074	4584	46137	21425	20736	0	0
170	50421	1179	474	17947	3652	463	0	0
175	215223	4337	3212	23249	8808	1889	0	0
180	141522	21167	78388	63458	46909	22648	0	0
190	516156	22841	49697	273383	82738	90743	0	0
200	443789	29991	50997	179686	66087	31641	0	0
210	189483	35613	116323	75073	65843	28739	0	0
220	226598	10640	101047	114861	45122	104783	0	0
230	518789	42317	59725	248218	108416	46282	0	0
235	117924	10694	10967	12299	8253	3312	0	0
240	144987	7364	41735	10672	4029	6057	0	0
250	116295	12997	7358	37535	19680	5854	0	0
260	292159	22616	41130	64401	34240	14921	0	0
265	174067	365	709	35337	7522	2790	0	0
270	1419350	3175	15348	256280	58057	65452	0	0
280	1255382	31375	62706	341048	104176	123064	0	0
290	187298	16271	19541	50367	24825	25531	0	0
300	468344	46061	55770	118958	47153	23618	0	0
310	71072	12296	2765	7012	2743	1723	0	0
330	37643	4087	19876	12286	4164	5533	0	0
340	57021	6018	12532	10245	5844	45575	0	0
370	8721	4572	9282	3375	2330	434	0	0
380	61068	28334	120948	9259	6129	3636	0	0
390	14854	12079	23293	1920	1103	2779	0	0
400	78269	80969	52337	8865	4568	11690	0	0
410	83121	33450	54870	5490	1587	6165	0	0
420	63109	31224	17365	4831	730	16742	0	0
430	262608	55020	99143	11140	2936	13083	0	0
440	90021	54689	38171	3067	522	11991	0	0

Table E.12.3

450	184706	51282	92358	55206	48832	35326	0	0
470	130647	23727	41251	32399	18354	39436	0	0
480	14095	1529	2482	2169	1128	57346	0	0
490	31134	1649	3975	2918	1529	56376	0	0
500	161676	39689	18107	31234	7956	70150	0	0
510	13724	499	1189	831	375	12683	0	0
540	19747	2350	2804	2810	421	75392	0	0
550	167438	6130	32843	68945	35031	87351	0	0
560	381162	117576	51351	23329	10484	32217	0	0
580	27654	7005	2498	400	67	2160	0	0
590	375490	74208	67380	21137	9805	30432	0	0
600	446260	81848	74190	35360	12764	179971	0	0
610	77036	7150	15715	7458	3085	47203	0	0
620	58665	19166	26645	4401	390	25935	0	0
630	4632	758	909	70	34	11455	0	0
650	41472	11060	19953	12120	9179	7671	0	0
700	87676	11560	319	20238	28383	5047	0	0
710	37750	30873	31245	15145	19290	12655	0	0
720	72297	65234	48550	27999	40233	47550	0	0
730	131448	36846	47837	33323	49598	18725	0	0
740	292813	20074	44093	112999	46705	25343	0	0
750	36721	11627	30311	8312	13563	6141	0	0
760	34026	7833	14132	8584	6501	7559	0	0
770	7782	4040	6931	560	391	739	0	0
800	23568	3092	6270	2236	1546	3786	0	0
810	28940	5579	50414	6566	4626	2516	0	0
820	6074	3680	8228	660	379	5729	0	0
830	23303	17094	26142	2264	1298	11585	0	0
840	163128	35566	51677	4069	1110	5915	0	0
850	27398	1453	4688	3210	1879	14552	0	0
860	4428	513	832	727	378	50570	0	0
870	9168	523	1245	871	393	13310	0	0
880	61223	4796	7762	6222	2279	29814	0	0
890	9567	351	3872	2001	98	41716	0	0
900	26291	949	1534	5853	2356	104554	0	0
910	72187	11295	1270	7535	1836	65960	0	0
920	229068	47268	22734	30651	8402	47301	0	0
930	17415	7651	2471	645	81	1520	0	0
940	163492	45478	13485	8679	2604	9861	0	0
950	21579	2750	1007	1686	1106	31503	0	0
960	29598	4178	9642	576	229	102342	0	0
970	27818	112	872	1150	697	5834	0	0
980	241184	54163	25735	14978	6331	32294	0	0
990	9668	1600	1383	1064	340	4823	0	0

Table E.12.4

Phase IV Chesapeake Bay Watershed Model
Forecasted 1991 Land Use

	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991
Model Segment	FOREST Acres	CONV. TILL Acres	CONS. TILL Acres	PASTURE Acres	PERVIOUS Acres	HAYLAND Acres	MANURE Acres	IMPERV. Acres	WATER Acres	Total Area Acres
10	1030419	107220	9745	200096	59926	240179	519	31651	11288	1691053
20	1874185	138503	11875	462807	98921	511675	1364	46456	30628	3176434
30	816047	54473	13308	166752	84736	203579	453	40309	20687	1400373
40	571915	81770	62835	82886	45103	69749	140	24571	12267	951277
50	753215	29766	11678	39210	16713	49745	82	7549	6471	914479
60	2287771	67057	51830	113692	33324	137081	358	16379	17915	2725467
70	527743	72948	55628	70534	18548	86151	199	9379	8174	849373
80	773027	153131	143025	131070	43617	165034	693	23750	26617	1460043
90	412153	27482	19442	52932	8141	65803	206	3119	10812	600180
100	1064886	95432	62172	113726	33819	155785	635	13384	7391	1547330
110	398159	239707	103575	114613	79054	134759	613	44311	17672	1132573
120	44069	39530	7768	13511	3901	17812	237	2244	2867	132059
140	66682	43897	19398	22482	1665	20786	145	810	10033	186037
160	654418	16186	7057	96774	23059	50985	124	11210	4795	864768
170	682365	7920	2349	197507	9917	41960	38	5176	2965	950368
175	643842	17355	7159	86171	7247	36117	114	3618	4164	805963
180	146994	38428	57160	73861	17911	60957	235	10705	3094	409526
190	512687	17361	41073	262359	75081	104669	316	22011	4772	1040520
200	470606	33470	30889	204809	48258	93476	224	13138	5899	900968
210	187632	70461	77425	64649	21528	77123	333	11923	1952	513236
220	218672	14684	65051	124083	80382	58292	59	41831	7525	610797
230	515223	23687	41506	264895	44588	125321	114	8413	3124	1027101
235	117230	7318	7062	17626	3384	9951	6	870	976	164659
240	144677	28108	14506	15482	4996	5566	2	1507	1033	216117
250	115814	5884	8526	40554	5267	22274	13	1389	14144	214114
260	290928	40582	14592	67109	13377	39403	17	3459	1903	471629
265	174255	218	526	35226	1768	8011	1	785	2612	223666
270	1459783	2857	15134	244889	47011	77228	82	19110	7300	1873664
280	1251157	31000	24550	334941	94407	147153	56	34488	14368	1932398
290	185412	16829	9226	55685	19810	28135	11	8601	5540	329539
300	467739	23392	42983	136020	17738	65135	66	6831	4294	764498
310	70959	7719	3786	10100	1275	3167	5	600	3532	101453
330	37158	2934	15467	14419	4770	7064	8	1769	1491	85410
340	52072	3842	10381	11812	33998	5588	9	19532	271	137845
370	9736	9946	7045	6445	406	3459	6	137	651	38201
380	75501	72772	66580	31785	5103	7607	51	1487	4292	265558
390	14735	14867	15459	6632	2553	1123	7	652	1500	57918
400	83495	119925	49557	26739	9621	5752	43	2876	3298	301704
410	190187	101139	115740	26476	15233	5754	92	5222	3361	463615
420	62388	37181	8768	6828	12645	1091	24	5801	1860	137004
430	276998	119759	31597	24029	11537	3754	79	2833	7326	478342
440	90106	84019	1434	10620	9358	463	4	2459	6924	205825
450	182774	70706	57881	64237	27236	52004	258	12613	6513	474674
470	129510	24747	33789	36948	26805	19200	38	14776	5086	291369
480	14692	1656	2201	2562	31578	1194	5	24576	293	79236
490	27836	1605	2595	3309	34988	1583	4	25661	1679	99751
500	156970	34635	12713	34134	61362	12674	8	16316	5099	334411
510	12807	657	606	971	9322	466	0	4472	975	30786
540	16162	1641	1628	2461	48338	1128	4	31848	201	103950
550	157293	5531	20329	71986	77358	36410	31	28505	3091	401085
560	377463	83635	58558	45571	28209	13001	7	9301	9840	626146
580	27567	6679	1903	1233	2000	123	0	277	1637	42000
590	372371	47840	74293	36600	24677	12344	20	10275	10233	589242
600	436418	98092	35102	56268	119106	14154	48	71202	23749	854737
610	73531	15094	4170	9166	35244	3455	3	16968	1008	159249
620	57961	34659	4287	10218	17488	816	15	9094	7034	142192
630	4107	141	1138	252	7428	38	0	4571	562	18868
650	41378	11102	16444	13681	5422	10878	0	2461	2585	104600
700	87703	9426	763	20240	3128	30023	66	1872	1851	155773
710	37469	47121	11178	16824	8670	20495	217	4986	8062	155730

Table E.12.4

Phase IV Chesapeake Bay Watershed Model
Forecasted 1991 Land Use

	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total Area
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
720	71015	90938	16254	29232	31512	41741	624	20548	1907	304490
730	131045	31200	46360	32576	12809	56643	309	6833	1079	319585
740	452098	52329	59616	167165	29001	95309	205	14355	5469	876285
750	36505	24289	8705	14797	4221	15606	40	2514	632	108057
760	33927	6780	11444	12348	5342	6312	57	2425	386	79781
770	30461	18150	14540	4742	1764	1473	11	199	56	72166
780	16417	7841	15667	2703	1670	714	11	390	0	46194
800	26274	7173	4966	4552	3525	2420	8	1106	977	51801
810	30444	35340	15523	14534	2025	5570	27	760	3787	108819
820	5770	3442	6315	2142	4812	398	4	1869	2113	27684
830	22875	26394	10409	7990	9688	1137	7	3186	5366	87882
840	163165	32276	48414	10883	4684	851	19	1173	15407	277712
850	25821	1175	3756	3654	12144	1989	10	4632	1752	55783
860	4641	558	742	862	24171	403	4	25932	1741	59913
870	8293	667	616	986	9565	473	0	4910	1748	28127
880	58671	5625	4190	7264	22860	3102	0	10384	3355	116331
890	9200	459	2461	2097	22412	1060	3	19804	648	59034
900	16607	387	898	4151	75668	1318	0	41872	997	142798
910	69917	6750	3303	8264	48988	2926	3	19733	995	161788
920	223447	30078	27809	37971	44904	10499	22	10694	7875	394219
930	17373	7296	1730	1685	1337	109	0	252	2018	32731
940	162579	17669	34431	14632	7904	3120	2	3261	7054	251593
950	19479	2051	329	2317	19911	1214	0	14207	3535	63993
960	23314	1005	8421	1859	62153	214	21	48664	8114	154725
970	26580	142	472	1197	4877	892	2	2322	249	37702
980	236347	52284	16063	22271	31132	8557	2	8028	9139	384803
990	9074	1860	666	1207	4186	382	2	1500	2100	21968
	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
	23968390	3079884	2068539	4923574	2241321	3449131	9901	1073672	485780	41300191

Table E.12.5

Phase IV Chesapeake Bay Watershed Model
Forecasted 1993 Land Use

Model Segment	1993 FOREST Acres	1993 CONV. TILL Acres	1993 CONS. TILL Acres	1993 PASTURE Acres	1993 PERVIOUS Acres	1993 HAYLAND Acres	1993 MANURE Acres	1993 IMPERV. Acres	1993 WATER Acres	1993 Total Area Acres
10	1030184	111540	7453	204924	60164	233209	505	31777	11288	1691053
20	1873963	146091	14759	459763	99163	504228	1250	46570	30628	3176434
30	816062	53835	12093	164222	84721	207989	433	40301	20687	1400373
40	571857	90307	70067	71614	45160	65228	135	24602	12267	951277
50	753097	31965	11403	36633	16808	50379	80	7592	6471	914479
60	2287123	80442	45550	108454	33830	135115	353	16627	17915	2725467
70	527456	85734	48908	64521	18841	85955	186	9527	8174	849373
80	772402	157181	149823	118645	44332	166126	698	24139	26617	1460043
90	412059	31725	17554	47483	8237	68858	207	3155	10812	600180
100	1064583	111967	55926	101881	34123	157212	642	13504	7391	1547330
110	397211	228415	130669	98644	80566	133509	618	45158	17672	1132573
120	44025	40174	8474	12645	3979	17246	240	2289	2867	132058
140	66656	47809	19512	18703	1710	20498	145	832	10033	186037
160	654451	13264	5893	98116	23031	53739	122	11197	4795	864768
170	682152	7827	2679	191967	10108	47185	40	5276	2965	950368
175	643586	14356	6111	84744	7457	41534	114	3722	4164	805963
180	146627	36004	55381	77336	18501	61116	230	11058	3094	409526
190	511594	27262	33386	262608	76628	101293	320	22465	4772	1040520
200	469566	30700	23960	213714	49705	93472	220	13531	5899	900968
210	186855	80833	96436	42415	22801	68790	316	12628	1952	513236
220	216366	27198	46723	123474	83717	61957	51	43567	7525	610797
230	514241	30920	39056	254630	46144	129942	107	8706	3124	1027101
235	116963	8334	5300	16916	3672	11314	5	944	976	164659
240	144523	28931	17255	11356	5167	6054	1	1558	1033	216117
250	115617	4532	6786	40986	5527	24803	11	1457	14144	214114
260	290363	31662	21134	65872	14075	42706	14	3640	1903	471629
265	174251	348	418	34780	1772	8433	0	787	2612	223666
270	1459223	4254	12339	242320	47502	81067	80	19309	7300	1873664
280	1249101	15285	21718	336022	96560	163743	49	35274	14368	1932398
290	184684	14819	11106	52122	20619	31401	6	8952	5540	329539
300	467242	30566	23344	142110	18302	71230	61	7048	4294	764498
310	70896	8472	2398	9977	1333	3904	5	627	3532	101453
330	37032	4659	15730	11631	4961	7731	6	1839	1491	85410
340	50601	5121	11118	8834	35499	5658	7	20395	271	137845
370	9732	9158	9798	4975	419	2953	5	141	651	38201
380	75451	75154	82880	16194	5232	4402	47	1525	4292	265558
390	14713	14483	19840	3032	2617	670	6	668	1500	57918
400	83424	112837	72481	12014	9808	4468	42	2932	3298	301704
410	189834	105389	126687	12401	15841	4169	93	5431	3361	463615
420	62146	38192	11253	3230	12954	984	23	5942	1860	137004
430	276732	115301	48990	11844	11889	2835	76	2920	7326	478342
440	90087	86177	4825	5281	9388	233	4	2467	6924	205825
450	182159	72218	66811	55953	28220	49029	250	13069	6513	474673
470	129164	23712	39312	33259	27226	18098	34	15008	5086	291369
480	15176	1403	2726	2575	31164	1160	4	24254	293	79236
490	26729	2203	2291	2704	35836	1532	3	26283	1679	99751
500	155657	43053	13631	25996	63022	10689	7	16758	5099	334411
510	12450	973	359	858	9614	437	0	4612	975	30786
540	15590	2129	1579	1889	48829	1018	3	32172	201	103950
550	154514	9534	11380	75256	81122	35716	29	29892	3091	401085
560	375911	93453	57008	35044	29998	14440	1	9891	9840	626146
580	27526	6696	2110	1024	2049	94	0	284	1637	42000
590	370932	79424	49993	29685	26159	11316	17	10892	10233	589242
600	433276	101142	39726	44743	121990	16534	52	72926	23749	854737
610	72322	13651	5639	7609	36414	4462	2	17531	1008	159249
620	57577	30933	12291	5682	17958	743	16	9338	7034	142192
630	3756	1220	70	116	7728	29	0	4756	562	18868
650	41249	14723	20693	6639	5622	9887	0	2552	2585	104600
700	87675	10139	178	20167	3158	29951	64	1890	1851	155773

Table E.12.5

Phase IV Chesapeake Bay Watershed Model
Forecasted 1993 Land Use

Model Segment	1993 FOREST Acres	1993 CONV. TILL Acres	1993 CONS. TILL Acres	1993 PASTURE Acres	1993 PERVIOUS Acres	1993 HAYLAND Acres	1993 MANURE Acres	1993 IMPERV. Acres	1993 WATER Acres	1993 Total Area Acres
710	37387	48585	11833	15025	8854	19963	219	5092	8062	155730
720	70731	91669	17441	27994	32116	40340	631	20942	1907	304490
730	130901	27401	50441	30491	13023	58253	319	6947	1079	319585
740	451344	46137	52524	171733	29922	103399	205	14811	5469	876285
750	36443	19828	14331	13877	4327	15254	40	2577	632	108057
760	33790	6489	13610	10539	5539	6099	53	2515	386	79781
770	30432	17657	17139	2982	1822	1089	11	206	56	72166
780	16380	8522	16601	1283	1748	458	11	409	0	46194
800	26182	6664	6856	3471	3646	2053	7	1144	977	51801
810	30424	33608	24756	8651	2073	3908	25	778	3787	108819
820	5709	3856	6966	1097	4950	247	3	1922	2113	27684
830	22821	22337	20037	2848	9809	602	6	3226	5366	87882
840	163142	35051	52355	4267	4713	738	18	1180	15407	277712
850	25319	2246	3101	3042	12656	1980	9	4827	1752	55783
860	4926	486	944	890	23958	402	3	25703	1741	59913
870	7952	974	359	859	9864	437	0	5063	1748	28127
880	57622	7816	2831	6222	23830	2951	0	10824	3355	116331
890	9391	868	2243	1884	22243	1208	3	19655	648	59034
900	14288	287	115	4204	77769	1205	0	43034	997	142798
910	69742	8053	4687	6151	49150	2299	3	19799	995	161788
920	222630	32434	33577	29701	45878	10257	22	10926	7875	394219
930	17359	7354	2047	1321	1357	89	0	256	2018	32731
940	162285	42841	14078	9080	8203	3727	1	3384	7054	251593
950	18374	2849	0	2255	20753	472	0	14807	3535	63993
960	20943	7871	1381	885	64140	193	18	50220	8114	154725
970	26213	223	270	1332	5150	840	2	2452	249	37702
980	234349	41203	24672	22872	33387	9592	1	8610	9139	384803
990	8956	2110	701	892	4312	358	2	1545	2100	21968
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23922431	3231246	2148911	4634080	2294163	3476887	9649	1097043	485780	41300191	

Table E.12.6

Phase IV Chesapeake Bay Watershed Model
Forecasted 1995 Land Use

Model Segment	1995 FOREST Acres	1995 CONV. TILL Acres	1995 CONS. TILL Acres	1995 PASTURE Acres	1995 PERVIOUS Acres	1995 HAYLAND Acres	1995 MANURE Acres	1995 IMPERV Acres	1995 WATER Acres	1995 Total Area Acres
10	1030485	114928	4099	204998	59860	233278	491	31616	11288	1691043
20	1875318	146812	14154	460210	97688	504592	1136	45877	30628	3176414
30	816469	54056	11905	164324	84296	208093	414	40099	20687	1400343
40	572039	96972	63453	71643	44980	65249	129	24505	12267	951237
50	753005	32167	11195	36631	16883	50373	78	7626	6471	914429
60	2286805	83939	42036	108444	34078	135096	347	16749	17915	2725407
70	527139	93671	40890	64495	19165	85904	174	9691	8174	849303
80	771930	168367	138449	118568	44873	166024	702	24434	26617	1459963
90	412007	28007	21266	47476	8290	68849	208	3176	10812	600090
100	1064483	105669	62209	101864	34223	157197	649	13544	7391	1547230
110	396339	233226	125070	98422	81958	133216	623	45938	17672	1132463
120	43977	37230	11365	12629	4064	17227	242	2337	2867	131939
140	66629	45950	21343	18695	1757	20490	146	855	10033	185897
160	654403	13377	5779	98110	23073	53735	121	11217	4795	864608
170	681900	7801	2701	191894	10335	47167	41	5394	2965	950198
175	643391	13603	6857	84719	7617	41521	113	3802	4164	805788
180	146297	35250	55928	77166	19032	60978	225	11375	3094	409346
190	510108	23553	36920	261841	78732	100999	324	23082	4772	1040330
200	468519	33139	21400	213240	51164	93264	216	13928	5899	900768
210	186098	75791	100760	42259	24042	68511	299	13315	1952	513026
220	214167	22189	50982	122227	86897	61327	43	45221	7525	610577
230	513260	29327	40516	254151	47699	129694	100	9000	3124	1026871
235	116669	7270	6330	16874	3990	11285	4	1026	976	164424
240	144364	30187	15947	11344	5343	6048	0	1612	1033	215877
250	115402	3463	7835	40912	5810	24757	9	1532	14144	213864
260	289692	35710	16964	65722	14906	42607	12	3854	1903	471369
265	174248	153	613	34779	1775	8433	0	788	2612	223401
270	1458748	3968	12619	242244	47918	81041	78	19479	7300	1873394
280	1247270	13905	23043	335537	98478	163502	41	35975	14368	1932118
290	184110	12845	13000	51965	21257	31303	1	9229	5540	329249
300	466909	26167	27704	142014	18680	71179	56	7193	4294	764197
310	70856	7822	3042	9971	1370	3901	4	644	3532	101143
330	36922	2678	17651	11598	5126	7708	5	1901	1491	85080
340	49111	3834	11927	8575	37020	5492	5	21269	271	137505
370	9727	8474	10473	4974	430	2952	4	145	651	37831
380	75398	71068	86854	16186	5371	4399	44	1565	4292	265178
390	14681	13314	20935	3026	2708	669	5	691	1500	57528
400	83363	98972	86210	12006	9968	4465	41	2980	3298	301304
410	189513	112557	119126	12379	16393	4162	94	5620	3361	463205
420	61941	37481	11801	3220	13215	981	23	6062	1860	136584
430	276443	112303	51817	11834	12271	2832	73	3014	7326	477912
440	90066	84680	6300	5280	9424	233	4	2476	6924	205385
450	181531	69332	69218	55767	29226	48860	243	13534	6513	474224
470	128802	19552	43296	33170	27665	18048	31	15250	5086	290899
480	15891	1076	3247	2697	30554	1215	4	23779	293	78756
490	25645	1764	2548	2595	36665	1470	2	26891	1679	99261
500	153963	42308	13760	25713	65162	10573	6	17327	5099	333911
510	12075	841	450	832	9921	423	0	4759	975	30276
540	14993	1916	1650	1817	49341	979	3	32509	201	103410
550	152317	7234	13383	74188	84098	35208	27	30989	3091	400535
560	374000	86037	63660	34867	32199	14367	0	10617	9840	625586
580	27506	5464	3335	1023	2073	94	0	287	1637	41420
590	369508	67871	61050	29573	27626	11272	15	11503	10233	588652
600	430802	105075	34989	44482	124261	16439	57	74284	23749	854137
610	71270	13619	5391	7499	37431	4397	1	18021	1008	158639
620	57018	33099	9705	5626	18643	736	16	9695	7034	141572
630	3521	1150	60	109	7929	27	0	4880	562	18238
650	41086	14014	21263	6612	5874	9849	0	2667	2585	103950
700	87660	10166	149	20167	3173	29946	61	1899	1851	155073

Table E.12.6

**Phase IV Chesapeake Bay Watershed Model
Forecasted 1995 Land Use**

Model Segment	1995 FOREST Acres	1995 CONV. TILL Acres	1995 CONS. TILL Acres	1995 PASTURE Acres	1995 PERVIOUS Acres	1995 HAYLAND Acres	1995 MANURE Acres	1995 IMPERV Acres	1995 WATER Acres	1995 Total Area Acres
710	37299	45401	14876	14987	9052	19916	221	5206	8062	155020
720	70425	84318	24320	27863	32768	40165	638	21367	1907	303770
730	130806	28221	49564	30459	13164	58211	329	7022	1079	318855
740	450571	46339	52153	171438	30867	103222	206	15279	5469	875545
750	36384	22196	11908	13855	4428	15229	39	2637	632	107307
760	33617	4969	15028	10489	5788	6068	49	2627	386	79021
770	30406	19517	15250	2980	1876	1088	10	212	56	71396
780	16346	10645	14427	1280	1822	457	11	426	0	45414
800	26100	6141	7338	3461	3753	2047	6	1178	977	51001
810	30408	32970	25362	8648	2112	3906	24	792	3787	108009
820	5627	3142	7525	1082	5135	244	3	1994	2113	26864
830	22709	22757	19409	2835	10062	599	5	3309	5366	87052
840	163160	31387	56030	4268	4690	738	18	1174	15407	276872
850	24797	2375	2862	2980	13189	1939	7	5031	1752	54933
860	5378	389	1173	973	23619	439	3	25340	1741	59053
870	7594	830	444	820	10179	418	0	5225	1748	27257
880	56560	7028	3422	6108	24811	2897	0	11270	3355	115451
890	9864	539	2729	1980	21826	1269	2	19286	648	58144
900	12852	120	241	3781	79069	1084	0	43754	997	141898
910	69378	8834	3839	6119	49489	2287	2	19935	995	160878
920	221391	34548	31095	29536	47355	10200	21	11278	7875	393299
930	17346	6367	3029	1321	1373	89	0	259	2018	31801
940	161985	34576	22238	9064	8506	3720	0	3509	7054	250653
950	17765	2370	384	2181	21215	456	0	15137	3535	63043
960	21000	8623	655	889	64092	193	16	50182	8114	153765
970	25909	111	377	1317	5378	830	1	2560	249	36732
980	232014	40786	24432	22645	36022	9496	0	9289	9139	383823
990	8795	1918	843	876	4485	351	2	1607	2100	20978
=====										
	23884279	3169808	2197568	4625419	2340124	3472196	9403	1115614	485780	41300191

Table E.12.7

**Phase IV Chesapeake Bay Watershed Model
Forecasted 2000 Land Use**

Model Segment	2000 FOREST Acres	2000 CONV. TILL Acres	2000 CONS. TILL Acres	2000 PASTURE Acres	2000 PERVIOUS Acres	2000 HAYLAND Acres	2000 MANURE Acres	2000 IMPERV. Acres	2000 WATER Acres	2000 Total Area Acres
10	1029716	114842	4096	204879	60636	233104	456	32026	11288	1691043
20	1873822	146695	14142	460127	99318	504190	851	46642	30628	3176414
30	817073	54096	11913	164494	83668	208247	365	39800	20687	1400343
40	572392	97031	63492	71701	44634	65289	115	24316	12267	951237
50	753238	32177	11199	36647	16695	50389	73	7541	6471	914429
60	2285920	83906	42020	108417	34766	135044	332	17087	17915	2725407
70	527130	93670	40889	64525	19175	85902	143	9696	8174	849303
80	771513	168276	138374	118493	45350	165934	713	24693	26617	1459963
90	411887	27999	21260	47460	8412	68829	211	3222	10812	600090
100	1063715	105593	62164	101773	34994	157084	666	13849	7391	1547230
110	395921	232980	124938	98306	82625	133075	634	46312	17672	1132463
120	43845	37118	11331	12584	4297	17176	248	2472	2867	131939
140	66590	45924	21330	18682	1825	20478	147	888	10033	185897
160	653943	13367	5774	98044	23463	53697	117	11407	4795	864608
170	682089	7803	2701	191944	10164	47180	45	5305	2965	950198
175	643189	13599	6855	84694	7782	41508	112	3885	4164	805788
180	145715	35110	55706	76869	19968	60736	214	11934	3094	409346
190	509953	23546	36908	261751	78952	100968	334	23146	4772	1040330
200	466630	33005	21313	212389	53793	92888	206	14644	5899	900768
210	184216	75025	99741	41871	27125	67819	256	15022	1952	513026
220	210724	21832	50162	120281	91876	60341	23	47813	7525	610577
230	510055	29143	40263	252581	52780	128884	82	9958	3124	1026871
235	116489	7259	6320	16851	4184	11268	1	1076	976	164424
240	144469	30209	15959	11352	5226	6052	0	1576	1033	215877
250	115334	3461	7830	40892	5900	24742	5	1556	14144	213864
260	289489	35685	16952	65683	15156	42578	5	3919	1903	471369
265	174383	153	613	34807	1658	8440	0	736	2612	223401
270	1460191	3972	12632	242489	46653	81121	72	18964	7300	1873394
280	1245643	13887	23013	335118	100181	163289	22	36597	14368	1932118
290	183097	12774	12929	51680	22381	31131	0	9718	5540	329249
300	467121	26179	27717	142092	18440	71212	43	7101	4294	764197
310	70789	7814	3039	9963	1431	3898	4	673	3532	101143
330	36656	2659	17523	11519	5530	7652	0	2050	1491	85080
340	45838	3579	11133	8008	40362	5126	0	23188	271	137505
370	9718	8466	10463	4971	458	2949	2	155	651	37831
380	75247	70926	86680	16163	5765	4391	35	1680	4292	265178
390	14583	13224	20795	3008	2989	664	3	763	1500	57528
400	83203	98782	86044	11986	10390	4457	39	3106	3298	301304
410	188755	112107	118650	12326	17696	4146	97	6067	3361	463205
420	61324	37108	11684	3189	14004	971	21	6424	1860	136584
430	275919	112090	51718	11819	12964	2826	66	3184	7326	477912
440	90133	84743	6305	5284	9314	233	3	2447	6924	205385
450	180026	68757	68644	55322	31634	48455	224	14650	6513	474224
470	128280	19472	43120	33043	28301	17975	22	15601	5086	290899
480	15741	1066	3217	2673	30682	1203	3	23879	293	78756
490	23802	1637	2365	2411	38076	1364	0	27926	1679	99261
500	149549	41095	13365	24977	70741	10270	5	18810	5099	333911
510	11592	808	432	799	10316	406	0	4948	975	30276
540	12557	1605	1382	1524	51433	820	0	33888	201	103410
550	144422	6859	12690	70346	94793	33384	21	34930	3091	400535
560	373771	85984	63621	34846	32463	14358	0	10704	9840	625586
580	27469	5457	3331	1022	2118	93	0	294	1637	41420
590	368306	67650	60851	29484	28865	11236	8	12019	10233	588652
600	425962	103894	34596	43971	128703	16255	68	76939	23749	854137
610	69166	13217	5232	7279	39467	4268	0	19001	1008	158639
620	56449	32769	9608	5568	19340	728	17	10057	7034	141572
630	3488	1139	59	108	7957	27	0	4897	562	18238
650	40870	13940	21151	6578	6211	9797	0	2819	2585	103950
700	87656	10166	149	20172	3178	29945	54	1902	1851	155073

Table E.12.7

Phase IV Chesapeake Bay Watershed Model
Forecasted 2000 Land Use

Model Segment	2000 FOREST Acres	2000 CONV. TILL Acres	2000 CONS. TILL Acres	2000 PASTURE Acres	2000 PERVIOUS Acres	2000 HAYLAND Acres	2000 MANURE Acres	2000 IMPERV. Acres	2000 WATER Acres	2000 Total Area Acres
710	37152	45222	14817	14920	9385	19838	228	5397	8062	155020
720	69503	83214	24001	27473	34731	39639	655	22647	1907	303770
730	130688	28196	49519	30407	13339	58158	353	7116	1079	318855
740	448729	46150	51940	170734	33121	102800	208	16394	5469	875545
750	36267	22125	11870	13812	4628	15180	38	2756	632	107307
760	33386	4935	14925	10426	6119	6026	39	2778	386	79021
770	30339	19474	15216	2974	2013	1086	9	228	56	71396
780	16269	10594	14358	1274	1988	455	12	465	0	45414
800	25904	6095	7282	3438	4011	2031	3	1259	977	51001
810	30380	32940	25339	8644	2180	3902	20	818	3787	108009
820	5344	2984	7145	1028	5775	231	2	2243	2113	26864
830	22573	22621	19292	2821	10371	596	2	3411	5366	87052
840	163076	31370	56001	4268	4796	738	16	1201	15407	276872
850	23461	2247	2707	2823	14553	1835	4	5551	1752	54933
860	5206	376	1135	942	23748	425	2	25478	1741	59053
870	7133	779	417	771	10585	392	0	5433	1748	27257
880	54777	6806	3315	5916	26459	2805	0	12018	3355	115451
890	9836	538	2721	1976	21851	1266	0	19308	648	58144
900	5637	53	106	1659	85602	476	0	47369	997	141898
910	66746	8499	3693	5888	51936	2200	1	20921	995	160878
920	215954	33699	30332	28811	53836	9949	21	12821	7875	393299
930	17309	6353	3022	1318	1425	88	0	269	2018	31801
940	161237	34416	22136	9022	9263	3703	0	3822	7054	250653
950	17654	2355	382	2167	21300	453	0	15197	3535	63043
960	14954	6140	466	633	69158	138	11	54149	8114	153765
970	24954	107	363	1269	6090	800	1	2899	249	36732
980	230882	40587	24313	22534	37299	9450	0	9619	9139	383823
990	8306	1812	796	828	5008	332	2	1795	2100	20978
=====										
23800418	3154013	2185991	4606609	2437825	3461479	8811	1159264	485780	41300191	

Table E.12.8

**Phase IV Chesapeake Bay Watershed Model
Forecasted 2005 Land Use**

	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total Area
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
10	1029203	114785	4094	204811	61154	232987	422	32299	11288	1691043
20	1873255	146651	14138	460273	99935	504037	565	46932	30628	3176414
30	818156	54168	11929	164762	82539	208523	317	39264	20687	1400343
40	572989	97133	63558	71790	44046	65357	101	23996	12267	951237
50	753527	32189	11203	36665	16461	50408	69	7435	6471	914429
60	2284917	83869	42001	108384	35548	134985	318	17471	17915	2725407
70	526865	93623	40868	64524	19446	85859	112	9833	8174	849303
80	770838	168129	138253	118377	46122	165789	724	25114	26617	1459963
90	411727	27988	21251	47439	8573	68802	213	3284	10812	600090
100	1063095	105532	62127	101696	35617	156992	683	14096	7391	1547230
110	394843	232346	124598	98025	84345	132713	645	47276	17672	1132463
120	43737	37026	11303	12546	4489	17133	255	2582	2867	131939
140	66551	45896	21317	18670	1894	20466	148	922	10033	185897
160	653888	13366	5774	98040	23510	53692	114	11429	4795	864608
170	681890	7801	2701	191884	10344	47166	49	5399	2965	950198
175	642836	13591	6851	84648	8072	41485	111	4029	4164	805788
180	145136	34970	55485	76575	20899	60494	203	12491	3094	409346
190	508624	23484	36812	261059	80832	100705	344	23697	4772	1040330
200	464480	32853	21215	211419	56786	92460	197	15459	5899	900768
210	182681	74400	98910	41563	29639	67254	214	16415	1952	513026
220	207113	21458	49302	118240	97098	59307	3	50531	7525	610577
230	507617	29004	40070	251392	56644	128268	64	10687	3124	1026871
235	116177	7240	6303	16807	4522	11238	0	1163	976	164424
240	144318	30178	15942	11340	5393	6046	0	1627	1033	215877
250	115093	3454	7814	40811	6218	24690	0	1640	14144	213864
260	288651	35581	16903	65497	16192	42454	0	4187	1903	471369
265	174387	153	613	34808	1654	8440	0	734	2612	223401
270	1459934	3972	12630	242452	46878	81106	67	19056	7300	1873394
280	1242707	13855	22959	334348	103255	162904	2	37720	14368	1932118
290	181890	12690	12843	51339	23722	30926	0	10300	5540	329249
300	466801	26161	27698	142007	18803	71163	30	7240	4294	764197
310	70715	7806	3036	9953	1499	3894	3	705	3532	101143
330	36380	2639	17392	11432	5947	7595	0	2205	1491	85080
340	42374	3308	10291	7403	43898	4738	0	25220	271	137505
370	9709	8458	10454	4968	482	2946	0	163	651	37831
380	75137	70822	86553	16148	6052	4384	26	1764	4292	265178
390	14511	13159	20693	2995	3193	661	1	815	1500	57528
400	83083	98639	85920	11971	10707	4450	36	3201	3298	301305
410	188168	111759	118281	12284	18706	4133	101	6413	3361	463205
420	60758	36765	11576	3161	14727	962	20	6756	1860	136584
430	275494	111917	51639	11808	13526	2822	59	3322	7326	477912
440	90162	84770	6307	5286	9266	233	3	2435	6924	205385
450	178961	68350	68238	55012	33338	48168	205	15439	6513	474224
470	127738	19390	42938	32912	28959	17899	14	15963	5086	290899
480	15922	1078	3254	2705	30527	1217	1	23758	293	78756
490	21789	1499	2165	2207	39617	1249	0	29056	1679	99261
500	145647	40022	13016	24327	75673	10002	4	20121	5099	333911
510	11046	770	411	761	10763	387	0	5163	975	30276
540	9737	1245	1071	1182	53855	636	0	35483	201	103410
550	138945	6599	12208	67683	102212	32117	15	37663	3091	400535
560	372224	85628	63357	34702	34245	14299	0	11292	9840	625586
580	27411	5445	3324	1020	2187	93	0	303	1637	41420
590	366132	67251	60492	29316	31106	11169	1	12952	10233	588652
600	420159	102479	34125	43359	134030	16033	80	80124	23749	854137
610	66798	12765	5053	7029	41759	4122	0	20105	1008	158639
620	55899	32450	9514	5513	20014	721	18	10408	7034	141572
630	3275	1069	56	101	8140	25	0	5009	562	18238
650	40597	13847	21009	6534	6635	9731	0	3012	2585	103950
700	87680	10168	149	20185	3153	29953	47	1887	1851	155073

Table E.12.8

**Phase IV Chesapeake Bay Watershed Model
Forecasted 2005 Land Use**

Model Segment	2005 FOREST Acres	2005 CONV. TILL Acres	2005 CONS. TILL Acres	2005 PASTURE Acres	2005 PERVIOUS Acres	2005 HAYLAND Acres	2005 MANURE Acres	2005 IMPERV. Acres	2005 WATER Acres	2005 Total Area Acres
710	36998	45034	14755	14851	9734	19755	234	5598	8062	155020
720	68771	82338	23749	27159	36289	39222	673	23663	1907	303770
730	130508	28157	49451	30341	13606	58079	377	7258	1079	318855
740	446966	45968	51736	170061	35277	102396	210	17462	5469	875545
750	36144	22049	11829	13765	4840	15128	37	2883	632	107307
760	33096	4892	14795	10345	6537	5974	29	2967	386	79021
770	30284	19438	15188	2970	2127	1084	8	241	56	71396
780	16209	10555	14306	1268	2115	453	12	495	0	45414
800	25737	6056	7235	3419	4230	2018	1	1328	977	51001
810	30359	32916	25321	8642	2233	3899	16	838	3787	108009
820	5140	2870	6874	990	6233	222	1	2420	2113	26864
830	22449	22497	19187	2807	10650	592	0	3503	5366	87052
840	163026	31361	55984	4268	4858	737	14	1216	15407	276872
850	22643	2169	2613	2728	15388	1771	0	5869	1752	54933
860	5248	379	1144	951	23717	428	1	25445	1741	59053
870	6611	722	386	714	11043	364	0	5669	1748	27257
880	52992	6584	3207	5723	28109	2714	0	12768	3355	115451
890	9025	493	2496	1813	22566	1161	0	19940	648	58144
900	2410	23	45	709	88525	203	0	48986	997	141898
910	64067	8158	3545	5652	54426	2112	1	21924	995	160878
920	212761	33201	29883	28385	57644	9802	20	13728	7875	393299
930	17276	6341	3017	1315	1469	88	0	277	2018	31801
940	160663	34294	22057	8990	9844	3690	0	4061	7054	250653
950	16779	2238	363	2060	21965	431	0	15672	3535	63043
960	10724	4403	334	456	72703	99	6	56925	8114	153765
970	24158	103	351	1229	6685	774	0	3182	249	36732
980	228850	40230	24099	22336	39593	9367	0	10210	9139	383823
990	7923	1728	759	789	5418	316	2	1942	2100	20978
=====										
	23718194	3138841	2174700	4588888	2532665	3451372	8241	1201511	485780	41300191

Table E.12.9

Phase IV Chesapeake Bay Watershed Model
Forecasted 2010 Land Use

	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total Area
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
10	1028807	114741	4093	204767	61553	232898	387	32510	11288	1691043
20	1872875	146621	14135	460465	100349	503935	280	47126	30628	3176414
30	819239	54239	11945	165029	81410	208799	268	38727	20687	1400343
40	573585	97234	63625	71879	43459	65425	87	23676	12267	951237
50	753817	32202	11207	36684	16227	50427	64	7330	6471	914429
60	2283915	83833	41983	108351	36328	134925	303	17855	17915	2725407
70	526600	93576	40848	64522	19717	85816	80	9970	8174	849303
80	770164	167982	138132	118262	46893	165644	735	25534	26617	1459963
90	411568	27977	21243	47418	8734	68776	216	3346	10812	600090
100	1062476	105470	62091	101620	36238	156901	700	14342	7391	1547230
110	393763	231710	124257	97744	86067	132350	656	48241	17672	1132463
120	43628	36935	11275	12508	4681	17091	261	2693	2867	131938
140	66517	45873	21307	18659	1953	20455	149	950	10033	185897
160	653847	13365	5774	98037	23545	53689	110	11446	4795	864608
170	681697	7799	2700	191826	10517	47153	52	5489	2965	950198
175	642506	13584	6847	84606	8342	41464	110	4164	4164	805788
180	144573	34835	55269	76288	21805	60259	191	13033	3094	409346
190	507295	23423	36716	260366	82713	100442	354	24249	4772	1040330
200	462380	32705	21119	210472	59709	92042	187	16255	5899	900768
210	181113	73761	98061	41247	32209	66676	171	17838	1952	513026
220	203458	21079	48432	116156	102385	58260	0	53282	7525	610577
230	505178	28865	39878	250202	60510	127651	45	11417	3124	1026871
235	115864	7220	6286	16761	4860	11207	0	1249	976	164424
240	144167	30146	15925	11329	5560	6040	0	1677	1033	215877
250	114851	3447	7797	40726	6537	24639	0	1724	14144	213864
260	287813	35478	16854	65307	17228	42331	0	4455	1903	471369
265	174390	153	613	34808	1652	8440	0	733	2612	223401
270	1459672	3971	12627	242414	47108	81092	61	19149	7300	1873394
280	1239771	13822	22905	333560	106330	162520	0	38843	14368	1932118
290	180682	12605	12758	50999	25062	30721	0	10882	5540	329249
300	466480	26143	27679	141923	19167	71114	17	7381	4294	764197
310	70640	7798	3033	9943	1568	3890	3	737	3532	101143
330	36181	2624	17296	11370	6248	7553	0	2316	1491	85080
340	40429	3156	9819	7064	45884	4521	0	26361	271	137505
370	9702	8452	10446	4965	502	2944	0	170	651	37831
380	75041	70732	86442	16136	6303	4379	18	1837	4292	265178
390	14450	13104	20606	2983	3367	658	0	859	1500	57528
400	82964	98499	85798	11956	11018	4444	34	3294	3298	301304
410	187666	111461	117966	12248	19569	4122	104	6709	3361	463205
420	60220	36439	11473	3134	15415	953	19	7071	1860	136584
430	275121	111766	51569	11799	14019	2818	51	3443	7326	477912
440	90191	84798	6309	5289	9217	233	2	2422	6924	205385
450	178206	68062	67950	54798	34546	47965	185	15998	6513	474223
470	127396	19338	42823	32833	29375	17851	5	16193	5086	290899
480	16162	1094	3303	2747	30322	1235	0	23599	293	78756
490	20819	1432	2069	2109	40360	1193	0	29600	1679	99261
500	141997	39019	12690	23719	80285	9751	2	21348	5099	333911
510	10778	751	401	743	10982	378	0	5268	975	30276
540	6813	871	750	827	56366	445	0	37138	201	103410
550	133468	6339	11727	65020	109631	30851	10	40397	3091	400535
560	370677	85272	63094	34557	36028	14239	0	11879	9840	625586
580	27354	5434	3317	1017	2255	93	0	313	1637	41420
590	363956	66851	60132	29144	33348	11103	0	13886	10233	588652
600	414354	101063	33653	42748	139359	15812	91	83309	23749	854137
610	64429	12312	4874	6780	44052	3975	0	21209	1008	158639
620	55349	32130	9421	5457	20688	714	20	10758	7034	141572
630	3062	1000	52	95	8322	24	0	5122	562	18238
650	43647	14887	22587	7024	1896	10462	0	861	2585	103950
700	87704	10171	149	20197	3127	29961	40	1872	1851	155073

Table E.12.9

**Phase IV Chesapeake Bay Watershed Model
Forecasted 2010 Land Use**

	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	Total Area
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
710	36843	44846	14694	14782	10082	19673	240	5799	8062	155020
720	68040	81462	23496	26846	37847	38805	690	24679	1907	303770
730	130328	28118	49383	30274	13872	57999	401	7400	1079	318855
740	445265	45793	51539	169411	37358	102006	211	18492	5469	875545
750	36018	21973	11788	13719	5055	15076	36	3011	632	107307
760	36345	5372	16247	11374	1868	6561	19	848	386	79021
770	30236	19407	15164	2966	2225	1082	7	252	56	71396
780	16160	10523	14262	1264	2221	452	13	519	0	45414
800	25587	6020	7193	3399	4428	2006	0	1390	977	51001
810	30336	32891	25302	8639	2289	3896	11	859	3787	108009
820	4974	2777	6652	959	6607	215	0	2566	2113	26864
830	22299	22346	19058	2788	10992	588	0	3615	5366	87052
840	162964	31349	55962	4268	4936	737	12	1236	15407	276872
850	22202	2127	2562	2675	15837	1737	0	6041	1752	54933
860	5380	389	1173	976	23618	439	0	25338	1741	59053
870	6356	695	371	687	11268	349	0	5784	1748	27257
880	51706	6425	3129	5584	29297	2648	0	13308	3355	115451
890	7684	420	2126	1544	23748	989	0	20985	648	58144
900	0	0	0	0	90707	0	0	50194	997	141898
910	61182	7790	3386	5398	57107	2017	0	23004	995	160878
920	209307	32662	29398	27925	61761	9643	19	14709	7875	393299
930	17244	6329	3011	1313	1513	88	0	285	2018	31801
940	160089	34171	21978	8958	10425	3676	0	4301	7054	250653
950	15905	2122	344	1952	22631	408	0	16147	3535	63043
960	6493	2666	202	279	76248	60	1	59700	8114	153765
970	23361	100	340	1189	7279	749	0	3465	249	36732
980	226816	39872	23885	22137	41888	9283	0	10802	9139	383823
990	7499	1636	719	747	5872	299	2	2104	2100	20978
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	23648084	3125928	2167494	4573688	2611886	3443232	7732	1236366	485780	41300191

Table E.12.10

Phase IV Chesapeake Bay Watershed Model
Forecasted 2015 Land Use

Model Segment	2015 FOREST Acres	2015 CONV. Acres	2015 TILLCONS. Acres	2015 TILL PASTURE Acres	2015 PERVIOUS Acres	2015 HAYLAND Acres	2015 MANURE Acres	2015 IMPERV. Acres	2015 WATER Acres	2015 Total Area Acres
10	1028579	114716	4092	204757	61782	232846	352	32632	11288	1691043
20	1872528	146594	14133	460660	100726	503842	0	47304	30628	3176414
30	820083	54295	11957	165248	80532	209014	219	38309	20687	1400343
40	574243	97345	63698	71976	42812	65500	72	23323	12267	951237
50	753891	32205	11208	36692	16167	50432	59	7303	6471	914429
60	2283157	83805	41969	108329	36919	134881	289	18145	17915	2725407
70	526385	93537	40831	64527	19937	85781	49	10081	8174	849303
80	769819	167907	138071	118198	47288	165570	746	25749	26617	1459963
90	411411	27966	21235	47398	8894	68749	218	3407	10812	600090
100	1061951	105418	62061	101552	36766	156823	717	14551	7391	1547230
110	393196	231376	124078	97591	86973	132159	668	48749	17672	1132463
120	43549	36868	11255	12478	4821	17060	267	2773	2867	131938
140	66491	45855	21299	18651	1998	20447	150	972	10033	185897
160	653798	13364	5773	98033	23586	53685	107	11467	4795	864608
170	681509	7797	2699	191770	10686	47140	56	5577	2965	950198
175	642203	13578	6844	84567	8590	41444	108	4288	4164	805788
180	144143	34731	55105	76072	22496	60080	180	13445	3094	409346
190	505929	23360	36617	259654	84648	100171	364	24816	4772	1040330
200	460336	32560	21026	209550	62555	91635	178	17030	5899	900768
210	180093	73346	97509	41056	33879	66301	128	18763	1952	513026
220	200481	20771	47724	114456	106691	57408	0	55522	7525	610577
230	502740	28725	39686	249012	64374	127035	27	12146	3124	1026871
235	115551	7201	6269	16716	5198	11177	0	1336	976	164424
240	144017	30115	15909	11317	5727	6033	0	1727	1033	215877
250	114610	3439	7781	40640	6855	24587	0	1807	14144	213864
260	286975	35375	16805	65117	18264	42208	0	4723	1903	471369
265	174390	153	613	34808	1652	8440	0	733	2612	223401
270	1459103	3969	12623	242325	47607	81060	55	19352	7300	1873394
280	1236835	13789	22851	332770	109404	162135	0	39966	14368	1932119
290	179467	12521	12672	50656	26412	30514	0	11468	5540	329249
300	466158	26125	27660	141838	19532	71065	4	7521	4294	764197
310	70566	7790	3029	9933	1636	3885	2	769	3532	101143
330	35969	2609	17195	11303	6569	7509	0	2435	1491	85080
340	37468	2925	9100	6546	48907	4190	0	28098	271	137505
370	9696	8447	10439	4962	519	2942	0	176	651	37831
380	74944	70641	86331	16124	6554	4373	9	1910	4292	265178
390	14389	13049	20519	2971	3542	655	0	904	1500	57528
400	82868	98385	85698	11944	11271	4439	32	3370	3298	301304
410	187236	111205	117695	12216	20309	4112	107	6963	3361	463205
420	59726	36140	11379	3109	16046	945	17	7361	1860	136584
430	274853	111657	51518	11795	14374	2815	44	3530	7326	477912
440	90182	84789	6308	5289	9233	233	2	2426	6924	205385
450	177496	67791	67679	54599	35680	47774	166	16524	6513	474224
470	126968	19273	42679	32728	29895	17791	0	16479	5086	290899
480	16043	1086	3278	2727	30424	1226	0	23678	293	78756
490	19427	1336	1930	1968	41425	1114	0	30381	1679	99261
500	137636	37821	12300	22992	85797	9452	1	22813	5099	333911
510	10484	731	391	722	11223	368	0	5383	975	30276
540	4070	520	448	494	58721	266	0	38689	201	103410
550	127991	6079	11246	62358	117050	29585	4	43131	3091	400535
560	369130	84916	62831	34413	37810	14180	0	12467	9840	625586
580	27297	5423	3310	1015	2323	93	0	322	1637	41420
590	361783	66452	59773	28969	35587	11037	0	14818	10233	588652
600	407922	99494	33131	42071	145262	15566	102	86839	23749	854137
610	62022	11852	4692	6527	46381	3827	0	22330	1008	158639
620	54784	31802	9325	5400	21381	707	21	11118	7034	141572
630	2824	922	48	87	8526	22	0	5247	562	18238
650	40024	13652	20713	6441	7526	9594	0	3416	2585	103950
700	87724	10174	149	20209	3106	29968	34	1859	1851	155073

Table E.12.10

Phase IV Chesapeake Bay Watershed Model
Forecasted 2015 Land Use

Model Segment	2015 FOREST Acres	2015 CONV. TILL Acres	2015 CONS. TILL Acres	2015 PASTURE Acres	2015 PERVIOUS Acres	2015 HAYLAND Acres	2015 MANURE Acres	2015 IMPERV. Acres	2015 WATER Acres	2015 Total Area Acres
710	36737	44716	14651	14732	10324	19616	246	5937	8062	155020
720	67505	80822	23312	26612	38984	38500	707	25421	1907	303770
730	130239	28099	49349	30229	14005	57959	425	7471	1079	318855
740	443656	45628	51353	168796	39326	101637	213	19466	5469	875545
750	35926	21916	11758	13684	5214	15037	35	3105	632	107307
760	32485	4802	14522	10174	7415	5864	9	3366	386	79021
770	30196	19382	15144	2964	2306	1081	6	261	56	71396
780	16117	10496	14225	1260	2311	451	13	540	0	45414
800	25461	5991	7158	3383	4594	1997	0	1442	977	51001
810	30314	32868	25284	8637	2340	3893	7	878	3787	108009
820	4802	2681	6421	926	6996	208	0	2717	2113	26864
830	22189	22236	18964	2774	11240	585	0	3697	5366	87052
840	162927	31342	55950	4269	4983	737	11	1247	15407	276872
850	21705	2079	2505	2615	16345	1698	0	6234	1752	54933
860	5223	377	1139	947	23735	426	0	25464	1741	59053
870	6075	664	355	656	11515	334	0	5911	1748	27257
880	50064	6221	3029	5407	30814	2564	0	13997	3355	115451
890	6523	357	1804	1310	24773	839	0	21890	648	58144
900	0	0	0	0	90707	0	0	50194	997	141898
910	57950	7379	3207	5113	60111	1910	0	24214	995	160878
920	206028	32150	28937	27488	65671	9492	19	15640	7875	393299
930	17212	6317	3005	1310	1557	88	0	293	2018	31801
940	159515	34049	21899	8926	11006	3663	0	4541	7054	250653
950	15030	2005	325	1845	23296	386	0	16622	3535	63043
960	2112	867	66	91	79920	19	0	62575	8114	153765
970	22565	97	328	1148	7874	723	0	3748	249	36732
980	224783	39515	23671	21939	44182	9200	0	11394	9139	383823
990	7086	1546	679	706	6314	283	2	2263	2100	20978
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	23565565	3110363	2154224	4556268	2708708	3433083	7249	1278951	485780	41300191

Table E.12.11

Phase IV Chesapeake Bay Watershed Model
Forecasted 2020 Land Use

Model Segment	2020 FOREST Acres	2020 CONV. Acres	2020 TILLCONS. Acres	2020 TILL PASTURE Acres	2020 PERVIOUS Acres	2020 HAYLAND Acres	2020 MANURE Acres	2020 IMPERV. Acres	2020 WATER Acres	2020 Total Area Acres
10	1028352	114690	4091	204746	62011	232795	317	32752.49	11288	1691043
20	1872181	146567	14130	460575	101104	503749	0	47481.05	30628	3176414
30	820927	54351	11970	165467	79652	209229	171	37890.3	20687	1400343
40	574901	97457	63771	72073	42165	65575	58	22970.75	12267	951237
50	753965	32208	11209	36701	16107	50437	55	7275.65	6471	914429
60	2282399	83777	41955	108308	37509	134836	274	18435.22	17915	2725407
70	526170	93499	40814	64532	20157	85746	18	10192.42	8174	849303
80	769474	167832	138009	118134	47683	165496	756	25963.61	26617	1459963
90	411254	27956	21227	47377	9053	68723	221	3468.05	10812	600090
100	1061425	105366	62030	101484	37294	156745	734	14759.74	7391	1547230
110	392629	231043	123899	97438	87877	131969	679	49256.13	17672	1132463
120	43470	36801	11234	12449	4961	17029	274	2853.62	2867	131939
140	66467	45838	21291	18643	2041	20440	151	993.22	10033	185897
160	653772	13364	5773	98033	23608	53683	103	11476.98	4795	864608
170	681355	7795	2699	191723	10823	47130	60	5648.99	2965	950198
175	641940	13572	6841	84534	8806	41427	107	4395.72	4164	805788
180	143750	34636	54955	75875	23128	59916	168	13823.38	3094	409346
190	504562	23297	36518	258942	86582	99901	373	25382.86	4772	1040330
200	458346	32419	20935	208653	65325	91239	168	17783.65	5899	900768
210	179082	72934	96961	40867	35536	65928	86	19680.62	1952	513026
220	197507	20463	47016	112758	110992	56556	0	57760.71	7525	610577
230	500302	28586	39493	247823	68239	126419	9	12875.12	3124	1026871
235	115237	7181	6252	16671	5536	11147	0	1423.37	976	164424
240	143866	30083	15892	11305	5894	6027	0	1777.81	1033	215877
250	114368	3432	7764	40554	7174	24535	0	1891.51	14144	213864
260	286137	35271	16756	64927	19300	42085	0	4990.64	1903	471369
265	174390	153	613	34808	1652	8440	0	733.34	2612	223401
270	1458533	3968	12618	242236	48107	81029	50	19555.24	7300	1873394
280	1233899	13756	22796	331980	112479	161750	0	41089.74	14368	1932118
290	178252	12436	12587	50312	27762	30307	0	12053.69	5540	329249
300	465836	26107	27640	141744	19898	71016	0	7662.23	4294	764197
310	70492	7781	3026	9923	1704	3881	1	801.47	3532	101143
330	35757	2593	17094	11236	6889	7465	0	2554.16	1491	85080
340	34555	2698	8392	6037	51881	3864	0	29806.33	271	137505
370	9690	8441	10433	4959	536	2941	0	181.17	651	37831
380	74864	70565	86238	16115	6764	4368	0	1971.58	4292	265178
390	14334	12999	20440	2959	3699	653	0	943.86	1500	57528
400	82785	98286	85612	11935	11491	4434	29	3435.48	3298	301304
410	186858	110980	117457	12188	20961	4104	110	7186.04	3361	463205
420	59288	35875	11296	3088	16606	939	16	7617.38	1860	136584
430	274660	111579	51482	11793	14628	2813	37	3592.52	7326	477912
440	90172	84780	6307	5288	9249	233	1	2430.45	6924	205385
450	176831	67537	67426	54413	36745	47595	147	17016.64	6513	474224
470	126519	19205	42528	32612	30441	17728	0	16780.42	5086	290899
480	15905	1077	3250	2704	30541	1216	0	23769.55	293	78756
490	18135	1247	1802	1837	42414	1039	0	31106.72	1679	99261
500	133489	36681	11930	22300	91038	9167	0	24207.05	5099	333911
510	10245	714	382	706	11418	359	0	5477.2	975	30276
540	1434	183	158	174	60985	94	0	40180.7	201	103410
550	122514	5818	10765	59693	124470	28319	0	45865.1	3091	400535
560	367583	84560	62567	34269	39592	14121	0	13054.64	9840	625586
580	27239	5411	3303	1013	2392	93	0	331.49	1637	41420
590	359608	66053	59414	28795	37828	10970	0	15751.34	10233	588652
600	401490	97926	32608	41395	151167	15321	114	90367.99	23749	854137
610	59615	11392	4510	6273	48710	3678	0	23451.61	1008	158639
620	54218	31474	9228	5343	22074	700	22	11478.74	7034	141572
630	2585	844	44	80	8730	20	0	5372.83	562	18238
650	39753	13559	20572	6398	7947	9529	0	3607.36	2585	103950
700	87745	10176	149	20220	3084	29975	27	1846.12	1851	155073

Table E.12.11

Phase IV Chesapeake Bay Watershed Model
Forecasted 2020 Land Use

	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Model	FOREST	CONV. TILL	CONS. TILL	PASTURE	PERVIOUS	HAYLAND	MANURE	IMPERV.	WATER	2020
Segment	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Total Area Acres
710	36630	44586	14608	14683	10565	19559	252	6076.13	8062	155020
720	66971	80182	23127	26379	40122	38195	725	26162.44	1907	303770
730	130149	28080	49315	30184	14138	57919	449	7541.97	1079	318855
740	442168	45475	51180	168228	41147	101296	215	20367.13	5469	875545
750	35834	21860	11728	13650	5372	14999	34	3199.43	632	107307
760	32196	4759	14392	10093	7830	5812	0	3554.31	386	79021
770	30161	19360	15127	2961	2377	1080	5	268.8	56	71396
780	16080	10471	14192	1256	2390	450	14	558.94	0	45414
800	25344	5963	7125	3367	4747	1987	0	1489.97	977	51001
810	30299	32851	25271	8637	2377	3892	3	891.95	3787	108009
820	4648	2595	6215	896	7343	201	0	2851.68	2113	26864
830	22079	22126	18870	2761	11489	583	0	3778.55	5366	87052
840	162902	31337	55941	4270	5014	737	9	1255.2	15407	276872
850	21246	2035	2452	2560	16813	1662	0	6412.96	1752	54933
860	5045	365	1100	915	23869	411	0	25607.84	1741	59053
870	5847	639	342	632	11715	321	0	6013.9	1748	27257
880	48561	6034	2938	5244	32203	2487	0	14627.76	3355	115451
890	5392	295	1492	1083	25769	694	0	22770.57	648	58144
900	0	0	0	0	90707	0	0	50194.1	997	141898
910	54845	6983	3035	4839	62997	1808	0	25376.05	995	160878
920	202837	31652	28489	27063	69474	9345	18	16545.58	7875	393299
930	17180	6305	3000	1308	1601	88	0	301.73	2018	31801
940	158941	33926	21820	8894	11587	3650	0	4780.56	7054	250653
950	14155	1888	306	1737	23962	363	0	17096.39	3535	63043
960	0	0	0	0	81690	0	0	63960.69	8114	153765
970	21768	93	317	1108	8469	698	0	4031.62	249	36732
980	222750	39157	23457	21741	46477	9117	0	11985.46	9139	383823
990	6696	1461	642	667	6731	267	2	2412.04	2100	20978
=====										
	23493833	3097751	2144635	4540571	2791418	3424541	7064	1314598	485780	41300191

Section E.13

Comparison of 1985 Phase II and 1985 Phase IV Watershed Model Land Use Data

Table E.13.1 is a comparison between the two different land use data sets used in Phase II (Section 4, Table E.4.1) and Phase IV (Section 12, Table E.12.1) of the Chesapeake Bay Watershed Model. Because some Phase II Watershed Model segments were subdivided for greater modeling accuracy into more segments in Phase IV, it was necessary to sum the land use of the subdivided Phase IV segments for comparison with the Phase II Watershed Model land use. Land use data for Phase IV was developed by "Hindcast" using methods previously described in section 12 from EMAP and the CBPLU database. The Equation used to calculate the difference in Phase IV and Phase II landuse was: Phase II subtracted from Phase IV divided by Phase IV. Because different databases were used in the development of the land use data we see that there are differences in the Phase II and Phase IV landuse, especially in urban vs. agriculture total acreages.

Table E.13.1

Percent Change Between Phase IV and Phase II Watershed Model Land Use with Respect to Phase IV Land Use Values

Model Segment	Conven. Till	Conserv. Till	Hayland	Pasture	Forest	Urban	Water	Total	Total Agriculture %	Total Urban %
10	-10.06	-20.51	5.69	19.13	4.43	-118.32	-8.74	0	10.72	-118.32
20	6.1	22.06	21.63	29.61	1.62	-190.55	-77.01	-0.01	22.31	-190.55
30	-20.38	-16.73	-2.81	22.08	3.2	18.93	-351.17	0	3.89	18.93
40	-44.39	4.48	8.9	64.15	0.2	-38.43	-9.23	0	7.81	-38.43
50	-25.31	18.82	-10.36	-86.2	9.78	-133.97	55.38	0	-33.98	-133.97
60	4.04	11.9	1.85	-22.29	1.47	-60.26	43.4	0	-3.83	-60.26
70	14.95	18.86	26.91	54.84	-15.57	-18.1	19.88	0	29.19	-18.1
80	10.99	0.4	9.35	41.85	-3.73	-102.44	94.36	0.01	15	-102.44
90	8.79	-45.24	-8.18	5.2	4.23	-44.7	-25.94	0	-5.67	-44.7
100	1.13	3.25	4.75	22.67	-1.06	-59.75	30.15	0	8.53	-59.75
110	7.97	-29.17	-13.21	-11.22	-4.35	-20.88	35.34	-0.09	-10.27	-20.88
120	37.53	-89.07	12.05	3.11	47.23	-3.49	90.29	0.2	9.61	-3.49
140	7.49	-10.23	1.87	-8.09	21.87	-1009	97.18	-0.02	-2.57	-1009
160	-11.04	-46.72	-13.6	-12.2	6.13	-42.53	-4.36	0	-14.05	-42.53
170	5.44	-7.7	9.67	24.96	-6.45	-53.66	21.22	0	21.44	-53.66
175	22.48	-47.72	-14.49	-22.81	9.27	-337.44	42.41	0	-16.8	-337.44
180	38.92	-15.41	6.43	19.52	1.16	-121.24	7.18	0	12.79	-121.24
190	-98.73	-4.16	-10.74	19.28	-15.82	57.55	26.24	0	6.29	57.55
200	13.09	17.05	5.03	2.05	-6.74	16.65	64.18	0	5.2	16.65
210	58.17	-43.26	-4.97	0.37	15.53	-113.34	-100.39	0	3.06	-113.34
220	76.99	-54.77	-22.16	14.94	4.84	-21.96	88.41	0	3.13	-21.96
230	-20.76	16.06	3.43	15.4	-11.88	24.56	28.3	0	10.53	24.56
235	25.52	-5.6	11.15	58.14	-5.47	-173.98	-23.18	0	32.25	-173.98

240	87.04	-67.58	49.45	84.86	-22.07	-53.64	-74.08	0	56.14	-53.64
250	-74.56	37.08	33.46	45.08	-26.69	-73.16	72.54	0	32.79	-73.16
260	27.31	9.26	28.83	64.17	-15.14	-130.42	63.16	0	39.49	-130.42
265	-1.53	-78.58	-35.4	45.52	-8.67	8.98	100	0	29.26	8.98
270	-95.58	-171.63	-109.96	4.7	6.56	10.09	74.78	0	-29.73	10.09
280	15.78	-14.78	-0.32	19.41	-8.34	41.81	31.9	0.01	12.18	41.81
290	32.96	-60.75	25.1	41.41	-19.69	24.08	21.19	0.01	27.69	24.08
300	-52.99	17.3	18.81	40.46	-12.36	-36.61	72.52	0	23.76	-36.61
310	-248.39	71.74	93.15	58.47	-0.35	-545.18	8.41	0	39.22	-545.18
330	24.27	33.98	31.55	41.2	31.23	-380.4	-113.35	0	35.45	-380.4
340	-14.19	13.19	5.96	12.27	14.41	-3.06	-3299.8	0	7.88	-3.06
360	41.84	-45.68	13.89	77.18	-0.34	-56.07	-61.85	-0.01	13.73	-56.07
370	72.35	10.2	44.4	70.88	-37.11	-1991.8	-60.49	-0.01	53.29	-1991.83
380	65.31	-81.76	2.1	82.53	-2.25	-364.72	-48.51	-0.01	13.58	-364.72
390	14.9	-8.42	8.57	82.34	-2.61	-163.58	-48.08	-0.01	15.27	-163.58
400	36.14	-34.2	16.17	81.19	-18.57	-181.36	35.81	0	18.98	-181.36
410	50.57	-53.82	-22.29	84.25	-15.98	-113.78	100	-0.01	18.76	-113.78
420	39.42	-49.92	31.26	81.77	-30.79	-2.2	100	-0.01	31.4	-2.2
430	68.58	-272.32	24.41	76.68	-17.73	-68.49	80.58	-0.01	28.01	-68.49
440	48.3	-38.16	35.87	74.97	-37.2	47.35	-109.16	-0.01	35.69	47.35
450	39.65	-9.92	20.84	23.37	10.3	-176.95	97.1	0.01	18.76	-176.95
460	-115.03	-70.92	-73.26	-36.55	1.3	64.82	71.81	0.33	-64.34	64.82
470	40.92	23.09	32.11	38.33	31.96	-208.55	92.31	0	33.36	-208.55
480	-21.25	-73.69	-43.86	-38.31	0.55	53.6	8.41	0.34	-44.65	53.6
490	16.82	-51.22	4.98	-6.23	14.76	-6.71	73.44	0.02	-9.17	-6.71
500	34.86	-16.49	25.86	80.02	2.06	-58.83	-14.72	0	44.54	-58.83
510	50.63	-73.46	-33.32	31.44	5.49	-5.21	-26.3	0	5.8	-5.21
520	29.39	-49.99	-7.07	57.02	-4.68	-80.35	-91.63	-0.24	20.25	-80.35
530	6.06	-34.37	-11.81	49.99	-7.19	8.38	-20.98	0.01	11.06	8.38
540	-159.13	-245.64	-239.55	-38.82	-99.06	33.93	-208.47	-0.01	-149.26	33.93
550	61.03	-62.27	-12.31	30.65	5.08	46.04	28.51	0.18	11.63	46.04
560	5.88	17.01	39.06	62.55	-11.71	12	-56.32	0	23.46	12
570	-16.93	64.02	54.37	61.8	1.54	61.85	15.59	0.18	32.87	61.85
580	-3.43	-2823.2	-7.76	19.74	13.54	9.45	-61.74	0	-31.31	9.45
590	34.11	17.48	33.54	65.5	-7.63	-76.27	-66.16	0	35.53	-76.27
600	34.61	31.29	59.01	67.68	-19.86	43.44	-4.29	0.1	44.36	43.44
610	51.39	-78.41	-6.91	56.52	-29.99	35.69	57.56	0.01	15.09	35.69
620	39.19	-37.09	57.33	62.32	-27.04	37.53	54.91	0.07	22.64	37.53
630	-2.59	-1137.7	90.76	64.46	-48.06	70.97	100	0.32	-68.78	70.97
640	29.55	-1447.6	-171.86	30.7	-131.8	45.56	27.91	0.03	-139.9	45.56

Note: Positive values indicate a larger acreage of a particular land use in the Phase II data base
Negative values indicate a larger acreage of a particular land use in the Phase IV data base

Section E.14

Manure Acres by Phase IV Chesapeake Bay Watershed Model Segment

The influence that agricultural livestock and farm animals have on the Chesapeake Bay watershed was determined by a mass balance of manure for each segment of the Phase IV Watershed Model. This is done by estimating populations of animal types in each segment and assuming average nutrient levels in average amounts of manure voided for each animal type (Table E.14.1)¹⁷. Six animal types are used in the calculations of this mass balance. These animal types are beef, dairy, swine, poultry (layers), poultry (broilers), and turkeys. Horse and sheep populations were not included in the manure mass balance. To estimate manure voided by each animal type within a segment animal units (AU) are used. An animal unit is defined as 1000 pounds of animal weight. One animal unit corresponds to 0.71 dairy cows, one beef cow, five swine, 250 poultry layers, 500 poultry broilers, or 100 turkeys (Table E.14.1). Animal population numbers were derived for each Phase II Watershed Model segment and for each year between 1984 and 2000 with an interpolation of the 1982 and the 1992 Agricultural Census published by the U.S. Department of Commerce, Bureau of the Census for the six states within the Chesapeake Bay Watershed. The percentage of area in a segment for each county is used to associate the proportion of animal units from counties found in each segment.

Table E.14.1

Estimated Quantities of Voided Manure from Livestock and Poultry. Normalized to 1,000 pounds body weight.

Animal Type	Animals/ Animal Units	Wet Manure Voided (tons/yr)	P (lb/yr)	N (lb/yr)	COD (lb/yr)
Dairy	0.71	14.9	21	123	3340
Beef	1	6.7	18	61	1510
Swine	5	11.7	37	160	2080
Poultry, layers	250	9.7	100	235	4353
Poultry, broilers	500	13.1	110	390	5915
Turkeys	100	10.2	84	304	4599

Source: (U.S. EPS, 1979) Animal Waste Utilization on Cropland and Pasture land.

¹⁷ 1982 Census of Agriculture, Volume 1, Geographic Area Series, published by the U.S. Department of Commerce, Washington D.C.

This mass balance distributes the manure nutrients voided into the following four groups: confined/never susceptible to runoff; confined/susceptible to run off; confined/susceptible to run off with BMPs able to be implemented; and pasture (Table E.14.2). Manure acres have previously been used in the model to simulate stream runoff of manure nutrients from an impervious surface. This mass balance uses the same terminology as used in the Phase II Watershed Model to describe nutrients that go to the land use category of Manure Acres. Best Management Practices are incorporated into the model by adjusting the percentage of manure voided between two of the confined groups (confined/susceptible to run off and confined/susceptible to run off with BMPs able to be implemented). Because some confined manure is always susceptible to runoff, BMPs will never be 100% efficient.

Table E.14.2 Distribution of TN from Manure for Each Segment in the Calculation of the Mass Balance of Manure for the Watershed Model.				
Animal Type	Confined/ Susceptible	Confined/ Susceptible (BMP's can be Implemented)	Confined/ Never Susceptible	Pasture
Dairy	0.2	0.8	0	0
Beef (Segment w/out snow)	0	0	0	1.0
Beef (Segment w/ snow)	0.04	0.16	0	0.80
Swine	0.2	0.8	0	0
Poultry, layers	0.01	0.14	0.85	0
Poultry, broilers	0.01	0.14	0.85	0
Turkeys	0.01	0.14	0.85	0

To determine Manure Acres, the number of animal units in the susceptible to runoff mass balance groups are added for a segment and then divided by 145. This indicates the density of animals units that are indicative of a concentrated animal feedlot.

The breakdown of each animal types into the four groups used in this mass balance follow. Dairy are in confined areas 100% of the time. Dairy are further divided into the

three confined groups as follows: 20% in confined/susceptible to runoff, 80% confined susceptible to runoff (BMPs able to be implemented), and 0% confined/never susceptible to runoff.

Beef are found 100% of the time in the pasture, except for segments that have snow on the ground a portion of the year. Beef in these segments are in confined areas 20% of the year (4% of the total time in confined/susceptible to runoff, and 16% in confined susceptible to runoff [BMPs able to be implemented]).

Swine are in confined areas 100% of the time. Swine are further divided into the three confined groups as follows: 1% in confined/susceptible to runoff, 16% confined susceptible to runoff (BMPs able to be implemented), and 85% confined/never susceptible to runoff.

All poultry (including poultry [layers], poultry [boilers] and turkeys) are found in confined areas 100% of the time. Poultry are further divided into the three confined groups as follows: 1% in confined/susceptible to runoff, 16% confined susceptible to runoff (BMPs able to be implemented), and 85% confined/never susceptible to runoff.

For an overview of manure mass balance for the Chesapeake Bay basin see Appendix B: Development of An Animal Waste Nutrient Mass Balance To Determine Pasture Loading and Compare Cropland Inputs in this volume. This appendix explains in greater detail the aggregation of agricultural census data to animal units per segment. It also explains how mass balance of animal nutrient waste is used to determine a nutrient load to pasture, and to revise a previously calculated manure application rates to cropland.

Table E.14.3

Phase IV Chesapeake Bay Watershed Model
Manure Acres by Model Segment 1985-2000

Segment	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
10	561	554	547	540	533	526	519	512	505	498	491	484	477	470	463	456
20	1,707	1,649	1,592	1,535	1,478	1,421	1,364	1,307	1,250	1,193	1,136	1,079	1,022	965	908	851
30	511	502	492	482	472	463	453	443	433	424	414	404	395	385	375	365
40	157	155	152	149	146	143	140	138	135	132	129	126	123	121	118	115
50	87	86	85	84	84	83	82	81	80	79	78	77	76	75	74	73
60	376	373	370	367	364	361	358	356	353	350	347	344	341	338	335	332
70	236	230	224	218	211	205	199	193	186	180	174	168	162	155	149	143
80	680	682	685	687	689	691	693	695	698	700	702	704	706	709	711	713
90	203	204	204	205	205	206	206	207	207	208	208	209	209	210	210	211
100	615	618	622	625	628	632	635	639	642	646	649	652	656	659	663	666
110	600	602	604	607	609	611	613	616	618	620	623	625	627	629	632	634
120	229	231	232	233	235	236	237	238	240	241	242	243	245	246	247	248
140	143	144	144	144	144	145	145	145	145	145	146	146	146	146	147	147
160	128	127	127	126	125	125	124	123	122	122	121	120	120	119	118	117
170	34	35	35	36	37	38	38	39	40	41	41	42	43	43	44	45
175	116	116	115	115	115	115	114	114	114	114	113	113	113	113	112	112
180	248	246	244	241	239	237	235	232	230	228	225	223	221	219	216	214
190	305	307	309	311	312	314	316	318	320	322	324	326	328	330	332	334
200	235	233	231	229	227	225	224	222	220	218	216	214	212	210	208	206
210	384	375	367	358	350	341	333	324	316	307	299	290	282	273	265	256
220	84	80	75	71	67	63	59	55	51	47	43	39	35	31	27	23
230	136	133	129	125	122	118	114	111	107	104	100	96	93	89	85	82
235	10	9	9	8	8	7	6	6	5	4	4	3	3	2	1	1
240	4	4	3	3	3	2	2	1	1	0	0	0	0	0	0	0
250	18	17	16	15	14	13	13	12	11	10	9	8	7	6	6	5
260	25	23	22	21	19	18	17	15	14	13	12	10	9	8	6	5
265	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
270	89	88	87	86	84	83	82	81	80	79	78	77	75	74	73	72
280	79	76	72	68	64	60	56	52	49	45	41	37	33	29	25	22
290	26	23	21	18	16	13	11	9	6	4	1	0	0	0	0	0
300	82	79	77	74	71	69	66	64	61	58	56	53	51	48	45	43
310	6	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4
330	13	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
340	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
370	8	8	8	7	7	6	6	6	5	5	4	4	4	3	3	2
380	61	59	58	56	54	52	51	49	47	45	44	42	40	38	37	35
390	9	9	8	8	7	7	7	6	6	5	5	4	4	4	3	3
400	46	45	45	45	44	44	43	43	42	42	41	41	40	40	39	39
410	88	89	89	90	90	91	92	92	93	94	94	95	96	96	97	97
420	25	25	25	24	24	24	24	23	23	23	23	22	22	22	21	21
430	88	86	85	83	82	80	79	77	76	75	73	72	70	69	67	66
440	5	5	5	4	4	4	4	4	4	4	4	4	4	3	3	3
450	281	277	273	270	266	262	258	254	250	247	243	239	235	231	228	224
470	48	46	45	43	41	40	38	36	34	33	31	29	27	26	24	22
480	6	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3

Table E.14.3

Phase IV Chesapeake Bay Watershed Model
Manure Acres by Model Segment 1985-2000

Segment	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
490	6	6	6	5	5	4	4	4	3	3	2	2	2	1	1	0
500	9	9	9	8	8	8	8	7	7	7	6	6	6	6	5	5
510	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
540	7	6	6	5	5	4	4	4	3	3	3	2	2	1	1	0
550	38	37	36	33	32	32	31	30	29	28	27	25	24	23	22	21
560	26	23	20	17	13	10	7	4	1	0	0	0	0	0	0	0
580	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
590	28	27	25	24	23	21	20	19	17	16	15	13	12	11	9	8
600	34	36	39	41	43	45	48	50	52	55	57	59	61	64	66	68
610	5	4	4	4	3	3	3	2	2	2	1	1	1	0	0	0
620	14	14	14	15	15	15	15	15	16	16	16	16	17	17	17	17
630	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	75	73	72	69	68	66	66	65	64	62	61	59	58	57	55	54
710	209	210	212	214	215	217	217	218	219	220	221	223	224	225	226	228
720	603	607	610	614	617	621	624	628	631	635	638	641	645	648	652	655
730	281	285	290	295	300	305	309	314	319	324	329	333	338	343	348	353
740	202	203	203	204	204	205	205	205	205	206	206	206	207	207	207	208
750	41	41	41	40	40	40	40	40	40	39	39	39	39	38	38	38
760	69	67	65	63	61	59	57	55	53	51	49	47	45	43	41	39
770	12	12	12	11	11	11	11	11	11	11	10	10	10	9	9	9
780	10	10	10	10	10	10	11	11	11	11	11	11	11	11	12	12
800	12	11	11	10	9	8	8	8	7	7	6	6	5	5	4	3
810	32	31	30	29	28	27	27	26	25	24	24	23	22	21	20	20
820	5	5	4	4	4	4	4	3	3	3	3	3	2	2	2	2
830	11	10	10	9	8	8	7	7	6	5	5	4	4	3	2	2
840	21	21	20	20	19	19	19	19	18	18	18	17	17	16	16	16
850	15	14	14	13	12	11	10	10	9	8	7	7	6	5	4	4
860	5	5	4	4	4	4	4	3	3	3	3	3	3	2	2	2
870	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
880	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
890	5	5	5	4	4	4	3	3	3	3	2	2	1	1	0	0
900	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
910	4	4	4	3	3	3	3	3	3	3	2	2	2	2	2	1
920	23	23	22	22	22	22	22	22	22	21	21	21	21	21	21	21
930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
940	6	5	5	4	3	3	2	1	1	0	0	0	0	0	0	0
950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
960	27	26	25	24	23	22	21	19	18	17	16	15	14	13	12	11
970	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1
980	5	5	4	4	3	3	2	2	1	1	0	0	0	0	0	0
990	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Section E.15

Phase IV Chesapeake Bay Watershed Model Below Fall Line Subsegments and Chesapeake Bay Water Quality Model Cell Linkage

In an effort to refine linkage between the Phase IV Watershed Model and the Chesapeake Bay Water Quality/Ecosystem Models, a new and more extensive segmentation was developed for the below fall line segments. Using GIS methodologies, subsegments were created based on hydrologic boundaries and the relative position of adjoining Chesapeake Bay Water Quality Model cells. The resulting final cover of subsegments contains 255 segments as compared to the Phase IV Watershed Model below fall line segment count of 43 segments (Figure E.15.1). Note that the Phase IV Watershed Below Fall-line Segments were renumbered in the subsegmentation GIS coverage. Thus, the Phase IV Watershed Model segment numbers do not correspond directly with the Phase IV Watershed Model subsegment numbers.

The final subsegmentation coverage was overlaid on the Chesapeake Bay Program Land Use (CBPLU) database to determine land use distribution within each subsegment. Acreage for forest, pervious urban, and impervious urban land use categories were obtained from the subsequent GIS overlay. Agricultural land use acres were determined by applying a proportional split based on the CBPLU Herbaceous cover within the subsegment and the distribution of Agricultural land uses in the parent Phase IV Watershed Model segment as provided in section E.8.

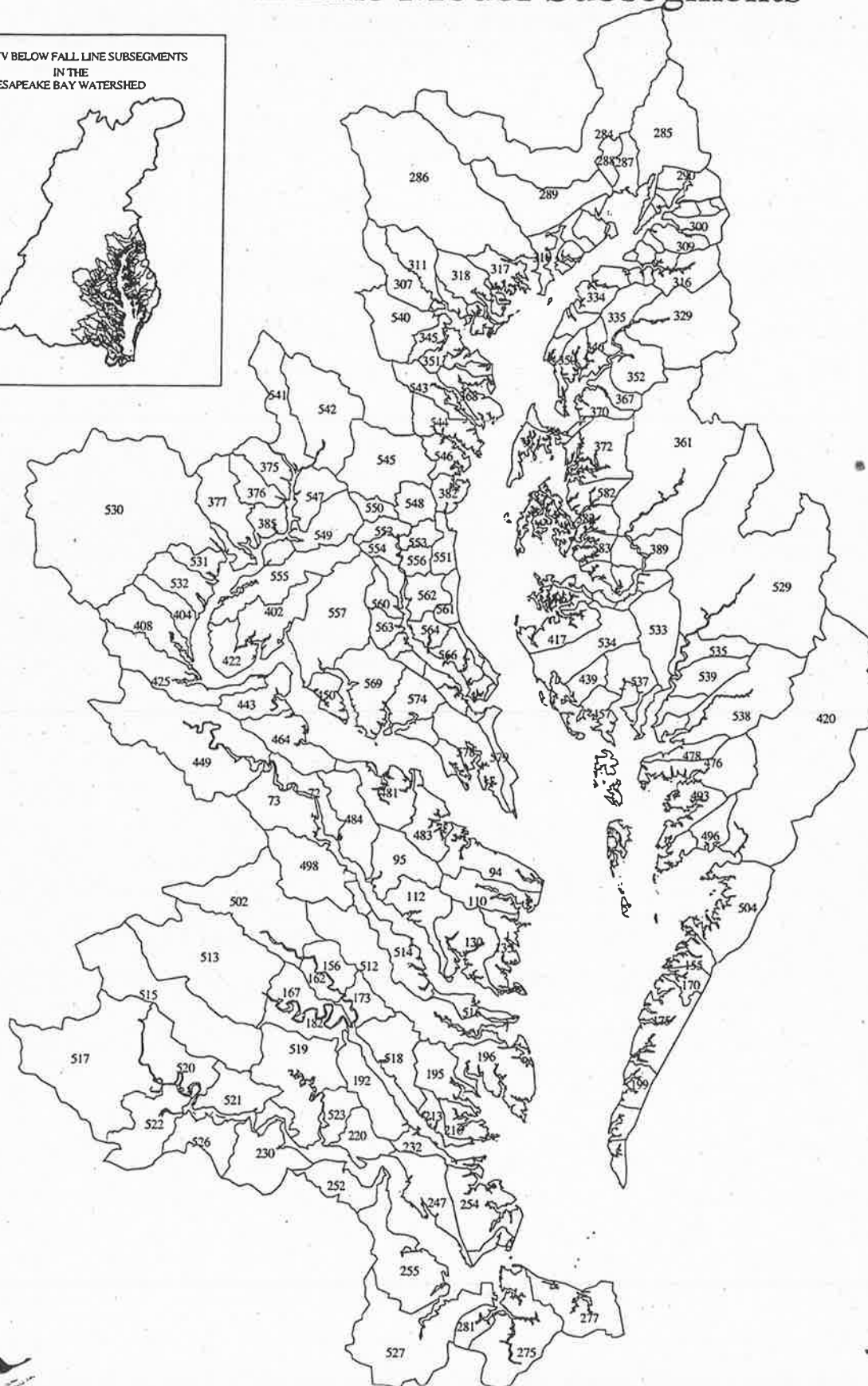
As part of the effort to support a more comprehensive multimedia loading simulation of the Chesapeake Bay, more refined linkages among the models have been forged. In this case, the Phase IV Watershed Model results are supplied as input information for the Chesapeake Bay Water Quality Model (Figure E.15.2). To achieve this linkage, a spatial relationship between the two model segmentation schemes was developed based on geographical information. An overlay of the Phase IV Watershed Model subsegment GIS coverage and the Chesapeake Bay Water Quality Model cell GIS coverage was performed (Figure E.15.3). The overlay helped to determine which Chesapeake Bay Water Quality Model cells would be loaded by which Phase IV Watershed Model Subsegment.

There are some cases where one subsegment discharges loads to the Chesapeake Bay Water Quality Model into more than one Tributary cell. In this case, the loading is proportionally divided by the number of cells to be loaded, as in subsegment 461 which discharges into tributary cells 163 and 164 (Table E.15.1). The following table shows each segment, and its respective subsegment where applicable, that discharges loads into multiple cells. The maximum count is the number of cells that the individual segment feeds.

The fifth column in Table E.15.1 shows the loading factor which is applied to the Phase IV Watershed Model loads in order to calculate the segment's input into the specific cell.

Phase IV Chesapeake Bay Watershed Model Below Fall Line Model Subsegments

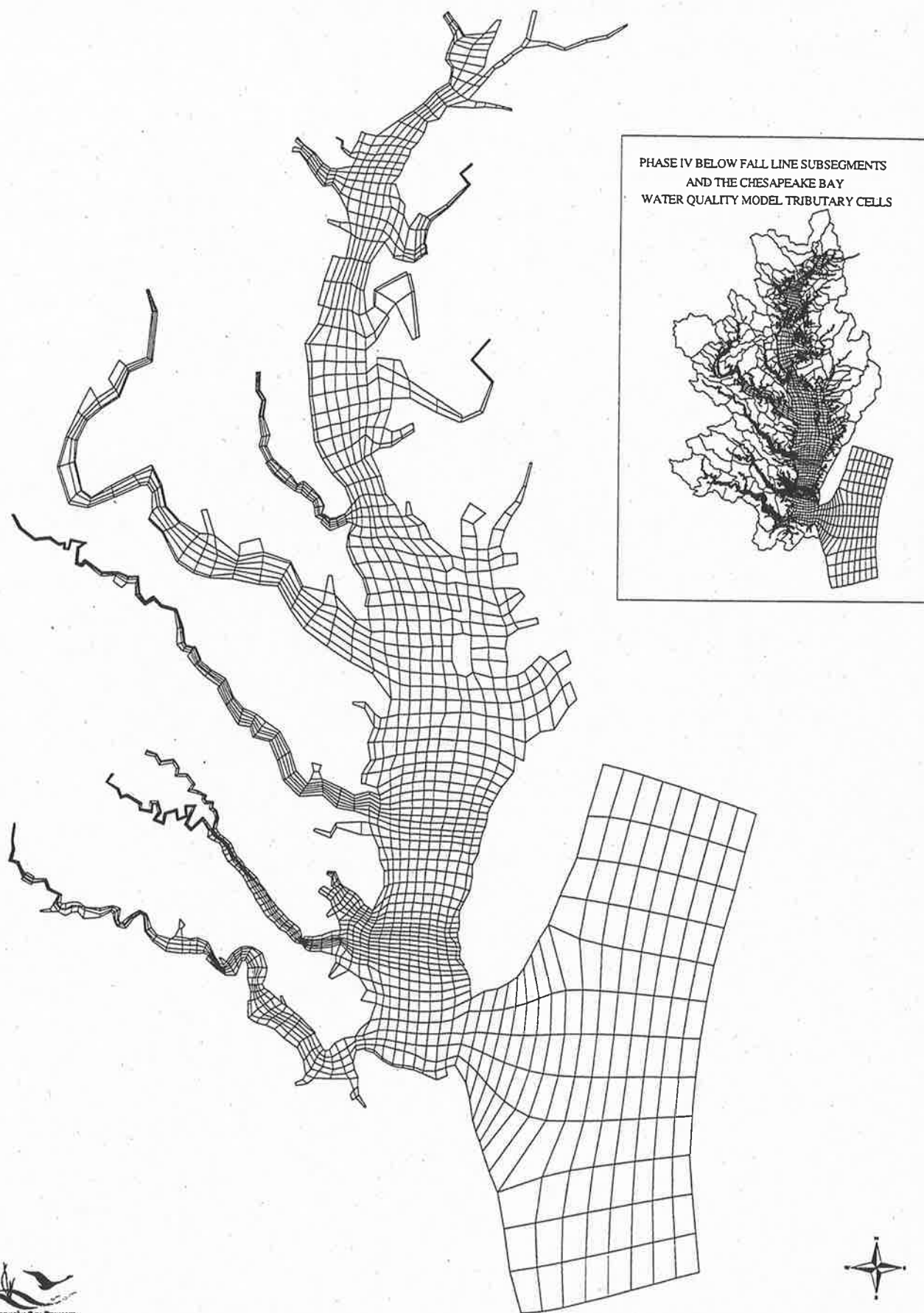
PHASE IV BELOW FALL LINE SUBSEGMENTS
IN THE
CHESAPEAKE BAY WATERSHED



KJH Map Date: July, 1997 /models/khopkins/maps/appendix

Source: U.S. E.P.A. Chesapeake Bay Program Modeling Team

Chesapeake Bay Water Quality Model



KJH Map Date: July, 1997 /modgis/khopkins/maps/appendix/ptnb.ps

Source: Chesapeake Bay Program Modeling Team

Phase IV Chesapeake Bay Watershed Model

Below Fall Line Model Subsegments

Chesapeake Bay Water Quality Model Cells

-  Phase IV WSM Segments
 Water Quality Model Cells

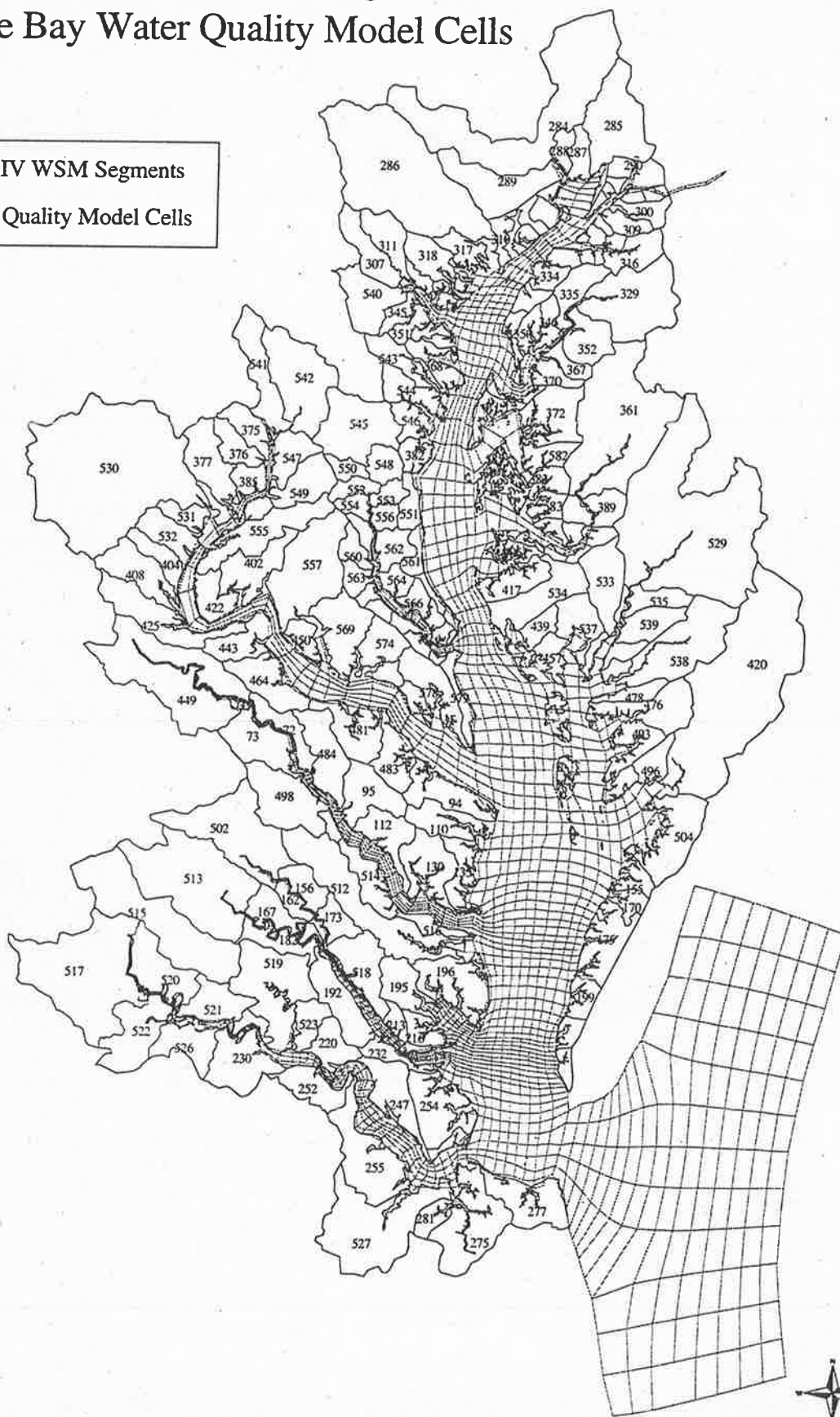


Table E.15.1

Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay Water Quality Model Cells, and Loading Factors

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
370	300	685	2	0.5	430	493	158	20	0.05
370	309	684	2	0.5	430	493	157	20	0.05
380	350	507	16	0.0625	430	499	156	20	0.05
380	350	506	16	0.0625	430	476	144	20	0.05
380	350	434	16	0.0625	430	493	143	20	0.05
380	350	368	16	0.0625	430	493	142	20	0.05
380	350	305	16	0.0625	430	499	141	20	0.05
380	329	236	16	0.0625	430	499	131	20	0.05
380	335	235	16	0.0625	430	499	122	20	0.05
380	335	234	16	0.0625	430	496	121	20	0.05
380	346	233	16	0.0625	430	420	113	20	0.05
380	352	177	16	0.0625	440	239	247	41	0.02439
380	352	176	16	0.0625	440	239	246	41	0.02439
380	352	175	16	0.0625	440	239	245	41	0.02439
380	367	174	16	0.0625	440	155	212	41	0.02439
380	370	173	16	0.0625	440	155	211	41	0.02439
380	370	172	16	0.0625	440	170	210	41	0.02439
380	370	171	16	0.0625	440	175	209	41	0.02439
390	372	300	1	1	440	175	208	41	0.02439
400	395	298	6	0.16667	440	175	207	41	0.02439
400	407	297	6	0.16667	440	175	206	41	0.02439
400	409	227	6	0.16667	440	175	205	41	0.02439
400	400	168	6	0.16667	440	175	204	41	0.02439
400	389	146	6	0.16667	440	175	203	41	0.02439
400	361	132	6	0.16667	440	175	202	41	0.02439
410	535	167	5	0.2	440	175	201	41	0.02439
410	539	166	5	0.2	440	175	200	41	0.02439
410	539	165	5	0.2	440	175	199	41	0.02439
410	461	164	5	0.2	440	199	198	41	0.02439
410	461	163	5	0.2	440	199	197	41	0.02439
420	478	225	4	0.25	440	199	196	41	0.02439
420	466	162	4	0.25	440	199	195	41	0.02439
420	478	161	4	0.25	440	218	194	41	0.02439
420	478	145	4	0.25	440	218	193	41	0.02439
430	476	224	20	0.05	440	218	192	41	0.02439
430	476	223	20	0.05	440	218	191	41	0.02439
430	493	220	20	0.05	440	218	190	41	0.02439
430	493	219	20	0.05	440	218	189	41	0.02439
430	493	218	20	0.05	440	239	188	41	0.02439
430	499	217	20	0.05	440	239	187	41	0.02439
430	499	216	20	0.05	440	239	186	41	0.02439
430	476	160	20	0.05	440	239	185	41	0.02439
430	493	159	20	0.05	440	239	184	41	0.02439
440	239	183	41	0.02439	500	564	1628	34	0.02941

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
440	155	153	41	0.02439	500	563	1626	34	0.02941
440	155	152	41	0.02439	500	564	1606	34	0.02941
440	504	138	41	0.02439	500	567	1603	34	0.02941
440	504	128	41	0.02439	500	566	1584	34	0.02941
440	504	121	41	0.02439	500	570	1581	34	0.02941
440	504	120	41	0.02439	500	566	1561	34	0.02941
440	504	119	41	0.02439	500	573	1558	34	0.02941
440	504	112	41	0.02439	500	566	1535	34	0.02941
450	288	1204	8	0.125	500	573	1532	34	0.02941
450	284	1203	8	0.125	500	566	1508	34	0.02941
450	289	1202	8	0.125	500	573	1505	34	0.02941
450	288	1148	8	0.125	500	573	1476	34	0.02941
450	289	1145	8	0.125	500	573	1446	34	0.02941
450	287	1075	8	0.125	500	576	1412	34	0.02941
450	289	1073	8	0.125	500	577	1408	34	0.02941
450	287	980	8	0.125	500	576	1373	34	0.02941
470	317	1201	3	0.33333	500	577	1370	34	0.02941
470	317	1145	3	0.33333	500	576	1334	34	0.02941
470	286	1062	3	0.33333	500	580	1330	34	0.02941
480	311	1416	4	0.25	500	576	1291	34	0.02941
480	311	1415	4	0.25	500	580	1287	34	0.02941
480	307	1414	4	0.25	510	543	1192	1	1
480	307	1376	4	0.25	540	542	1829	1	1
490	540	1413	8	0.125	550	530	1760	2	0.5
490	345	1374	8	0.125	550	531	1759	2	0.5
490	351	1335	8	0.125	560	449	1995	89	0.01124
490	351	1292	8	0.125	560	449	1994	89	0.01124
490	355	1248	8	0.125	560	449	1993	89	0.01124
490	355	1194	8	0.125	560	449	1985	89	0.01124
490	359	1137	8	0.125	560	449	1975	89	0.01124
490	359	1054	8	0.125	560	449	1973	89	0.01124
500	553	1728	34	0.02941	560	449	1965	89	0.01124
500	552	1727	34	0.02941	560	449	1963	89	0.01124
500	554	1726	34	0.02941	560	449	1955	89	0.01124
500	556	1708	34	0.02941	560	449	1953	89	0.01124
500	559	1706	34	0.02941	560	449	1945	89	0.01124
500	562	1688	34	0.02941	560	449	1943	89	0.01124
500	559	1686	34	0.02941	560	449	1935	89	0.01124
500	562	1668	34	0.02941	560	449	1933	89	0.01124
500	559	1666	34	0.02941	560	449	1925	89	0.01124
500	562	1648	34	0.02941	560	449	1923	89	0.01124
500	560	1646	34	0.02941	560	449	1915	89	0.01124
500	560	1645	34	0.02941	560	449	1913	89	0.01124
560	449	1905	89	0.01124	560	116	1521	89	0.01124

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
560	449	1903	89	0.01124	560	112	1498	89	0.01124
560	449	1894	89	0.01124	560	514	1494	89	0.01124
560	449	1892	89	0.01124	560	112	1468	89	0.01124
560	449	1883	89	0.01124	560	514	1464	89	0.01124
560	449	1880	89	0.01124	560	112	1439	89	0.01124
560	449	1878	89	0.01124	560	514	1435	89	0.01124
560	449	1868	89	0.01124	560	112	1401	89	0.01124
560	449	1866	89	0.01124	560	514	1397	89	0.01124
560	449	1856	89	0.01124	560	112	1363	89	0.01124
560	449	1854	89	0.01124	560	514	1359	89	0.01124
560	449	1844	89	0.01124	560	130	1323	89	0.01124
560	449	1839	89	0.01124	560	514	1319	89	0.01124
560	449	1826	89	0.01124	560	130	1280	89	0.01124
560	449	1823	89	0.01124	560	130	1279	89	0.01124
560	72	1809	89	0.01124	560	130	1278	89	0.01124
560	449	1807	89	0.01124	560	516	1273	89	0.01124
560	72	1792	89	0.01124	560	130	1234	89	0.01124
560	73	1790	89	0.01124	560	516	1229	89	0.01124
560	72	1776	89	0.01124	560	130	1180	89	0.01124
560	73	1774	89	0.01124	560	516	1175	89	0.01124
560	72	1758	89	0.01124	560	189	1174	89	0.01124
560	73	1756	89	0.01124	560	516	1096	89	0.01124
560	72	1741	89	0.01124	560	189	1095	89	0.01124
560	73	1739	89	0.01124	560	516	1010	89	0.01124
560	72	1721	89	0.01124	560	189	1009	89	0.01124
560	73	1719	89	0.01124	560	189	1008	89	0.01124
560	72	1701	89	0.01124	580	110	1235	6	0.16667
560	73	1699	89	0.01124	580	110	1181	6	0.16667
560	72	1681	89	0.01124	580	110	1106	6	0.16667
560	73	1679	89	0.01124	580	110	1020	6	0.16667
560	72	1661	89	0.01124	580	110	925	6	0.16667
560	73	1659	89	0.01124	580	110	924	6	0.16667
560	72	1641	89	0.01124	590	513	2085	137	0.0073
560	73	1639	89	0.01124	590	513	2084	137	0.0073
560	484	1621	89	0.01124	590	513	2080	137	0.0073
560	498	1617	89	0.01124	590	513	2079	137	0.0073
560	484	1598	89	0.01124	590	513	2075	137	0.0073
560	498	1595	89	0.01124	590	513	2074	137	0.0073
560	484	1576	89	0.01124	590	513	2068	137	0.0073
560	498	1573	89	0.01124	590	513	2067	137	0.0073
560	95	1551	89	0.01124	590	513	2063	137	0.0073
560	116	1547	89	0.01124	590	513	2062	137	0.0072993
560	95	1525	89	0.01124	590	167	2058	137	0.0072993
590	167	2057	137	0.0072993	590	167	1969	137	0.0072993

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
590	502	2053	137	0.0072993	590	173	1962	137	0.0072993
590	502	2052	137	0.0072993	590	181	1961	137	0.0072993
590	167	2051	137	0.0072993	590	167	1960	137	0.0072993
590	167	2050	137	0.0072993	590	167	1959	137	0.0072993
590	502	2046	137	0.0072993	590	173	1952	137	0.0072993
590	502	2045	137	0.0072993	590	181	1951	137	0.0072993
590	167	2044	137	0.0072993	590	167	1950	137	0.0072993
590	167	2043	137	0.0072993	590	167	1949	137	0.0072993
590	156	2037	137	0.0072993	590	173	1942	137	0.0072993
590	162	2036	137	0.0072993	590	181	1941	137	0.0072993
590	167	2035	137	0.0072993	590	167	1940	137	0.0072993
590	167	2034	137	0.0072993	590	167	1939	137	0.0072993
590	156	2030	137	0.0072993	590	173	1932	137	0.0072993
590	162	2029	137	0.0072993	590	181	1931	137	0.0072993
590	167	2028	137	0.0072993	590	167	1930	137	0.0072993
590	167	2027	137	0.0072993	590	167	1929	137	0.0072993
590	156	2023	137	0.0072993	590	173	1922	137	0.0072993
590	162	2022	137	0.0072993	590	181	1921	137	0.0072993
590	167	2021	137	0.0072993	590	167	1920	137	0.0072993
590	167	2020	137	0.0072993	590	167	1919	137	0.0072993
590	156	2016	137	0.0072993	590	173	1912	137	0.0072993
590	162	2015	137	0.0072993	590	181	1911	137	0.0072993
590	167	2014	137	0.0072993	590	167	1910	137	0.0072993
590	167	2013	137	0.0072993	590	167	1909	137	0.0072993
590	156	2009	137	0.0072993	590	518	1902	137	0.0072993
590	162	2008	137	0.0072993	590	192	1898	137	0.0072993
590	167	2007	137	0.0072993	590	518	1891	137	0.0072993
590	167	2006	137	0.0072993	590	192	1887	137	0.0072993
590	156	2002	137	0.0072993	590	518	1877	137	0.0072993
590	162	2001	137	0.0072993	590	192	1873	137	0.0072993
590	167	2000	137	0.0072993	590	518	1865	137	0.0072993
590	167	1999	137	0.0072993	590	192	1861	137	0.0072993
590	156	1992	137	0.0072993	590	518	1853	137	0.0072993
590	162	1991	137	0.0072993	590	192	1849	137	0.0072993
590	167	1990	137	0.0072993	590	518	1838	137	0.0072993
590	167	1989	137	0.0072993	590	192	1834	137	0.0072993
590	156	1982	137	0.0072993	590	518	1822	137	0.0072993
590	162	1981	137	0.0072993	590	192	1818	137	0.0072993
590	167	1980	137	0.0072993	590	518	1806	137	0.0072993
590	167	1979	137	0.0072993	590	192	1802	137	0.0072993
590	173	1972	137	0.0072993	590	518	1789	137	0.0072993
590	162	1971	137	0.0072993	590	192	1785	137	0.0072993
590	167	1970	137	0.0072993	590	518	1773	137	0.0072993
590	192	1769	137	0.0072993	600	517	2092	118	0.0084746

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
590	518	1755	137	0.0072993	600	520	2091	118	0.0084746
590	192	1751	137	0.0072993	600	517	2089	118	0.0084746
590	518	1738	137	0.0072993	600	520	2088	118	0.0084746
590	192	1734	137	0.0072993	600	517	2086	118	0.0084746
590	518	1718	137	0.0072993	600	520	2083	118	0.0084746
590	192	1714	137	0.0072993	600	517	2081	118	0.0084746
590	518	1698	137	0.0072993	600	520	2078	118	0.0084746
590	192	1694	137	0.0072993	600	517	2076	118	0.0084746
590	213	1678	137	0.0072993	600	520	2073	118	0.0084746
590	192	1674	137	0.0072993	600	517	2070	118	0.0084746
590	518	1658	137	0.0072993	600	517	2069	118	0.0084746
590	192	1654	137	0.0072993	600	520	2066	118	0.0084746
590	213	1638	137	0.0072993	600	522	2064	118	0.0084746
590	192	1634	137	0.0072993	600	520	2061	118	0.0084746
590	213	1616	137	0.0072993	600	522	2059	118	0.0084746
590	232	1612	137	0.0072993	600	520	2056	118	0.0084746
590	213	1594	137	0.0072993	600	520	2049	118	0.0084746
590	232	1590	137	0.0072993	600	521	2042	118	0.0084746
590	213	1572	137	0.0072993	600	522	2039	118	0.0084746
590	232	1568	137	0.0072993	600	522	2038	118	0.0084746
590	213	1546	137	0.0072993	600	520	2033	118	0.0084746
590	232	1542	137	0.0072993	600	526	2031	118	0.0084746
590	213	1520	137	0.0072993	600	521	2026	118	0.0084746
590	232	1516	137	0.0072993	600	526	2024	118	0.0084746
590	213	1490	137	0.0072993	600	521	2019	118	0.0084746
590	232	1468	137	0.0072993	600	526	2017	118	0.0084746
590	213	1460	137	0.0072993	600	521	2012	118	0.0084746
590	232	1456	137	0.0072993	600	526	2010	118	0.0084746
590	213	1429	137	0.0072993	600	521	2005	118	0.0084746
590	213	1428	137	0.0072993	600	526	2003	118	0.0084746
590	232	1424	137	0.0072993	600	521	1998	118	0.0084746
590	232	1423	137	0.0072993	600	526	1996	118	0.0084746
590	213	1390	137	0.0072993	600	521	1988	118	0.0084746
590	232	1384	137	0.0072993	600	524	1978	118	0.0084746
590	213	1352	137	0.0072993	600	230	1976	118	0.0084746
590	232	1346	137	0.0072993	600	524	1968	118	0.0084746
590	232	1305	137	0.0072993	600	230	1966	118	0.0084746
600	520	2100	118	0.0084746	600	230	1956	118	0.0084746
600	520	2099	118	0.0084746	600	524	1948	118	0.0084746
600	517	2098	118	0.0084746	600	230	1946	118	0.0084746
600	520	2097	118	0.0084746	600	230	1936	118	0.0084746
600	517	2095	118	0.0084746	600	524	1928	118	0.0084746
600	520	2094	118	0.0084746	600	230	1926	118	0.0084746
600	524	1918	118	0.0084746	600	247	1541	118	0.0084746

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
600	524	1908	118	0.0084746	600	255	1536	118	0.0084746
600	230	1906	118	0.0084746	600	247	1515	118	0.00847
600	523	1897	118	0.0084746	600	247	1514	118	0.00847
600	230	1895	118	0.0084746	600	255	1509	118	0.00847
600	523	1886	118	0.0084746	600	247	1485	118	0.00847
600	523	1885	118	0.0084746	600	255	1480	118	0.00847
600	523	1884	118	0.0084746	600	247	1455	118	0.00847
600	230	1881	118	0.0084746	600	255	1450	118	0.00847
600	523	1872	118	0.0084746	600	247	1422	118	0.00847
600	252	1869	118	0.0084746	600	255	1417	118	0.00847
600	220	1860	118	0.0084746	600	247	1383	118	0.00847
600	252	1857	118	0.0084746	600	255	1379	118	0.00847
600	220	1848	118	0.0084746	600	247	1345	118	0.00847
600	252	1845	118	0.0084746	600	255	1341	118	0.00847
600	220	1833	118	0.0084746	600	247	1304	118	0.00847
600	252	1830	118	0.0084746	600	255	1300	118	0.00847
600	220	1817	118	0.0084746	600	255	1299	118	0.00847
600	252	1813	118	0.0084746	600	267	1258	118	0.00847
600	252	1797	118	0.0084746	600	267	1210	118	0.00847
600	252	1780	118	0.0084746	600	267	1156	118	0.00847
600	220	1768	118	0.0084746	600	267	1078	118	0.00847
600	252	1763	118	0.0084746	600	267	984	118	0.00847
600	220	1750	118	0.0084746	600	267	983	118	0.00847
600	252	1746	118	0.0084746	620	527	1300	6	0.16667
600	220	1733	118	0.0084746	620	527	1298	6	0.16667
600	252	1730	118	0.0084746	620	527	1254	6	0.16667
600	252	1729	118	0.0084746	620	527	1206	6	0.16667
600	220	1713	118	0.0084746	620	527	1152	6	0.16667
600	252	1709	118	0.0084746	620	527	1151	6	0.16667
600	247	1693	118	0.0084746	630	281	1205	1	1
600	252	1689	118	0.0084746	800	291	881	17	0.05882
600	247	1673	118	0.0084746	800	291	880	17	0.05882
600	255	1669	118	0.0084746	800	293	879	17	0.05882
600	247	1653	118	0.0084746	800	293	878	17	0.05882
600	255	1649	118	0.0084746	800	298	877	17	0.05882
600	247	1633	118	0.0084746	800	298	876	17	0.05882
600	255	1629	118	0.0084746	800	298	875	17	0.05882
600	247	1611	118	0.0084746	800	298	874	17	0.05882
600	255	1607	118	0.0084746	800	298	781	17	0.05882
600	247	1589	118	0.0084746	800	297	686	17	0.05882
600	255	1585	118	0.0084746	800	290	668	17	0.05882
600	247	1567	118	0.0084746	800	291	607	17	0.05882
600	255	1562	118	0.0084746	800	297	589	17	0.05882
800	296	509	17	0.05882	830	585	578	16	0.0625

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
800	294	436	17	0.05882	830	585	577	16	0.0625
800	294	370	17	0.05882	830	383	503	16	0.0625
800	294	307	17	0.05882	830	585	502	16	0.0625
810	312	683	21	0.04762	830	585	501	16	0.0625
810	314	682	21	0.04762	830	383	429	16	0.0625
810	320	681	21	0.04762	830	585	428	16	0.0625
810	324	680	21	0.04762	830	583	427	16	0.0625
810	324	679	21	0.047619	830	383	362	16	0.0625
810	334	678	21	0.047619	830	383	361	16	0.0625
810	334	677	21	0.047619	830	583	360	16	0.0625
810	334	676	21	0.047619	830	582	299	16	0.0625
810	342	675	21	0.047619	840	417	572	31	0.032258
810	342	674	21	0.047619	840	417	571	31	0.032258
810	342	673	21	0.047619	840	534	570	31	0.032258
810	342	672	21	0.047619	840	534	569	31	0.032258
810	354	671	21	0.047619	840	534	567	31	0.032258
810	354	670	21	0.047619	840	403	499	31	0.032258
810	324	588	21	0.047619	840	403	498	31	0.032258
810	354	587	21	0.047619	840	406	497	31	0.032258
810	354	586	21	0.047619	840	406	496	31	0.03226
810	326	508	21	0.047619	840	417	495	31	0.03226
810	325	435	21	0.047619	840	534	494	31	0.03226
810	316	369	21	0.047619	840	403	426	31	0.03226
810	319	306	21	0.047619	840	406	425	31	0.03226
820	581	583	15	0.066667	840	417	424	31	0.03226
820	581	582	15	0.066667	840	439	423	31	0.03226
820	9	581	15	0.066667	840	439	422	31	0.03226
820	9	580	15	0.066667	840	457	421	31	0.03226
820	9	579	15	0.066667	840	457	420	31	0.03226
820	581	504	15	0.066667	840	457	419	31	0.03226
820	9	503	15	0.066667	840	403	359	31	0.03226
820	581	431	15	0.066667	840	406	358	31	0.03226
820	9	430	15	0.066667	840	417	357	31	0.03226
820	374	364	15	0.066667	840	457	356	31	0.03226
820	9	363	15	0.066667	840	406	296	31	0.03226
820	374	301	15	0.066667	840	417	295	31	0.03226
820	374	228	15	0.066667	840	537	294	31	0.03226
820	374	170	15	0.066667	840	537	293	31	0.03226
820	374	169	15	0.066667	840	537	292	31	0.03226
830	585	660	16	0.0625	840	456	291	31	0.03226
830	585	659	16	0.0625	840	457	290	31	0.03226
830	585	658	16	0.0625	840	456	226	31	0.03226
830	585	657	16	0.0625	850	292	1072	9	0.11111
850	292	1071	9	0.11111	900	385	1810	5	0.2

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
850	302	1070	9	0.11111	900	377	1793	5	0.2
850	302	1069	9	0.11111	900	387	1777	5	0.2
850	302	1068	9	0.11111	910	547	1829	6	0.16667
850	301	1067	9	0.11111	910	392	1812	6	0.16667
850	315	1066	9	0.11111	910	392	1796	6	0.16667
850	310	1064	9	0.11111	910	555	1779	6	0.16667
850	310	1063	9	0.11111	910	555	1762	6	0.16667
860	331	1378	12	0.08333	910	555	1745	6	0.16667
860	318	1340	12	0.08333	920	422	1725	21	0.04762
860	341	1339	12	0.08333	920	422	1705	21	0.04762
860	337	1297	12	0.08333	920	422	1685	21	0.04762
860	347	1296	12	0.08333	920	422	1665	21	0.04762
860	337	1253	12	0.08333	920	402	1645	21	0.04762
860	347	1252	12	0.08333	920	402	1625	21	0.04762
860	333	1200	12	0.08333	920	557	1602	21	0.04762
860	337	1199	12	0.08333	920	557	1580	21	0.04762
860	349	1198	12	0.08333	920	450	1557	21	0.04762
860	349	1142	12	0.08333	920	450	1504	21	0.04762
860	349	1141	12	0.08333	920	569	1475	21	0.04762
870	368	1193	6	0.16667	920	569	1474	21	0.04762
870	368	1136	6	0.16667	920	569	1445	21	0.04762
870	368	1135	6	0.16667	920	574	1408	21	0.04762
870	368	1053	6	0.16667	920	468	1369	21	0.04762
870	368	1051	6	0.16667	920	479	1329	21	0.04762
870	368	1050	6	0.16667	920	479	1286	21	0.04762
880	546	1191	14	0.07143	920	578	1242	21	0.04762
880	382	1133	14	0.07143	920	578	1241	21	0.04762
880	382	1132	14	0.07143	920	578	1187	21	0.04762
880	551	1131	14	0.07143	930	135	1105	9	0.11111
880	551	1130	14	0.07143	930	135	1104	9	0.11111
880	551	1129	14	0.07143	930	135	1103	9	0.11111
880	561	1128	14	0.07143	930	135	1102	9	0.11111
880	561	1127	14	0.07143	930	135	1101	9	0.11111
880	561	1126	14	0.07143	930	135	1016	9	0.11111
880	568	1125	14	0.07143	930	135	1015	9	0.11111
880	568	1124	14	0.07143	930	135	919	9	0.11111
880	571	1123	14	0.07143	930	135	918	9	0.11111
880	571	1122	14	0.07143	940	196	1493	37	0.02703
880	571	1121	14	0.07143	940	196	1492	37	0.02703
890	541	1844	2	0.5	940	196	1491	37	0.02703
890	541	1843	2	0.5	940	196	1463	37	0.02703
900	375	1842	5	0.2	940	196	1461	37	0.02703
900	376	1827	5	0.2	940	196	1434	37	0.02703
940	196	1432	37	0.02703	960	275	1150	22	0.04545

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
940	195	1431	37	0.02703	960	275	1149	22	0.04545
940	195	1430	37	0.02703	960	275	1076	22	0.04545
940	196	1396	37	0.02703	960	275	981	22	0.04545
940	196	1394	37	0.02703	960	275	882	22	0.04545
940	196	1393	37	0.02703	960	275	782	22	0.04545
940	195	1391	37	0.02703	960	277	689	22	0.04545
940	196	1358	37	0.02703	960	277	590	22	0.04545
940	195	1353	37	0.02703	960	277	510	22	0.04545
940	196	1318	37	0.02703	960	277	437	22	0.04545
940	195	1314	37	0.02703	960	277	371	22	0.04545
940	195	1313	37	0.02703	960	277	309	22	0.04545
940	216	1312	37	0.02703	960	277	308	22	0.04545
940	216	1311	37	0.02703	960	277	237	22	0.04545
940	512	1272	37	0.02703	960	277	178	22	0.04545
940	196	1271	37	0.02703	960	277	147	22	0.04545
940	216	1266	37	0.02703	960	277	133	22	0.04545
940	216	1265	37	0.02703	960	277	123	22	0.04545
940	512	1228	37	0.02703	970	532	1742	1	1
940	196	1227	37	0.02703	980	404	1722	21	0.04762
940	216	1221	37	0.02703	980	408	1702	21	0.04762
940	216	1220	37	0.02703	980	425	1682	21	0.04762
940	216	1219	37	0.02703	980	425	1662	21	0.04762
940	196	1173	37	0.02703	980	425	1642	21	0.04762
940	196	1094	37	0.02703	980	443	1622	21	0.04762
940	196	1007	37	0.02703	980	443	1599	21	0.04762
940	196	1006	37	0.02703	980	443	1577	21	0.04762
940	196	1005	37	0.02703	980	443	1552	21	0.04762
940	196	1004	37	0.02703	980	464	1526	21	0.04762
940	196	1003	37	0.02703	980	464	1499	21	0.04762
940	196	1002	37	0.02703	980	481	1469	21	0.04762
950	254	1212	9	0.11111	980	481	1440	21	0.04762
950	254	1211	9	0.11111	980	481	1402	21	0.04762
950	254	1157	9	0.11111	980	481	1364	21	0.04762
950	254	1079	9	0.11111	980	483	1324	21	0.04762
950	254	987	9	0.11111	980	483	1281	21	0.04762
950	254	986	9	0.11111	980	94	1236	21	0.04762
950	254	985	9	0.11111	980	94	1182	21	0.04762
950	254	887	9	0.11111	980	94	1107	21	0.04762
950	254	886	9	0.11111	980	94	1021	21	0.04762
960	275	1154	22	0.04545	990	63	1247	12	0.08333
960	275	1153	22	0.04545	990	579	1243	12	0.08333
960	275	1152	22	0.04545	990	63	1190	12	0.08333
960	275	1151	22	0.04545	990	579	1118	12	0.08333
990	579	1117	12	0.08333					

Table E.15.1

**Phase IV Watershed Model Segments, Their Corresponding Chesapeake Bay
Water Quality Model Cells, and Loading Factors**

Segment	Sub-Segment	Cell	Max. Count	Factor	Segment	Sub-Segment	Cell	Max. Count	Factor
990	579	1116	12	0.08333					
990	579	1115	12	0.08333					
990	579	1114	12	0.08333					
990	579	1113	12	0.08333					
990	579	1112	12	0.08333					
990	579	1027	12	0.08333					
990	579	1026	12	0.08333					

Section E.16

Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat

In order to fully incorporate the littoral zone submerged aquatic vegetation (SAV) sub-model into the Chesapeake Bay Water Quality Model, it was necessary to define those shallow water littoral zone model cells in which the SAV sub-model would be turned on for running during scenarios. These grow cells were then further subdivided into three categories of model cells to reflect the three representative Bay SAV species for which the Chesapeake Bay Water Quality Model littoral zone SAV sub-model would be parameterized.

Identification of SAV “Grow” Cells

In 1992, the Chesapeake Bay Program developed a series of tiered SAV distribution restoration target maps as part of the SAV Technical Synthesis¹⁸ based on both present and historical SAV distribution patterns and understanding of the physical habitat conditions limiting potential SAV distribution. The Tier I target, adopted by the Chesapeake Executive Council as a formal Bay Program goal in 1993, delineated restoration of SAV to areas currently or previously inhabited by SAV as mapped through regional and bay wide aerial surveys from 1971 through 1990. The Tier II target delineated restoration of SAV to all shallow water areas delineated as existing or potential SAV habitat down to the one meter depth contour. The Tier III target delineated restoration of SAV to all shallow water areas delineated as existing or potential SAV habitat down to the two meter depth contour.

The GIS coverage of the Chesapeake Bay Water Quality Model segmentation was overlaid onto the Tier III Chesapeake Bay SAV Distribution Restoration Target map. Through visual inspection of the map overlay, the individual Water Quality model cells which overlaid onto part of or were in close proximity to the Tier III target coverage within were identified as SAV “grow” cells as described below. Given the Phase IV Chesapeake Bay Water Quality Model segmentation and the Chesapeake Bay shoreline GIS shoreline coverage did not exactly correspond (and in some case diverged from each other), the following series of decision rules were developed and adhered to where possible.

- In cases where there was clearly no potential SAV habitat along the Chesapeake Bay shoreline, the adjacent outer model cell depicting that shoreline and adjoining littoral zone habitat was designated a SAV “no grow” cell (e.g., Calvert Cliffs and model cell 1125) and not considered further.

¹⁸ Batiuk et al. 1992. Chesapeake Bay Submerged Aquatic Vegetation Habitat Requirements and Restoration Goals: A Technical Synthesis. CBP/TRS 83/92. Chesapeake Bay Program, Annapolis, Maryland.

- In cases where there was clearly potential SAV habitat along the shoreline, adjacent outer model cell that was depicting that shoreline and adjoining littoral zone habitat was designated a SAV “grow” cell (e.g., Patuxent River and model cell 1581).
- In cases where there was clearly potential SAV habitat extending well out away from the shoreline into shallow water areas, the model cells that depicted that shallow water region were designated SAV “grow” cells (e.g., Tangier Sound and model cells 489, 418, and 355 just north of South Marsh Island).
- In cases where one model cell protruded out from the surrounding model cells to depict a minor tributary or embayment and there was potential SAV habitat within the tributary or embayment and along the mainstem tributary’s shoreline, that protruding model cell along with the adjacent model cell were designated SAV “grow” cells (e.g., Potomac River and Wicomico River model cells 1474 and 1475, respectively).

There are other instances where the best professional judgement of the Chesapeake Bay Program Office staff was used to make the final determination when the model cell in question did not fall neatly into one of the above categories.

The compiled listing of SAV grow cells were entered into a spreadsheet and quality assured through a visual cross check and comparison of each spreadsheet listed grow cell with the original GIS Tier III/Model Segmentation overlay maps on which the SAV “grow” cells were identified. The spreadsheet file listing the SAV “grow” cells was sent to the U.S. Army Corps of Engineers-Waterways Experiment Station where the file was incorporated into the Chesapeake Bay Water Quality Model segmentation program. A map of the model segmentation with the SAV “grow” cells identified was produced and sent back to the Chesapeake Bay Program Office. This SAV grow cell map was compared through a visual cross check with the original GIS Tier III/Model Segmentation overlay maps on which the SAV “grow” cells were identified.

Partitioning the SAV Grow Cells by the Three Modeled Species

The Chesapeake Bay Program Living Resources SAV Workgroup decided to select *Vallisneria americana*, *Potamogeton pectinatus*, and *Zostera marina* as the three species for which the Chesapeake Bay Water Quality Model littoral zone SAV sub-model would be parameterized. These three species were considered the most representative species for the modeling objective as: 1) all three species are native to Chesapeake Bay; 2) their combined existing and potential habitat distribution covered the full range of Bay salinities, and 3) their minimum light requirements were generally the most conservative for their habitat range.

The Chesapeake Bay Program developed a series of distribution restoration target maps as part of the production of the 1992 SAV Technical Synthesis based on both existing and historical SAV distribution patterns. The information on actual past and present species distribution derived from aerial and ground surveys of present SAV distribution, survey from past pollen and seed records, and the published literature. Potential distribution was based on the above information and the individual species distribution limits as defined by their upper and lower salinity tolerances.

The Chesapeake Bay Program Office staff overlaid the Chesapeake Bay Distribution Restoration Target maps for *Vallisneria americana*, *Potamogeton pectinatus*, and *Zostera marina* from the SAV Technical Synthesis to produce a single map outlining the actual/potential distribution of these three species. This integrated map of the three species' distribution was further refined through an analysis of distribution of 1985-1995 monthly mean salinity data from all the Chesapeake Bay Water Quality Monitoring Program stations. The integrated species' distribution map was further refined to ensure that all areas of the Bay where the mean salinity was generally (between the 25th and 75th percentile) below 5 part per thousand were delineated as *Vallisneria* habitat, areas with a mean salinity between 5 and 18 ppt were delineated as *Potamogeton* habitat, and areas with a mean salinity above 18 ppt were delineated as *Zostera* habitat. This analysis involving monthly mean salinity data resulted in relatively minor refinements to the integrated species' distribution map developed originally based on the SAV Technical Synthesis species restoration target maps.

The Chesapeake Bay Program Living Resources Subcommittee's SAV Workgroup reviewed and approved the final integrated species distribution map. The integrated species distribution map was then overlaid on top of the Chesapeake Bay Water Quality Model segmentation map on which the SAV grow model cells had been delineated. Based on visual and then GIS analysis of the overlay, each delineated SAV grow cell was categorized and labeled as either a *Vallisneria*, *Potamogeton*, or *Zostera* SAV grow cell (Table E.16.1).

Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
112	Zostera	High Mesohaline/Polyhaline	1,440	Potamogeton	Low Mesohaline
113	Zostera	High Mesohaline/Polyhaline	1,445	Potamogeton	Low Mesohaline
119	Zostera	High Mesohaline/Polyhaline	1,446	Potamogeton	Low Mesohaline
120	Zostera	High Mesohaline/Polyhaline	1,449	Potamogeton	Low Mesohaline
122	Zostera	High Mesohaline/Polyhaline	1,450	Potamogeton	Low Mesohaline
128	Zostera	High Mesohaline/Polyhaline	1,455	Potamogeton	Low Mesohaline
131	Zostera	High Mesohaline/Polyhaline	1,456	Zostera	High Mesohaline/Polyhaline
132	Vallisneria	Tidal Fresh/Oligohaline	1,460	Zostera	High Mesohaline/Polyhaline
138	Zostera	High Mesohaline/Polyhaline	1,461	Zostera	High Mesohaline/Polyhaline
141	Zostera	High Mesohaline/Polyhaline	1,463	Zostera	High Mesohaline/Polyhaline
142	Zostera	High Mesohaline/Polyhaline	1,464	Potamogeton	Low Mesohaline
143	Zostera	High Mesohaline/Polyhaline	1,468	Potamogeton	Low Mesohaline
144	Zostera	High Mesohaline/Polyhaline	1,469	Potamogeton	Low Mesohaline
145	Potamogeton	Low Mesohaline	1,474	Potamogeton	Low Mesohaline
146	Vallisneria	Tidal Fresh/Oligohaline	1,475	Potamogeton	Low Mesohaline
152	Zostera	High Mesohaline/Polyhaline	1,476	Potamogeton	Low Mesohaline
156	Zostera	High Mesohaline/Polyhaline	1,479	Potamogeton	Low Mesohaline
157	Zostera	High Mesohaline/Polyhaline	1,480	Potamogeton	Low Mesohaline
158	Zostera	High Mesohaline/Polyhaline	1,485	Potamogeton	Low Mesohaline
159	Zostera	High Mesohaline/Polyhaline	1,486	Zostera	High Mesohaline/Polyhaline
160	Zostera	High Mesohaline/Polyhaline	1,490	Zostera	High Mesohaline/Polyhaline
161	Zostera	High Mesohaline/Polyhaline	1,491	Zostera	High Mesohaline/Polyhaline
162	Zostera	High Mesohaline/Polyhaline	1,493	Zostera	High Mesohaline/Polyhaline
163	Potamogeton	low	1,494	Potamogeton	Low Mesohaline
164	Potamogeton	Low Mesohaline	1,498	Potamogeton	Low Mesohaline
165	Potamogeton	Low Mesohaline	1,499	Potamogeton	Low Mesohaline
166	Potamogeton	Low Mesohaline	1,504	Potamogeton	Low Mesohaline
167	Potamogeton	Low Mesohaline	1,505	Potamogeton	Low Mesohaline
168	Potamogeton	Low Mesohaline	1,508	Potamogeton	Low Mesohaline
169	Potamogeton	Low Mesohaline	1,509	Potamogeton	Low Mesohaline
170	Potamogeton	Low Mesohaline	1,514	Potamogeton	Low Mesohaline
171	Potamogeton	Low Mesohaline	1,515	Potamogeton	Low Mesohaline
172	Potamogeton	Low Mesohaline	1,516	Zostera	High Mesohaline/Polyhaline
173	Potamogeton	Low Mesohaline	1,520	Zostera	High Mesohaline/Polyhaline
174	Vallisneria	Tidal Fresh/Oligohaline	1,521	Potamogeton	Low Mesohaline
175	Vallisneria	Tidal Fresh/Oligohaline	1,525	Potamogeton	Low Mesohaline
176	Vallisneria	Tidal Fresh/Oligohaline	1,526	Potamogeton	Low Mesohaline
177	Vallisneria	Tidal Fresh/Oligohaline	1,531	Potamogeton	Low Mesohaline
183	Zostera	High Mesohaline/Polyhaline	1,532	Potamogeton	Low Mesohaline
184	Zostera	High Mesohaline/Polyhaline	1,535	Potamogeton	Low Mesohaline
185	Zostera	High Mesohaline/Polyhaline	1,536	Potamogeton	Low Mesohaline
186	Zostera	High Mesohaline/Polyhaline	1,537	Potamogeton	Low Mesohaline
187	Zostera	High Mesohaline/Polyhaline	1,541	Potamogeton	Low Mesohaline
188	Zostera	High Mesohaline/Polyhaline	1,542	Zostera	High Mesohaline/Polyhaline
189	Zostera	High Mesohaline/Polyhaline	1,546	Zostera	High Mesohaline/Polyhaline
190	Zostera	High Mesohaline/Polyhaline	1,547	Potamogeton	Low Mesohaline
191	Zostera	High Mesohaline/Polyhaline	1,551	Potamogeton	Low Mesohaline
192	Zostera	High Mesohaline/Polyhaline	1,552	Potamogeton	Low Mesohaline
193	Zostera	High Mesohaline/Polyhaline	1,557	Potamogeton	Low Mesohaline
194	Zostera	High Mesohaline/Polyhaline	1,558	Potamogeton	Low Mesohaline
195	Zostera	High Mesohaline/Polyhaline	1,561	Potamogeton	Low Mesohaline
196	Zostera	High Mesohaline/Polyhaline	1,562	Potamogeton	Low Mesohaline
197	Zostera	High Mesohaline/Polyhaline	1,563	Potamogeton	Low Mesohaline
198	Zostera	High Mesohaline/Polyhaline	1,567	Potamogeton	Low Mesohaline
199	Zostera	High Mesohaline/Polyhaline	1,568	Zostera	High Mesohaline/Polyhaline
200	Zostera	High Mesohaline/Polyhaline	1,572	Zostera	High Mesohaline/Polyhaline
201	Zostera	High Mesohaline/Polyhaline	1,573	Potamogeton	Low Mesohaline

Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
202	Zostera	High Mesohaline/Polyhaline	1,576	Potamogeton	Low Mesohaline
203	Zostera	High Mesohaline/Polyhaline	1,577	Potamogeton	Low Mesohaline
204	Zostera	High Mesohaline/Polyhaline	1,580	Potamogeton	Low Mesohaline
205	Zostera	High Mesohaline/Polyhaline	1,581	Potamogeton	Low Mesohaline
206	Zostera	High Mesohaline/Polyhaline	1,584	Potamogeton	Low Mesohaline
207	Zostera	High Mesohaline/Polyhaline	1,585	Potamogeton	Low Mesohaline
208	Zostera	High Mesohaline/Polyhaline	1,589	Potamogeton	Low Mesohaline
209	Zostera	High Mesohaline/Polyhaline	1,590	Zostera	High Mesohaline/Polyhaline
210	Zostera	High Mesohaline/Polyhaline	1,594	Zostera	High Mesohaline/Polyhaline
211	Zostera	High Mesohaline/Polyhaline	1,595	Potamogeton	Low Mesohaline
213	Zostera	High Mesohaline/Polyhaline	1,598	Potamogeton	Low Mesohaline
214	Zostera	High Mesohaline/Polyhaline	1,599	Vallisneria	Tidal Fresh/Oligohaline
215	Zostera	High Mesohaline/Polyhaline	1,602	Vallisneria	Tidal Fresh/Oligohaline
216	Zostera	High Mesohaline/Polyhaline	1,603	Potamogeton	Low Mesohaline
217	Zostera	High Mesohaline/Polyhaline	1,606	Potamogeton	Low Mesohaline
218	Zostera	High Mesohaline/Polyhaline	1,607	Potamogeton	Low Mesohaline
219	Zostera	High Mesohaline/Polyhaline	1,611	Potamogeton	Low Mesohaline
223	Zostera	High Mesohaline/Polyhaline	1,612	Zostera	High Mesohaline/Polyhaline
224	Zostera	High Mesohaline/Polyhaline	1,616	Zostera	High Mesohaline/Polyhaline
226	Zostera	High Mesohaline/Polyhaline	1,617	Potamogeton	Low Mesohaline
227	Potamogeton	Low Mesohaline	1,621	Potamogeton	Low Mesohaline
228	Potamogeton	Low Mesohaline	1,622	Vallisneria	Tidal Fresh/Oligohaline
233	Vallisneria	Tidal Fresh/Oligohaline	1,625	Vallisneria	Tidal Fresh/Oligohaline
234	Vallisneria	Tidal Fresh/Oligohaline	1,626	Potamogeton	Low Mesohaline
235	Vallisneria	Tidal Fresh/Oligohaline	1,628	Potamogeton	Low Mesohaline
236	Vallisneria	Tidal Fresh/Oligohaline	1,629	Potamogeton	Low Mesohaline
237	Zostera	High Mesohaline/Polyhaline	1,633	Potamogeton	Low Mesohaline
242	Zostera	High Mesohaline/Polyhaline	1,634	Zostera	High Mesohaline/Polyhaline
243	Zostera	High Mesohaline/Polyhaline	1,638	Zostera	High Mesohaline/Polyhaline
244	Zostera	High Mesohaline/Polyhaline	1,639	Vallisneria	Tidal Fresh/Oligohaline
245	Zostera	High Mesohaline/Polyhaline	1,641	Vallisneria	Tidal Fresh/Oligohaline
246	Zostera	High Mesohaline/Polyhaline	1,642	Vallisneria	Tidal Fresh/Oligohaline
247	Zostera	High Mesohaline/Polyhaline	1,645	Vallisneria	Tidal Fresh/Oligohaline
282	Zostera	High Mesohaline/Polyhaline	1,646	Potamogeton	Low Mesohaline
283	Zostera	High Mesohaline/Polyhaline	1,648	Potamogeton	Low Mesohaline
284	Zostera	High Mesohaline/Polyhaline	1,649	Potamogeton	Low Mesohaline
285	Zostera	High Mesohaline/Polyhaline	1,653	Potamogeton	Low Mesohaline
286	Zostera	High Mesohaline/Polyhaline	1,654	Potamogeton	Low Mesohaline
287	Zostera	High Mesohaline/Polyhaline	1,658	Potamogeton	Low Mesohaline
288	Zostera	High Mesohaline/Polyhaline	1,659	Vallisneria	Tidal Fresh/Oligohaline
289	Zostera	High Mesohaline/Polyhaline	1,661	Vallisneria	Tidal Fresh/Oligohaline
290	Zostera	High Mesohaline/Polyhaline	1,662	Vallisneria	Tidal Fresh/Oligohaline
291	zostera	high	1,665	Vallisneria	Tidal Fresh/Oligohaline
292	Potamogeton	Low Mesohaline	1,666	Vallisneria	Tidal Fresh/Oligohaline
293	Potamogeton	Low Mesohaline	1,668	Vallisneria	Tidal Fresh/Oligohaline
294	Potamogeton	Low Mesohaline	1,669	Potamogeton	Low Mesohaline
295	Potamogeton	Low Mesohaline	1,673	Potamogeton	Low Mesohaline
296	Potamogeton	Low Mesohaline	1,674	Potamogeton	Low Mesohaline
297	Potamogeton	Low Mesohaline	1,678	Potamogeton	Low Mesohaline
298	Potamogeton	Low Mesohaline	1,679	Vallisneria	Tidal Fresh/Oligohaline
299	Potamogeton	Low Mesohaline	1,681	Vallisneria	Tidal Fresh/Oligohaline
300	Potamogeton	Low Mesohaline	1,682	Vallisneria	Tidal Fresh/Oligohaline
301	Potamogeton	Low Mesohaline	1,685	Vallisneria	Tidal Fresh/Oligohaline
306	Vallisneria	Tidal Fresh/Oligohaline	1,686	Vallisneria	Tidal Fresh/Oligohaline
308	Zostera	High Mesohaline/Polyhaline	1,688	Vallisneria	Tidal Fresh/Oligohaline
350	Zostera	High Mesohaline/Polyhaline	1,689	Potamogeton	Low Mesohaline
351	Zostera	High Mesohaline/Polyhaline	1,693	Potamogeton	Low Mesohaline

Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
352	Zostera	High Mesohaline/Polyhaline	1,694	Potamogeton	Low Mesohaline
353	Zostera	High Mesohaline/Polyhaline	1,698	Potamogeton	Low Mesohaline
354	Zostera	High Mesohaline/Polyhaline	1,699	Vallisneria	Tidal Fresh/Oligohaline
355	Zostera	High Mesohaline/Polyhaline	1,701	Vallisneria	Tidal Fresh/Oligohaline
356	Zostera	High Mesohaline/Polyhaline	1,702	Vallisneria	Tidal Fresh/Oligohaline
357	Potamogeton	Low Mesohaline	1,705	Vallisneria	Tidal Fresh/Oligohaline
358	Potamogeton	Low Mesohaline	1,706	Vallisneria	Tidal Fresh/Oligohaline
359	Potamogeton	Low Mesohaline	1,708	Vallisneria	Tidal Fresh/Oligohaline
360	Potamogeton	Low Mesohaline	1,709	Potamogeton	Low Mesohaline
361	Potamogeton	Low Mesohaline	1,713	Potamogeton	Low Mesohaline
362	Potamogeton	Low Mesohaline	1,714	Potamogeton	Low Mesohaline
363	Potamogeton	Low Mesohaline	1,718	Potamogeton	Low Mesohaline
364	Potamogeton	Low Mesohaline	1,719	Vallisneria	Tidal Fresh/Oligohaline
367	Potamogeton	Low Mesohaline	1,721	Vallisneria	Tidal Fresh/Oligohaline
368	Potamogeton	Low Mesohaline	1,722	Vallisneria	Tidal Fresh/Oligohaline
369	Vallisneria	Tidal Fresh/Oligohaline	1,725	Vallisneria	Tidal Fresh/Oligohaline
371	Zostera	High Mesohaline/Polyhaline	1,726	Vallisneria	Tidal Fresh/Oligohaline
414	Zostera	High Mesohaline/Polyhaline	1,728	Vallisneria	Tidal Fresh/Oligohaline
415	Zostera	High Mesohaline/Polyhaline	1,729	Potamogeton	Low Mesohaline
416	Zostera	High Mesohaline/Polyhaline	1,733	Potamogeton	Low Mesohaline
417	Zostera	High Mesohaline/Polyhaline	1,734	Potamogeton	Low Mesohaline
418	Zostera	High Mesohaline/Polyhaline	1,738	Potamogeton	Low Mesohaline
419	Zostera	High Mesohaline/Polyhaline	1,739	Vallisneria	Tidal Fresh/Oligohaline
420	Zostera	High Mesohaline/Polyhaline	1,741	Vallisneria	Tidal Fresh/Oligohaline
421	Zostera	High Mesohaline/Polyhaline	1,742	Vallisneria	Tidal Fresh/Oligohaline
422	Zostera	High Mesohaline/Polyhaline	1,745	Vallisneria	Tidal Fresh/Oligohaline
423	Zostera	High Mesohaline/Polyhaline	1,746	Vallisneria	Tidal Fresh/Oligohaline
424	Potamogeton	Low Mesohaline	1,750	Vallisneria	Tidal Fresh/Oligohaline
425	Potamogeton	Low Mesohaline	1,751	Potamogeton	Low Mesohaline
426	Potamogeton	Low Mesohaline	1,755	Potamogeton	Low Mesohaline
428	Potamogeton	Low Mesohaline	1,756	Vallisneria	Tidal Fresh/Oligohaline
429	Potamogeton	Low Mesohaline	1,758	Vallisneria	Tidal Fresh/Oligohaline
430	Potamogeton	Low Mesohaline	1,759	Vallisneria	Tidal Fresh/Oligohaline
431	Potamogeton	Low Mesohaline	1,762	Vallisneria	Tidal Fresh/Oligohaline
434	Potamogeton	Low Mesohaline	1,763	Vallisneria	Tidal Fresh/Oligohaline
435	Vallisneria	Tidal Fresh/Oligohaline	1,767	Vallisneria	Tidal Fresh/Oligohaline
480	Zostera	High Mesohaline/Polyhaline	1,768	Vallisneria	Tidal Fresh/Oligohaline
481	Zostera	High Mesohaline/Polyhaline	1,769	Potamogeton	Low Mesohaline
482	Zostera	High Mesohaline/Polyhaline	1,773	Potamogeton	Low Mesohaline
483	Zostera	High Mesohaline/Polyhaline	1,774	Vallisneria	Tidal Fresh/Oligohaline
484	Zostera	High Mesohaline/Polyhaline	1,776	Vallisneria	Tidal Fresh/Oligohaline
485	Zostera	High Mesohaline/Polyhaline	1,777	Vallisneria	Tidal Fresh/Oligohaline
486	Zostera	High Mesohaline/Polyhaline	1,779	Vallisneria	Tidal Fresh/Oligohaline
487	Zostera	High Mesohaline/Polyhaline	1,780	Vallisneria	Tidal Fresh/Oligohaline
488	Zostera	High Mesohaline/Polyhaline	1,784	Vallisneria	Tidal Fresh/Oligohaline
489	Zostera	High Mesohaline/Polyhaline	1,785	Potamogeton	Low Mesohaline
490	Zostera	High Mesohaline/Polyhaline	1,789	Potamogeton	Low Mesohaline
492	Zostera	High Mesohaline/Polyhaline	1,790	Vallisneria	Tidal Fresh/Oligohaline
493	Zostera	High Mesohaline/Polyhaline	1,792	Vallisneria	Tidal Fresh/Oligohaline
494	Zostera	High Mesohaline/Polyhaline	1,793	Vallisneria	Tidal Fresh/Oligohaline
495	Potamogeton	Low Mesohaline	1,794	Vallisneria	Tidal Fresh/Oligohaline
497	Potamogeton	Low Mesohaline	1,796	Vallisneria	Tidal Fresh/Oligohaline
498	Potamogeton	Low Mesohaline	1,797	Vallisneria	Tidal Fresh/Oligohaline
501	Potamogeton	Low Mesohaline	1,801	Vallisneria	Tidal Fresh/Oligohaline
502	Potamogeton	Low Mesohaline	1,802	Potamogeton	Low Mesohaline
504	Potamogeton	Low Mesohaline	1,806	Potamogeton	Low Mesohaline
507	Vallisneria	Tidal Fresh/Oligohaline	1,807	Vallisneria	Tidal Fresh/Oligohaline

Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
508	Vallisneria	Tidal Fresh/Oligohaline	1,809	Vallisneria	Tidal Fresh/Oligohaline
565	Zostera	High Mesohaline/Polyhaline	1,810	Vallisneria	Tidal Fresh/Oligohaline
566	Zostera	High Mesohaline/Polyhaline	1,812	Vallisneria	Tidal Fresh/Oligohaline
567	Zostera	High Mesohaline/Polyhaline	1,813	Vallisneria	Tidal Fresh/Oligohaline
568	Zostera	High Mesohaline/Polyhaline	1,817	Vallisneria	Tidal Fresh/Oligohaline
569	Zostera	High Mesohaline/Polyhaline	1,818	Potamogeton	Low Mesohaline
570	Potamogeton	Low Mesohaline	1,822	Potamogeton	Low Mesohaline
571	Potamogeton	Low Mesohaline	1,823	Vallisneria	Tidal Fresh/Oligohaline
572	Potamogeton	Low Mesohaline	1,826	Vallisneria	Tidal Fresh/Oligohaline
577	Potamogeton	Low Mesohaline	1,827	Vallisneria	Tidal Fresh/Oligohaline
578	Potamogeton	Low Mesohaline	1,829	Vallisneria	Tidal Fresh/Oligohaline
580	Potamogeton	Low Mesohaline	1,830	Vallisneria	Tidal Fresh/Oligohaline
581	Potamogeton	Low Mesohaline	1,833	Vallisneria	Tidal Fresh/Oligohaline
582	Potamogeton	Low Mesohaline	1,834	Potamogeton	Low Mesohaline
583	Potamogeton	Low Mesohaline	1,838	Potamogeton	Low Mesohaline
587	Vallisneria	Tidal Fresh/Oligohaline	1,839	Vallisneria	Tidal Fresh/Oligohaline
588	Vallisneria	Tidal Fresh/Oligohaline	1,841	Vallisneria	Tidal Fresh/Oligohaline
589	Vallisneria	Tidal Fresh/Oligohaline	1,842	Vallisneria	Tidal Fresh/Oligohaline
657	Potamogeton	Low Mesohaline	1,844	Vallisneria	Tidal Fresh/Oligohaline
658	Potamogeton	Low Mesohaline	1,845	Vallisneria	Tidal Fresh/Oligohaline
659	Potamogeton	Low Mesohaline	1,848	Vallisneria	Tidal Fresh/Oligohaline
660	Potamogeton	Low Mesohaline	1,849	Potamogeton	Low Mesohaline
670	Vallisneria	Tidal Fresh/Oligohaline	1,853	Potamogeton	Low Mesohaline
674	Vallisneria	Tidal Fresh/Oligohaline	1,854	Vallisneria	Tidal Fresh/Oligohaline
675	Vallisneria	Tidal Fresh/Oligohaline	1,856	Vallisneria	Tidal Fresh/Oligohaline
676	Vallisneria	Tidal Fresh/Oligohaline	1,857	Vallisneria	Tidal Fresh/Oligohaline
677	Vallisneria	Tidal Fresh/Oligohaline	1,860	Vallisneria	Tidal Fresh/Oligohaline
678	Vallisneria	Tidal Fresh/Oligohaline	1,861	Potamogeton	Low Mesohaline
679	Vallisneria	Tidal Fresh/Oligohaline	1,865	Potamogeton	Low Mesohaline
682	Vallisneria	Tidal Fresh/Oligohaline	1,866	Vallisneria	Tidal Fresh/Oligohaline
683	Vallisneria	Tidal Fresh/Oligohaline	1,868	Vallisneria	Tidal Fresh/Oligohaline
684	Vallisneria	Tidal Fresh/Oligohaline	1,869	Vallisneria	Tidal Fresh/Oligohaline
685	Vallisneria	Tidal Fresh/Oligohaline	1,872	Vallisneria	Tidal Fresh/Oligohaline
686	Vallisneria	Tidal Fresh/Oligohaline	1,873	Potamogeton	Low Mesohaline
687	Vallisneria	Tidal Fresh/Oligohaline	1,877	Potamogeton	Low Mesohaline
688	Vallisneria	Tidal Fresh/Oligohaline	1,878	Vallisneria	Tidal Fresh/Oligohaline
876	Vallisneria	Tidal Fresh/Oligohaline	1,880	Vallisneria	Tidal Fresh/Oligohaline
877	Vallisneria	Tidal Fresh/Oligohaline	1,881	Vallisneria	Tidal Fresh/Oligohaline
878	Vallisneria	Tidal Fresh/Oligohaline	1,883	Vallisneria	Tidal Fresh/Oligohaline
879	Vallisneria	Tidal Fresh/Oligohaline	1,884	Vallisneria	Tidal Fresh/Oligohaline
880	Vallisneria	Tidal Fresh/Oligohaline	1,885	Vallisneria	Tidal Fresh/Oligohaline
881	Vallisneria	Tidal Fresh/Oligohaline	1,886	Vallisneria	Tidal Fresh/Oligohaline
919	Zostera	High Mesohaline/Polyhaline	1,887	Potamogeton	Low Mesohaline
926	Zostera	High Mesohaline/Polyhaline	1,888	Potamogeton	Low Mesohaline
973	Vallisneria	Tidal Fresh/Oligohaline	1,892	Vallisneria	Tidal Fresh/Oligohaline
974	Vallisneria	Tidal Fresh/Oligohaline	1,894	Vallisneria	Tidal Fresh/Oligohaline
975	Vallisneria	Tidal Fresh/Oligohaline	1,895	Vallisneria	Tidal Fresh/Oligohaline
976	Vallisneria	Tidal Fresh/Oligohaline	1,897	Vallisneria	Tidal Fresh/Oligohaline
977	Vallisneria	Tidal Fresh/Oligohaline	1,898	Potamogeton	Low Mesohaline
978	Vallisneria	Tidal Fresh/Oligohaline	1,902	Potamogeton	Low Mesohaline
979	Vallisneria	Tidal Fresh/Oligohaline	1,903	Vallisneria	Tidal Fresh/Oligohaline
980	Vallisneria	Tidal Fresh/Oligohaline	1,905	Vallisneria	Tidal Fresh/Oligohaline
984	Zostera	High Mesohaline/Polyhaline	1,906	Vallisneria	Tidal Fresh/Oligohaline
985	Zostera	High Mesohaline/Polyhaline	1,908	Vallisneria	Tidal Fresh/Oligohaline
986	Zostera	High Mesohaline/Polyhaline	1,909	Vallisneria	Tidal Fresh/Oligohaline
987	Zostera	High Mesohaline/Polyhaline	1,910	Vallisneria	Tidal Fresh/Oligohaline
999	Zostera	High Mesohaline/Polyhaline	1,911	Vallisneria	Tidal Fresh/Oligohaline

Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
1,000	Zostera	High Mesohaline/Polyhaline	1,912	Vallisneria	Tidal Fresh/Oligohaline
1,001	Zostera	High Mesohaline/Polyhaline	1,913	Vallisneria	Tidal Fresh/Oligohaline
1,002	Zostera	High Mesohaline/Polyhaline	1,915	Vallisneria	Tidal Fresh/Oligohaline
1,003	Zostera	High Mesohaline/Polyhaline	1,916	Vallisneria	Tidal Fresh/Oligohaline
1,004	Zostera	High Mesohaline/Polyhaline	1,918	Vallisneria	Tidal Fresh/Oligohaline
1,005	Zostera	High Mesohaline/Polyhaline	1,919	Vallisneria	Tidal Fresh/Oligohaline
1,006	Zostera	High Mesohaline/Polyhaline	1,920	Vallisneria	Tidal Fresh/Oligohaline
1,007	Zostera	High Mesohaline/Polyhaline	1,921	Vallisneria	Tidal Fresh/Oligohaline
1,009	Zostera	High Mesohaline/Polyhaline	1,922	Vallisneria	Tidal Fresh/Oligohaline
1,010	Zostera	High Mesohaline/Polyhaline	1,923	Vallisneria	Tidal Fresh/Oligohaline
1,015	Zostera	High Mesohaline/Polyhaline	1,925	Vallisneria	Tidal Fresh/Oligohaline
1,016	Zostera	High Mesohaline/Polyhaline	1,926	Vallisneria	Tidal Fresh/Oligohaline
1,021	Zostera	High Mesohaline/Polyhaline	1,928	Vallisneria	Tidal Fresh/Oligohaline
1,051	Potamogeton	Low Mesohaline	1,929	Vallisneria	Tidal Fresh/Oligohaline
1,053	Potamogeton	Low Mesohaline	1,930	Vallisneria	Tidal Fresh/Oligohaline
1,063	Vallisneria	Tidal Fresh/Oligohaline	1,931	Vallisneria	Tidal Fresh/Oligohaline
1,064	Vallisneria	Tidal Fresh/Oligohaline	1,932	Vallisneria	Tidal Fresh/Oligohaline
1,065	Vallisneria	Tidal Fresh/Oligohaline	1,933	Vallisneria	Tidal Fresh/Oligohaline
1,066	Vallisneria	Tidal Fresh/Oligohaline	1,935	Vallisneria	Tidal Fresh/Oligohaline
1,067	Vallisneria	Tidal Fresh/Oligohaline	1,936	Vallisneria	Tidal Fresh/Oligohaline
1,068	Vallisneria	Tidal Fresh/Oligohaline	1,938	Vallisneria	Tidal Fresh/Oligohaline
1,069	Vallisneria	Tidal Fresh/Oligohaline	1,939	Vallisneria	Tidal Fresh/Oligohaline
1,070	Vallisneria	Tidal Fresh/Oligohaline	1,940	Vallisneria	Tidal Fresh/Oligohaline
1,071	Vallisneria	Tidal Fresh/Oligohaline	1,941	Vallisneria	Tidal Fresh/Oligohaline
1,072	Vallisneria	Tidal Fresh/Oligohaline	1,942	Vallisneria	Tidal Fresh/Oligohaline
1,073	Vallisneria	Tidal Fresh/Oligohaline	1,943	Vallisneria	Tidal Fresh/Oligohaline
1,075	Vallisneria	Tidal Fresh/Oligohaline	1,945	Vallisneria	Tidal Fresh/Oligohaline
1,078	Zostera	High Mesohaline/Polyhaline	1,946	Vallisneria	Tidal Fresh/Oligohaline
1,079	Zostera	High Mesohaline/Polyhaline	1,948	Vallisneria	Tidal Fresh/Oligohaline
1,086	Zostera	High Mesohaline/Polyhaline	1,949	Vallisneria	Tidal Fresh/Oligohaline
1,087	Zostera	High Mesohaline/Polyhaline	1,950	Vallisneria	Tidal Fresh/Oligohaline
1,094	Zostera	High Mesohaline/Polyhaline	1,951	Vallisneria	Tidal Fresh/Oligohaline
1,095	Zostera	High Mesohaline/Polyhaline	1,952	Vallisneria	Tidal Fresh/Oligohaline
1,096	Zostera	High Mesohaline/Polyhaline	1,953	Vallisneria	Tidal Fresh/Oligohaline
1,101	Zostera	High Mesohaline/Polyhaline	1,955	Vallisneria	Tidal Fresh/Oligohaline
1,102	Zostera	High Mesohaline/Polyhaline	1,956	Vallisneria	Tidal Fresh/Oligohaline
1,103	Zostera	High Mesohaline/Polyhaline	1,958	Vallisneria	Tidal Fresh/Oligohaline
1,104	Zostera	High Mesohaline/Polyhaline	1,959	Vallisneria	Tidal Fresh/Oligohaline
1,105	Zostera	High Mesohaline/Polyhaline	1,960	Vallisneria	Tidal Fresh/Oligohaline
1,106	Zostera	High Mesohaline/Polyhaline	1,961	Vallisneria	Tidal Fresh/Oligohaline
1,107	Zostera	High Mesohaline/Polyhaline	1,962	Vallisneria	Tidal Fresh/Oligohaline
1,112	Zostera	High Mesohaline/Polyhaline	1,963	Vallisneria	Tidal Fresh/Oligohaline
1,113	Zostera	High Mesohaline/Polyhaline	1,965	Vallisneria	Tidal Fresh/Oligohaline
1,131	Potamogeton	Low Mesohaline	1,966	Vallisneria	Tidal Fresh/Oligohaline
1,132	Potamogeton	Low Mesohaline	1,968	Vallisneria	Tidal Fresh/Oligohaline
1,133	Potamogeton	Low Mesohaline	1,969	Vallisneria	Tidal Fresh/Oligohaline
1,136	Potamogeton	Low Mesohaline	1,970	Vallisneria	Tidal Fresh/Oligohaline
1,137	Vallisneria	Tidal Fresh/Oligohaline	1,971	Vallisneria	Tidal Fresh/Oligohaline
1,142	Vallisneria	Tidal Fresh/Oligohaline	1,972	Vallisneria	Tidal Fresh/Oligohaline
1,143	Vallisneria	Tidal Fresh/Oligohaline	1,973	Vallisneria	Tidal Fresh/Oligohaline
1,144	Vallisneria	Tidal Fresh/Oligohaline	1,975	Vallisneria	Tidal Fresh/Oligohaline
1,145	Vallisneria	Tidal Fresh/Oligohaline	1,976	Vallisneria	Tidal Fresh/Oligohaline
1,146	Vallisneria	Tidal Fresh/Oligohaline	1,978	Vallisneria	Tidal Fresh/Oligohaline
1,148	Vallisneria	Tidal Fresh/Oligohaline	1,979	Vallisneria	Tidal Fresh/Oligohaline
1,156	Zostera	High Mesohaline/Polyhaline	1,980	Vallisneria	Tidal Fresh/Oligohaline
1,157	Zostera	High Mesohaline/Polyhaline	1,981	Vallisneria	Tidal Fresh/Oligohaline
1,165	Zostera	High Mesohaline/Polyhaline	1,982	Vallisneria	Tidal Fresh/Oligohaline

Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat Within Which the Littoral Zone SAV Submodel will be Run

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Table E.16.1

**Chesapeake Bay Water Quality Model Cells Identified as Potential SAV Habitat
Within Which the Littoral Zone SAV Submodel will be Run**

Bay WQ Model Cell	Principal Species	Salinity Regime	Bay WQ Model Cell	Principal Species	Salinity Regime
1,300	Zostera	High Mesohaline/Polyhaline	2,051	Vallisneria	Tidal Fresh/Oligohaline
1,305	Zostera	High Mesohaline/Polyhaline	2,052	Vallisneria	Tidal Fresh/Oligohaline
1,311	Zostera	High Mesohaline/Polyhaline	2,053	Vallisneria	Tidal Fresh/Oligohaline
1,312	Zostera	High Mesohaline/Polyhaline	2,054	Vallisneria	Tidal Fresh/Oligohaline
1,313	Zostera	High Mesohaline/Polyhaline	2,056	Vallisneria	Tidal Fresh/Oligohaline
1,318	Zostera	High Mesohaline/Polyhaline	2,057	Vallisneria	Tidal Fresh/Oligohaline
1,319	Zostera	High Mesohaline/Polyhaline	2,058	Vallisneria	Tidal Fresh/Oligohaline
1,323	Zostera	High Mesohaline/Polyhaline	2,059	Vallisneria	Tidal Fresh/Oligohaline
1,324	Potamogeton	Low Mesohaline	2,061	Vallisneria	Tidal Fresh/Oligohaline
1,329	Potamogeton	Low Mesohaline	2,062	Vallisneria	Tidal Fresh/Oligohaline
1,330	Zostera	High Mesohaline/Polyhaline	2,063	Vallisneria	Tidal Fresh/Oligohaline
1,334	Zostera	High Mesohaline/Polyhaline	2,064	Vallisneria	Tidal Fresh/Oligohaline
1,335	Vallisneria	Tidal Fresh/Oligohaline	2,066	Vallisneria	Tidal Fresh/Oligohaline
1,339	Vallisneria	Tidal Fresh/Oligohaline	2,067	Vallisneria	Tidal Fresh/Oligohaline
1,340	Vallisneria	Tidal Fresh/Oligohaline	2,068	Vallisneria	Tidal Fresh/Oligohaline
1,341	Zostera	High Mesohaline/Polyhaline	2,069	Vallisneria	Tidal Fresh/Oligohaline
1,346	Zostera	High Mesohaline/Polyhaline	2,073	Vallisneria	Tidal Fresh/Oligohaline
1,352	Zostera	High Mesohaline/Polyhaline	2,074	Vallisneria	Tidal Fresh/Oligohaline
1,353	Zostera	High Mesohaline/Polyhaline	2,075	Vallisneria	Tidal Fresh/Oligohaline
1,358	Zostera	High Mesohaline/Polyhaline	2,076	Vallisneria	Tidal Fresh/Oligohaline
1,359	Zostera	High Mesohaline/Polyhaline	2,078	Vallisneria	Tidal Fresh/Oligohaline
1,363	Zostera	High Mesohaline/Polyhaline	2,079	Vallisneria	Tidal Fresh/Oligohaline
1,364	Potamogeton	Low Mesohaline	2,080	Vallisneria	Tidal Fresh/Oligohaline
1,369	Potamogeton	Low Mesohaline	2,081	Vallisneria	Tidal Fresh/Oligohaline
1,370	Zostera	High Mesohaline/Polyhaline	2,083	Vallisneria	Tidal Fresh/Oligohaline
1,373	Zostera	High Mesohaline/Polyhaline	2,084	Vallisneria	Tidal Fresh/Oligohaline
1,379	Zostera	High Mesohaline/Polyhaline	2,085	Vallisneria	Tidal Fresh/Oligohaline
1,384	Zostera	High Mesohaline/Polyhaline	2,086	Vallisneria	Tidal Fresh/Oligohaline
1,390	Zostera	High Mesohaline/Polyhaline	2,088	Vallisneria	Tidal Fresh/Oligohaline
1,391	Zostera	High Mesohaline/Polyhaline	2,089	Vallisneria	Tidal Fresh/Oligohaline
1,392	Zostera	High Mesohaline/Polyhaline	2,091	Vallisneria	Tidal Fresh/Oligohaline
1,393	Zostera	High Mesohaline/Polyhaline	2,092	Vallisneria	Tidal Fresh/Oligohaline
1,396	Zostera	High Mesohaline/Polyhaline	2,094	Vallisneria	Tidal Fresh/Oligohaline
1,397	Zostera	High Mesohaline/Polyhaline	2,095	Vallisneria	Tidal Fresh/Oligohaline
1,401	Zostera	High Mesohaline/Polyhaline	2,097	Vallisneria	Tidal Fresh/Oligohaline
1,402	Potamogeton	Low Mesohaline	2,098	Vallisneria	Tidal Fresh/Oligohaline
1,407	Potamogeton	Low Mesohaline	2,100	Vallisneria	Tidal Fresh/Oligohaline
1,408	Potamogeton	Low Mesohaline			
1,409	Potamogeton	Low Mesohaline			
1,412	Potamogeton	Low Mesohaline			
1,417	Zostera	High Mesohaline/Polyhaline			
1,422	Zostera	High Mesohaline/Polyhaline			
1,423	Zostera	High Mesohaline/Polyhaline			
1,429	Zostera	High Mesohaline/Polyhaline			
1,430	Zostera	High Mesohaline/Polyhaline			
1,431	Zostera	High Mesohaline/Polyhaline			
1,432	Zostera	High Mesohaline/Polyhaline			
1,434	Zostera	High Mesohaline/Polyhaline			
1,435	Potamogeton	Low Mesohaline			
1,439	Potamogeton	Low Mesohaline			

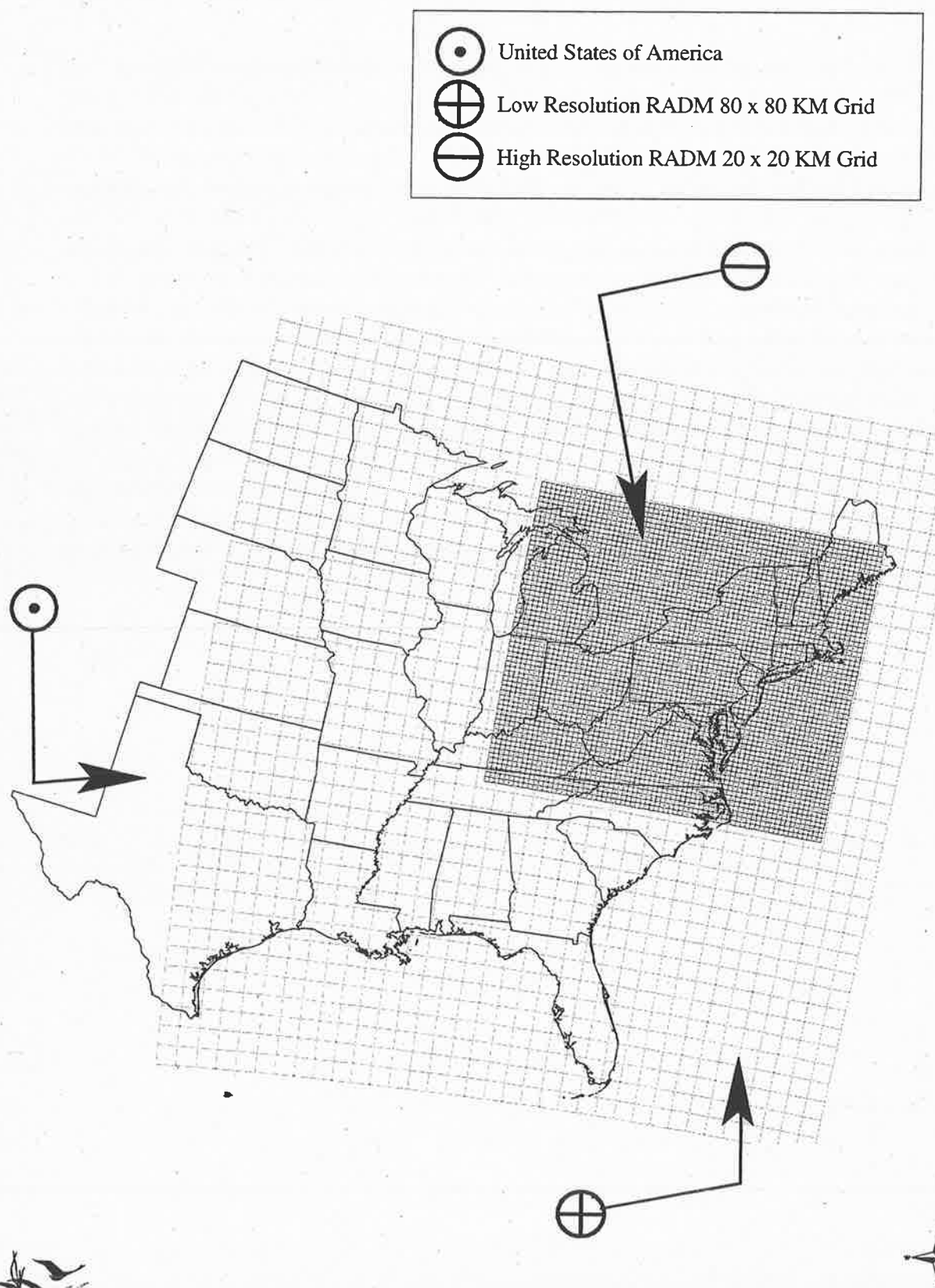
Section E.17

Phase IV Chesapeake Bay Watershed Model and Regional Acid Deposition Model Linkage

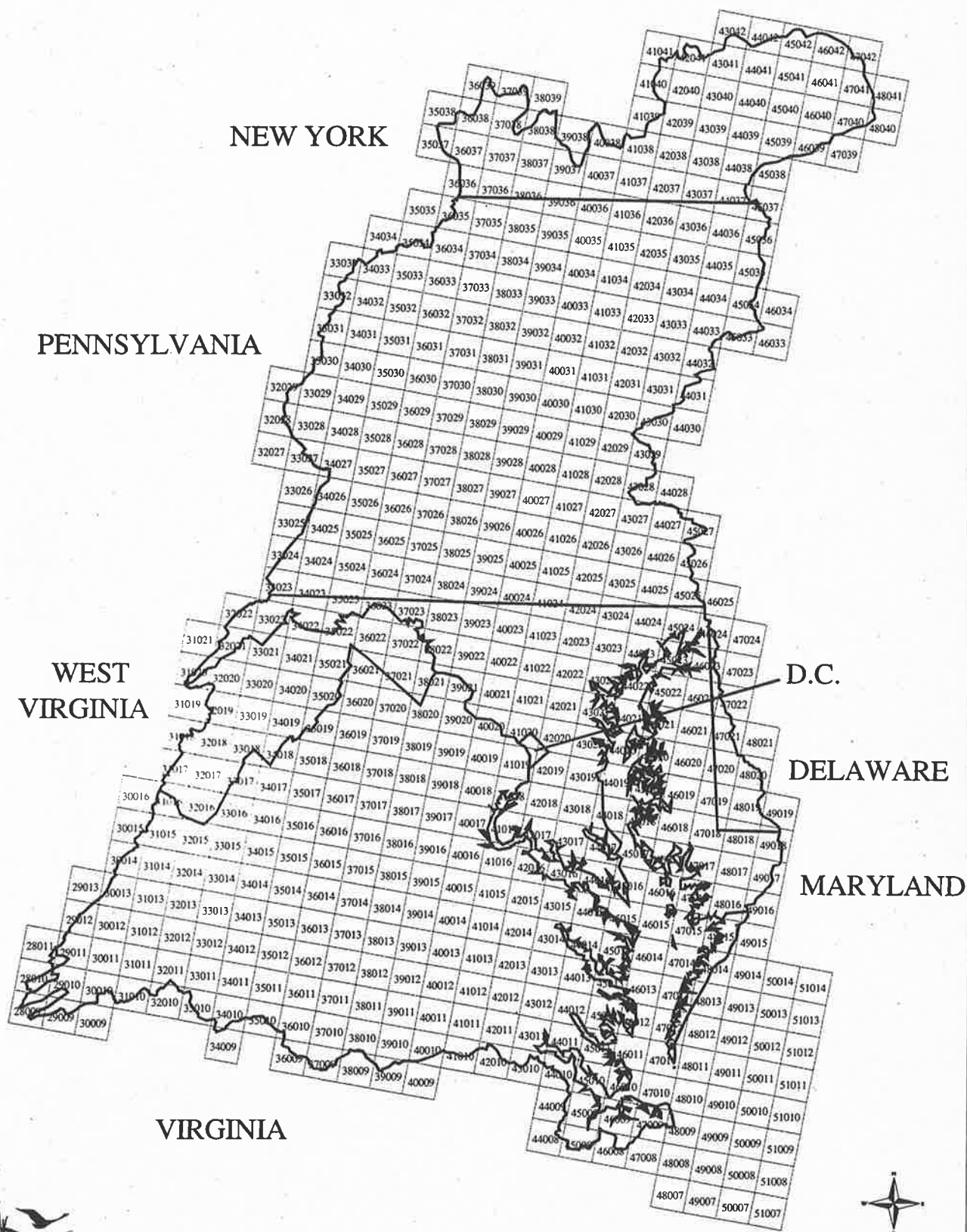
A direct linkage has been foraged to facilitate the incorporation of the Regional Acid Deposition Model (RADM) output data into development of input decks for running scenarios through the Phase IV Watershed Model. The linkage between the two models was developed by using GIS overlay of the Watershed Model segments coverage and the 20x20 km grid of the RADM model coverage. RADM model runs are based on two different resolution grids: 20x20 km and 80x80 km grid. Figure E.17.1 shows the high and low resolution RADM grids domain as they relate spatially to the United States coverage. For purposes of simulating atmospheric deposition loads to the Chesapeake Bay watershed, it was necessary to develop a RADM grid with better resolution than the 80x80 km. With this in mind, the 20x20 km grid was developed (Figure E.17.2). Figure E.17.3 shows the overlay of the high resolution 20x20 km grid with the Chesapeake Bay Water Quality Model cells and the Phase IV Watershed Model segments. The GIS coverages overlaid allow development of a spatial relationship between the air, watershed, and water quality models.

The following table contains information about the spatial relationship between the models and the percentage of the RADM cells within the respective Phase IV Watershed Model segments (Table E.17.1). RADM cell numbering is by ColRow, a combination of Column and Row numbering sequences.

Regional Acid Deposition Model (RADM) Grids Domain

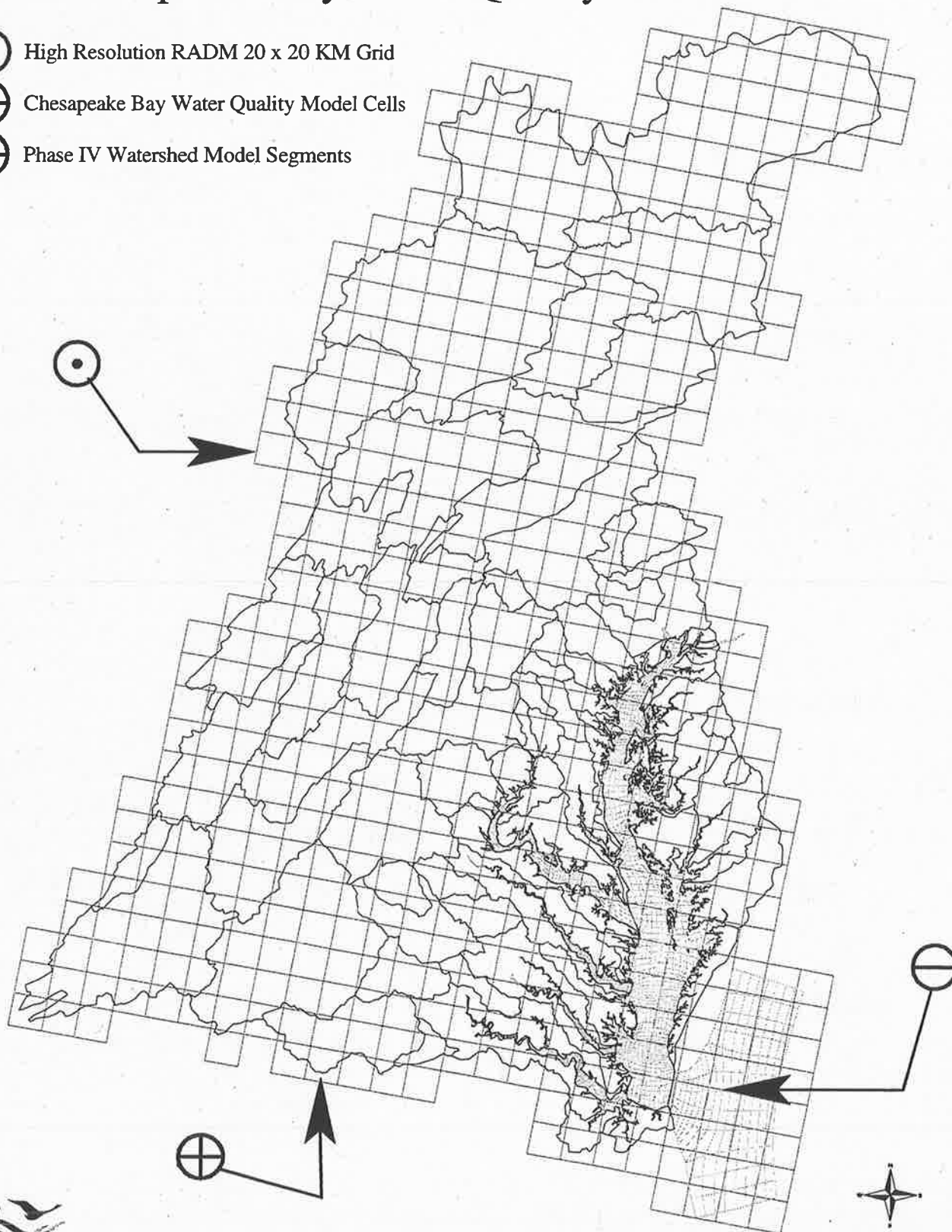


Regional Acid Deposition Model 20 x 20 km Cells, Which Overlay the Chesapeake Bay Basin



Regional Acid Deposition Model Grid, Phase IV Chesapeake Bay Watershed Model Segments, and Chesapeake Bay Water Quality Model Cells

-  High Resolution RADM 20 x 20 KM Grid
-  Chesapeake Bay Water Quality Model Cells
-  Phase IV Watershed Model Segments



KJH Map Date: July, 1997

/modgis/khopkins/maps/appendix/pradmp3.ps

Source: U.S. E.P.A. Chesapeake Bay Program Modeling Team

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
28009	N/A	0.77	32013	270	1.00	33028	N/A	0.00
28009	270	0.23	32014	190	0.02	33028	50	1.00
28010	N/A	0.63	32014	270	0.98	33029	N/A	0.03
28010	270	0.37	32015	170	0.07	33029	50	0.97
28011	N/A	0.95	32015	190	0.11	33030	N/A	0.33
28011	270	0.05	32015	270	0.81	33030	50	0.63
29009	N/A	0.67	32016	170	0.94	33030	60	0.05
29009	270	0.33	32016	190	0.03	33031	N/A	0.36
29010	N/A	0.09	32016	270	0.03	33031	50	0.00
29010	270	0.91	32017	170	1.00	33031	60	0.64
29011	N/A	0.07	32018	N/A	0.04	33032	N/A	0.58
29011	270	0.93	32018	170	0.96	33032	60	0.42
29012	N/A	0.47	32019	N/A	0.16	33033	N/A	0.86
29012	265	0.03	32019	160	0.18	33033	60	0.14
29012	270	0.50	32019	170	0.66	34009	N/A	0.97
29013	N/A	0.98	32020	N/A	0.03	34009	280	0.03
29013	265	0.02	32020	160	0.96	34010	N/A	0.17
29014	N/A	1.00	32020	170	0.01	34010	280	0.83
30009	N/A	0.99	32021	N/A	0.14	34011	280	1.00
30009	270	0.01	32021	160	0.86	34012	280	1.00
30010	N/A	0.22	32022	N/A	0.53	34013	190	0.40
30010	270	0.78	32022	160	0.47	34013	270	0.02
30011	270	1.00	32027	N/A	1.00	34013	280	0.57
30012	265	0.01	32028	N/A	0.74	34014	190	0.96
30012	270	0.99	32028	50	0.26	34014	280	0.04
30013	N/A	0.15	32029	N/A	0.82	34015	190	1.00
30013	265	0.52	32029	50	0.18	34016	190	0.60
30013	270	0.33	33010	N/A	0.41	34016	200	0.40
30014	N/A	0.49	33010	270	0.06	34017	190	0.00
30014	265	0.51	33010	280	0.53	34017	200	1.00
30015	N/A	0.91	33011	270	0.69	34018	175	0.33
30015	265	0.09	33011	280	0.31	34018	200	0.67
30016	N/A	1.00	33012	270	0.60	34019	170	0.08
31010	N/A	0.43	33012	280	0.40	34019	175	0.91
31010	270	0.57	33013	190	0.31	34019	200	0.01
31011	270	1.00	33013	270	0.62	34020	170	0.30
31012	270	1.00	33013	280	0.07	34020	175	0.70
31013	265	0.04	33014	190	0.95	34021	160	0.14
31013	270	0.96	33014	270	0.05	34021	170	0.50
31014	265	0.35	33015	190	1.00	34021	175	0.36
31014	270	0.65	33016	170	0.09	34022	160	0.76
31015	N/A	0.03	33016	190	0.89	34022	170	0.08
31015	170	0.09	33016	200	0.03	34022	175	0.17
31015	265	0.57	33017	170	0.38	34023	160	0.58
31015	270	0.31	33017	190	0.12	34023	175	0.42
31016	N/A	0.13	33017	200	0.50	34024	90	0.69
31016	170	0.84	33018	170	0.74	34024	160	0.26
31016	265	0.02	33018	175	0.08	34024	175	0.04
31016	270	0.00	33018	200	0.18	34025	N/A	0.00
31017	N/A	0.40	33019	160	0.08	34025	90	1.00
31017	170	0.60	33019	170	0.90	34026	N/A	0.14
31018	N/A	0.70	33019	175	0.02	34026	90	0.37
31018	170	0.30	33020	160	0.50	34026	100	0.49
31019	N/A	0.99	33020	170	0.50	34027	N/A	0.07
31019	160	0.01	33021	160	0.98	34027	50	0.31
31020	N/A	0.58	33021	170	0.02	34027	100	0.62
31020	160	0.42	33022	N/A	0.02	34028	50	0.74
31021	N/A	0.99	33022	160	0.98	34028	100	0.26
31021	160	0.01	33023	N/A	0.23	34029	50	1.00
32010	N/A	0.85	33023	160	0.77	34030	50	1.00
32010	270	0.15	33024	N/A	0.49	34030	60	0.00
32011	N/A	0.02	33024	90	0.26	34031	50	0.26
32011	270	0.98	33024	160	0.26	34031	60	0.74
32012	270	1.00	33025	N/A	0.91	34032	60	1.00
35009	N/A	1.00	33025	90	0.09	34033	N/A	0.16
35010	N/A	0.42	33026	N/A	1.00	34033	60	0.84

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
35010	280	0.30	33027	N/A	0.60	34034	N/A	0.98
35010	300	0.28	33027	50	0.40	34034	60	0.02
35011	280	0.99	36015	280	0.78	37018	190	0.03
35011	300	0.01	36016	190	0.15	37018	200	0.02
35012	280	1.00	36016	230	0.83	37018	230	0.94
35013	280	1.00	36016	280	0.03	37019	190	0.00
35014	190	0.10	36017	190	0.50	37019	200	0.57
35014	280	0.90	36017	230	0.50	37019	220	0.26
35015	190	0.49	36018	190	0.68	37019	230	0.16
35015	280	0.52	36018	200	0.15	37020	200	0.66
35016	190	0.87	36018	230	0.17	37020	220	0.00
35016	200	0.13	36019	190	0.14	37020	740	0.33
35016	280	0.01	36019	200	0.86	37021	180	0.02
35017	190	0.53	36020	200	0.37	37021	200	0.19
35017	200	0.47	36020	740	0.63	37021	740	0.79
35018	190	0.04	36021	175	0.00	37022	740	1.00
35018	200	0.96	36021	740	1.00	37023	730	0.16
35019	175	0.26	36022	175	0.10	37023	740	0.84
35019	200	0.74	36022	740	0.90	37024	80	0.00
35020	175	0.78	36023	175	0.33	37024	100	0.01
35020	200	0.13	36023	740	0.67	37024	730	0.82
35020	740	0.09	36024	90	0.10	37024	740	0.17
35021	175	0.93	36024	740	0.90	37025	80	0.18
35021	740	0.07	36025	90	0.14	37025	100	0.30
35022	170	0.00	36025	100	0.63	37025	730	0.44
35022	175	0.97	36025	740	0.23	37025	740	0.07
35022	740	0.03	36026	90	0.48	37026	80	0.00
35023	175	0.95	36026	100	0.52	37026	100	0.85
35023	740	0.05	36027	90	0.31	37026	730	0.14
35024	90	0.62	36027	100	0.69	37027	100	1.00
35024	175	0.33	36028	100	1.00	37028	100	1.00
35024	740	0.05	36029	50	0.02	37029	60	0.31
35025	90	1.00	36029	60	0.62	37029	80	0.36
35026	90	0.60	36029	50	0.36	37029	100	0.33
35026	100	0.40	36030	50	0.20	37030	60	0.87
35027	90	0.05	36030	60	0.80	37030	80	0.13
35027	100	0.95	36031	60	1.00	37031	60	1.00
35028	50	0.01	36032	60	1.00	37032	60	1.00
35028	100	0.99	36033	60	1.00	37033	60	1.00
35029	50	0.64	36034	N/A	0.00	37034	60	1.00
35029	60	0.19	36034	60	1.00	37035	10	0.74
35029	100	0.17	36035	N/A	0.30	37035	60	0.26
35030	50	0.98	36035	10	0.33	37036	10	1.00
35030	60	0.02	36035	60	0.37	37037	10	1.00
35031	50	0.07	36036	N/A	0.42	37038	N/A	0.18
35031	60	0.93	36036	10	0.58	37038	10	0.82
35032	60	1.00	36037	N/A	0.04	37039	N/A	0.62
35033	60	1.00	36037	10	0.96	37039	10	0.38
35034	N/A	0.60	36038	N/A	0.24	38009	N/A	0.92
35034	60	0.40	36038	10	0.76	38009	300	0.08
35035	N/A	1.00	36039	N/A	0.77	38010	N/A	0.02
35037	N/A	0.70	36039	10	0.23	38010	300	0.98
35037	10	0.30	37009	N/A	0.42	38011	280	0.01
35038	N/A	0.91	37009	300	0.58	38011	290	0.26
35038	10	0.09	37010	280	0.05	38011	300	0.73
36009	N/A	0.71	37010	300	0.95	38012	280	0.26
36009	300	0.29	37011	280	0.76	38012	290	0.74
36010	N/A	0.05	37011	300	0.24	38013	260	0.17
36010	280	0.02	37012	260	1.00	38013	280	0.52
36010	300	0.93	37013	280	1.00	38013	290	0.31
36011	280	0.96	37014	230	0.00	38014	250	0.31
36011	300	0.04	37014	250	0.00	38014	260	0.68
36012	280	1.00	37014	260	0.43	38014	280	0.01
36013	280	1.00	37014	280	0.57	38015	230	0.08
36014	280	1.00	37015	230	0.64	38015	235	0.00
36015	230	0.22	37015	250	0.21	38015	250	0.92

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
45013	930	0.10	37015	260	0.09	38016	230	1.00
45013	940	0.20	37015	280	0.06	38016	250	0.00
45014	N/A	0.01	37016	230	1.00	38017	230	0.99
45014	N/A	0.14	37017	230	1.00	38017	550	0.01
45014	560	0.33	45036	20	0.21	46021	400	0.73
45014	580	0.31	45036	30	0.39	46021	770	0.16
45014	930	0.20	45037	N/A	0.74	46022	N/A	0.00
45014	980	0.01	45037	20	0.26	46022	N/A	0.01
45015	N/A	0.43	45038	N/A	0.82	46022	380	0.89
45015	N/A	0.22	45038	20	0.18	46022	400	0.02
45015	580	0.03	45039	N/A	0.01	46022	770	0.07
45015	920	0.01	45039	20	0.99	46022	810	0.01
45015	980	0.31	45040	20	1.00	46023	N/A	0.26
45015	990	0.01	45041	20	1.00	46023	N/A	0.02
45015	N/A	0.69	45042	N/A	0.23	46023	370	0.26
45016	N/A	0.06	45042	20	0.77	46023	380	0.12
45016	920	0.13	46008	N/A	0.78	46023	800	0.01
45016	990	0.12	46008	N/A	0.00	46023	510	0.33
45016	N/A	0.75	46008	620	0.02	46024	N/A	0.56
45017	840	0.23	46008	630	0.00	46024	N/A	0.03
45017	990	0.01	46008	960	0.19	46024	370	0.03
45017	N/A	0.34	46009	N/A	0.00	46024	450	0.10
45018	400	0.02	46009	N/A	0.21	46024	500	0.28
45018	840	0.65	46009	620	0.18	46025	14/A	0.98
45018	N/A	0.51	46009	630	0.18	46025	450	0.02
45019	400	0.04	46009	960	0.43	46033	N/A	0.98
45019	830	0.42	46010	N/A	0.38	46033	30	0.02
45019	840	0.02	46010	N/A	0.16	46034	N/A	1.00
45019	890	0	46010	600	0.10	46034	30	0.00
45020	N/A	0.28	46010	950	0.31	46039	N/A	0.37
45020	390	0.40	46010	960	0.05	46039	20	0.63
45020	400	0.01	46011	N/A	0.00	46040	20	1.00
45020	820	0.04	46011	N/A	0.93	46041	20	1.00
45020	830	0.26	46011	590	0	46042	N/A	0.19
45021	N/A	0.21	46011	940	0.01	46042	20	0.81
45021	380	0.64	46011	950	0.06	47008	N/A	0
45021	390	0.13	46012	N/A	0.71	47000	N/A	0.98
45021	400	0.00	46012	940	0.29	47008	960	0.02
45021	820	0.02	46013	N/A	0.94	47009	4/A	0.00
45022	N/A	0.06	46013	N/A	0.04	47009	N/A	0.02
45022	380	0.73	46013	560	0.01	47009	N/A	0.33
45022	810	0.28	46013	930	0.01	47009	960	0.64
45023	N/A	0.50	46013	940	0.01	47010	N/A	0.84
45023	370	0.07	46014	N/A	0.99	47010	N/A	0.09
45023	380	0.00	46014	580	0.01	47010	960	0.07
45023	450	0.01	46014	930	0.00	47011	N/A	0.15
45023	800	0.04	46014	980	0.00	47011	N/A	0.76
45023	810	0.29	46015	N/A	0.00	47011	440	0.09
45023	850	0.10	46015	N/A	0.92	47012	N/A	0.12
45024	N/A	0.10	46015	430	0.07	47012	N/A	0.60
45024	450	0.75	46015	980	0.01	47012	440	0.29
45024	800	0.15	46016	N/A	0.90	47013	N/A	0.69
45024	850	0.00	46016	420	0.00	47013	440	0.31
45025	N/A	0.17	46016	430	0.05	47014	N/A	0.90
45025	450	0.83	46016	840	0.05	47014	430	0.01
45026	N/A	0.59	46017	N/A	0.43	47014	440	0.09
45026	120	0.19	46017	840	0.57	47015	N/A	0.86
45026	450	0.23	46018	N/A	0.03	47015	430	0.14
45027	N/A	0.73	46018	400	0.06	47015	440	0.00
45027	120	0.01	46018	840	0.91	47016	N/A	0.43
45027	720	0.26	46019	N/A	0.08	47016	41&0	0.02
45033	N/A	0.52	46019	400	0.72	47016	430	0.55
45033	30	0.48	46019	410	0.08	47017	N/A	0.18
45034	N/A	0.24	46019	830	0.05	47017	410	0.20
45034	30	0.76	46019	840	0.07	47017	420	0.54
45035	N/A	0.24	46020	N/A	0.01	47017	430	0.05

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
45035	30	0.76	46020	390	0.02	47017	840	0.02
45036	N/A	0.39	46020	400	0.93	47018	N/A	0.03
43016	920	0.26	46020	410	0.02	47018	410	0.81
43016	980	0.15	46020	830	0.01	47018	420	0.03
43017	N/A	0.05	46021	380	0.10	47018	840	0.13
43017	N/A	0.04	46021	390	0.00	47019	N/A	0.01
43017	500	0.23	43039	20	1.00	44022	N/A	0.71
43017	920	0.68	43040	20	1.00	44022	380	0.00
43018	N/A	0.06	43041	N/A	0.09	44022	470	0.09
43018	500	0.78	43041	20	0.92	44022	810	0.11
43018	880	0.03	43042	N/A	0.81	44022	850	0.05
43018	920	0.13	43042	20	0.19	44022	860	0.04
43019	N/A	0.01	44008	N/A	0.92	44023	N/A	0.11
43019	N/A	0.02	44008	620	0.08	44023	450	0.42
43019	500	0.77	44009	N/A	0.89	44023	470	0.10
43019	880	0.20	44009	600	0.03	44023	850	0.37
43020	N/A	0.06	44009	620	0.08	44024	140	0.31
43020	340	0.12	44010	N/A	0.09	44024	450	0.69
43020	500	0.28	44010	N/A	0.42	44025	120	0.13
43020	510	0.05	44010	600	0.49	44025	140	0.49
43020	870	0.00	44011	N/A	0.04	44025	450	0.38
43020	880	0.49	44011	N/A	0.17	44026	120	0.49
43021	N/A	0.16	44011	590	0.26	44026	450	0.13
43021	340	0.02	44011	600	0.52	44026	720	0.38
43021	490	0.44	44012	N/A	0.15	44027	14/A	0.06
43021	510	0.21	44012	590	0.76	44027	120	0.00
43021	860	0.01	44012	600	0.02	44027	720	0.94
43021	870	0.14	44012	940	0.07	44028	N/A	0.97
43021	880	0.01	44013	N/A	0.00	44028	720	0.03
43022	N/A	0.12	44013	N/A	0.10	44030	N/A	1.00
43022	470	0.14	44013	560	0.29	44030	80	0.00
43022	480	0.16	44013	590	0.18	44031	N/A	0.74
43022	490	0.06	44013	940	0.43	44031	40	0.26
43022	860	0.52	44014	N/A	0.19	44032	N/A	0.26
43023	450	0.17	44014	560	0.73	44032	40	0.74
43023	470	0.83	44014	580	0.05	44033	N/A	0.06
43023	480	0	44014	940	0.01	44033	30	0.66
43024	140	0.33	44014	980	0.01	44033	40	0.28
43024	450	0.61	44015	N/A	0.17	44034	30	1.00
43024	470	0.06	44015	560	0.20	44035	30	1.00
43025	120	0.40	44015	580	0.00	44036	20	0.40
43025	140	0.44	44015	980	0.62	44036	30	0.60
43025	710	0.13	44016	N/A	0.43	44037	N/A	0.07
43025	720	0.03	44016	920	0.50	44037	20	0.93
43026	120	0.05	44016	980	0.06	44038	N/A	0.04
43026	710	0.29	44016	990	0.01	44038	20	0.96
43026	720	0.67	44017	N/A	0.16	44039	20	1.00
43027	N/A	0.03	44017	N/A	0.10	44040	20	1.00
43027	110	0.13	44017	500	0.45	44041	20	1.00
43027	710	0.26	44017	880	0.07	44042	N/A	0.67
43027	720	0.58	44017	920	0.17	44042	20	0.33
43028	N/A	0.49	44017	990	0.04	45008	N/A	0.00
43028	110	0.51	44018	N/A	0.70	45008	N/A	0.43
43029	720	0.00	44018	N/A	0.00	45008	620	0.57
43029	N/A	0.49	44018	500	0.11	45009	N/A	0.10
43029	110	0.51	44019	880	0.19	45009	600	0.48
43030	N/A	0.52	44019	N/A	0.88	45009	620	0.43
43030	40	0.19	44019	830	0.06	45010	N/A	0.00
43030	80	0.30	44019	880	0.06	45010	N/A	0.45
43031	N/A	0.00	44019	890	0.00	45010	600	0.42
43031	40	1.00	44020	N/A	0.71	45010	950	0.13
43032	40	1.00	44020	390	0.00	45011	N/A	0.05
43033	30	0.28	44020	510	0.00	45011	N/A	0.20
43033	40	0.72	44020	0.82	0.18	45011	N/A	0.02
43034	30	1.00	44020	830	0.01	45011	590	0.28
43035	30	1.00	44020	870	0.04	45011	600	0.19

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
43036	20	0.43	44020	880	0.06	45011	940	0.15
43036	30	0.57	44021	N/A	0.80	45011	950	0.11
43037	20	1.00	44021	380	0.05	45012	N/A	0.14
43038	20	1.00	44021	490	0.02	45012	590	0.06
41010	310	0.08	44021	510	0.04	45012	940	0.80
41010	600	0.40	44021	820	0.02	45013	N/A	0.11
41011	N/A	0.02	44021	860	0.00	45013	N/A	0.28
41011	600	0.98	44021	870	0.07	45013	560	0.30
41012	N/A	0.00	41030	40	0.83	42021	510	0.03
41012	590	0.04	41030	70	0.01	42021	540	0.03
41012	600	0.48	41030	80	0.16	42022	340	0.07
41012	610	0.48	41031	40	0.47	42022	480	0.47
41013	260	0.17	41031	70	0.53	42022	490	0.17
41013	590	0.73	41032	40	0.23	42022	760	0.28
41013	610	0.10	41032	70	0.77	42023	470	0.81
41014	240	0.75	41033	40	0.09	42023	480	0.11
41014	260	0.07	41033	70	0.91	42023	760	0.09
41014	590	0.17	41034	30	0.43	42024	110	0.22
41015	N/A	0.01	41034	70	0.57	42024	140	0.03
41015	235	0.10	41035	30	0.65	42024	450	0.20
41015	240	0.40	41035	700	0.35	42024	470	0.54
41015	560	0.49	41036	10	0.09	42025	110	0.61
41016	N/A	0.02	41036	20	0.42	42025	120	0.00
41016	N/A	0.11	41036	30	0.28	42025	140	0.16
41016	560	0.50	41036	700	0.20	42025	710	0.22
41016	920	0.00	41037	20	1.00	42026	110	0.58
41016	980	0.38	41038	N/A	0.12	42026	710	0.42
41017	N/A	0.30	41038	20	0.88	42027	110	0.86
41017	910	0.11	41039	N/A	0.79	42027	710	0.14
41017	920	0.54	41039	20	0.21	42028	80	0.11
41017	970	0.03	41040	N/A	0.58	42028	110	0.89
41017	980	0.02	41040	20	0.42	42029	N/A	0.01
41018	N/A	0.26	41041	N/A	0.87	42029	80	0.64
41018	550	0.10	41041	20	0.13	42029	110	0.36
41018	900	0.28	42010	N/A	0.74	42030	N/A	0.00
41018	910	0.33	42010	600	0.26	42030	40	0.71
41018	920	0.01	42011	N/A	0.12	42030	50	0.29
41018	970	0.03	42011	600	0.87	42031	40	1.00
41019	N/A	0.07	42011	610	0.01	42032	40	1.00
41019	220	0.01	42012	N/A	0.00	42032	70	0.00
41019	540	0.00	42012	590	0.36	42033	30	0.21
41019	890	0.05	42012	600	0.09	42033	40	0.48
41019	900	0.82	42012	610	0.55	42033	70	0.30
41019	910	0.04	42013	N/A	0.01	42034	30	0.67
41020	N/A	0.01	42013	590	0.99	42034	70	0.33
41020	220	0.36	42014	240	0.19	42035	30	1.00
41020	540	0.27	42014	560	0.24	42036	20	0.42
41020	890	0.34	42014	590	0.57	42036	30	0.58
41020	900	0.03	42015	N/A	0.07	42037	20	1.00
41021	220	0.06	42015	240	0.11	42038	20	1.00
41021	330	0.54	42015	560	0.80	42039	20	1.00
41021	340	0.14	42015	980	0.02	42040	20	1.00
41021	540	0.12	42016	N/A	0.00	42041	N/A	0.40
41021	890	0.15	42016	N/A	0.29	42041	20	0.60
41022	210	0.04	42016	560	0.09	43010	N/A	0.00
41022	330	0.14	42016	920	0.05	43010	N/A	0.64
41022	340	0.12	42016	980	0.57	43010	600	0.36
41022	760	0.71	42017	N/A	0.19	43011	N/A	0.17
41023	210	0.35	42017	920	0.74	43011	600	0.83
41023	470	0.02	42017	980	0.07	43012	N/A	0.05
41023	760	0.63	42018	N/A	0.01	43012	N/A	0.01
41024	110	0.61	42018	500	0.01	43012	590	0.38
41024	210	0.21	42018	910	0.45	43012	600	0.55
41024	470	0.17	42018	920	0.54	43013	N/A	0.03
41024	760	0.01	42019	N/A	0.00	43013	590	0.79
41025	110	1.00	42019	500	0.31	43013	940	0.18

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
41026	110	1.00	42019	540	0.06	43014	N/A	0.11
41027	50	0.35	42019	890	0.01	43014	560	0.59
41027	110	0.65	42019	910	0.62	43014	590	0.05
41028	50	0.86	42020	N/A	0.00	43014	940	0.26
41028	110	0.14	42020	340	0.21	43015	N/A	0.01
41029	80	1.00	42020	500	0.26	43015	N/A	0.07
38018	230	0.69	42020	540	0.52	43015	560	0.73
38018	550	0.31	42021	330	0.06	43015	980	0.20
38019	220	0.14	42021	340	0.63	43016	N/A	0.56
38019	230	0.11	42021	490	0.26	43016	560	0.02
38019	550	0.15	39016	560	0.01	40014	240	0.36
38020	180	0.10	39016	980	0.00	40014	260	0.64
38020	200	0.23	39017	230	0.62	46015	235	0.66
38020	220	0.67	39017	550	0.29	40015	240	0.26
38021	180	0.65	39017	980	0.09	40015	560	0.08
38021	200	0.35	39018	550	1.00	40016	N/A	0.00
38021	740	0.00	39019	220	0.26	40016	230	0.14
38022	180	0.14	39019	550	0.74	40016	235	0.03
38022	740	0.26	39020	180	0.04	40016	560	0.59
38023	180	0.71	39020	220	0.96	40016	980	0.24
38023	730	0.04	39021	180	0.33	40017	N/A	0.02
38023	740	0.26	39021	210	0.16	40017	550	0.02
38024	180	0.38	39021	220	0.50	40017	970	0.07
38024	730	0.62	39022	150	0.42	40017	980	0.90
38025	80	0.56	39022	210	0.56	40018	N/A	0.00
38025	730	0.44	39022	220	0.03	40018	550	0.14
38026	80	0.82	39023	180	0.26	40018	900	0.01
38026	100	0.07	39023	210	0.74	40018	970	0.24
38026	730	0.10	39024	180	0.23	40018	990	0.01
38027	80	0.37	39024	210	0.43	40019	220	0.28
38027	100	0.63	39024	730	0.10	40019	550	0.5
38028	100	1.00	39024	750	0.24	40019	900	0.22
38029	80	0.26	39025	80	0.14	40020	N/A	0.00
38029	100	0.74	39025	110	0.61	40020	220	1.00
38030	60	0.26	39025	730	0.17	40021	210	0.29
38030	80	0.74	39025	750	0.09	40021	220	0.69
38031	60	1.00	39026	80	0.76	40021	330	0.02
38032	60	1.00	39026	110	0.24	40022	210	0.91
38033	60	1.00	39021	80	0.81	40022	330	0.05
38034	10	0.08	39027	100	0.19	40022	760	0.03
38034	60	0.92	39028	80	0.01	40023	210	1.00
38035	10	0.91	39028	100	0.99	40023	750	0.00
38035	60	0.09	39029	80	0.65	40024	110	0.16
38036	10	1.00	39029	100	0.35	40024	210	0.22
38037	10	1.00	39030	60	0.00	40024	750	0.61
38038	N/A	0.23	39030	70	0.35	40025	110	0.93
38038	10	0.77	39030	80	0.65	40025	750	0.07
38039	N/A	0.98	39031	60	0.42	40026	50	0.24
38039	10	0.02	39031	70	0.58	40026	110	0.76
39009	N/A	0.80	39032	60	0.84	40027	80	0.99
39009	300	0.18	39032	70	0.16	40027	110	0.01
39009	310	0.02	39033	60	0.86	40028	80	0.68
39010	N/A	0.00	39033	70	0.14	40028	100	0.12
39010	300	0.90	39034	10	0.49	40029	50	0.97
39010	310	0.10	39034	30	0.04	40029	100	0.03
39011	290	0.01	39034	60	0.47	40030	40	0.04
39011	300	0.91	39035	10	0.87	40030	70	0.33
39011	310	0.00	39035	700	0.13	40030	80	0.63
39011	600	0.08	39036	10	1.00	40031	70	1.00
39012	290	0.94	39037	N/A	0.13	40032	70	1.00
39012	300	0.05	39037	10	0.87	40033	60	0.11
39012	600	0.01	39038	N/A	0.87	40033	70	0.89
39013	260	0.76	39038	10	0.06	40034	10	0.00
39013	290	0.24	39038	20	0.05	40034	30	0.59
39014	240	0.00	40010	N/A	0.22	40034	60	0.22
39014	250	0.33	40010	300	0.17	40034	70	0.19

Table E.17.1

RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment	RADM Cell COLROW	Phase 4 WSM Segment	Percent of Cell in Segment
39014	260	0.67	40010	310	0.60	40035	10	0.04
39015	230	0.00	40010	600	0.01	40035	30	(1.26
39015	235	0.52	40011	300	0.04	40035	700	0.70
39015	240	0.00	48020	780	0.21	40036	10	0.91
39015	250	0.28	48040	N/A	0.93	40036	20	0.01
39015	260	0.19	48040	20	0.07	40036	700	0.09
39016	230	0.73	40011	310	0.17	40037	10	0.67
39016	235	0.26	40011	600	0.79	40037	20	0.33
47019	410	0.99	40012	290	0.61	40038	N/A	0.44
47019	840	0.00	40012	600	0.27	40038	10	0.02
47020	N/A	0.01	40012	610	0.13	40038	20	0.54
47020	400	0.14	40013	260	0.66	41010	N/A	0.52
47020	410	0.64	40013	290	0.06			
47020	780	0.22	40013	590	0.01			
47021	N/A	0.33	40013	610	0.26			
47021	400	0.20	48041	N/A	0.97			
47021	410	0.16	48041	20	0.03			
47021	770	0.31	49015	N/A	1.00			
47022	N/A	0.82	49015	430	0.00			
47022	380	0.04	49016	N/A	0.78			
47022	770	0.13	49016	430	0.22			
47023	N/A	1.00	49017	N/A	0.36			
47039	N/A	0.98	49017	430	0.64			
47039	20	0.02	49018	N/A	0.29			
47040	N/A	0.19	49018	410	0.00			
47040	20	0.81	49018	430	0.71			
47041	N/A	0.12	49019	N/A	0.90			
47041	20	0.88	49019	430	0.10			
47042	N/A	0.76						
47042	20	0.24						
48009	N/A	0.93						
48009	960	0.07						
48010	N/A	1.00						
48010	960	0.00						
48012	N/A	1.00						
48012	440	0.00						
48013	N/A	0.83						
48013	N/A	0.00						
48013	440	0.17						
48014	N/A	0.04						
48014	N/A	0.46						
48014	440	0.50						
48015	N/A	0.33						
48015	N/A	0.08						
48015	430	0.07						
48015	440	0.52						
48016	N/A	0.01						
48016	430	0.99						
48017	N/A	0.00						
48017	420	0.24						
48017	430	0.76						
48018	N/A	0.00						
48018	410	0.33						
48018	420	0.47						
48018	430	0.20						
48019	N/A	0.10						
48019	410	0.87						
48019	430	0.03						
48020	N/A	0.44						
48020	410	0.35						

Section E.18

Atmospheric Deposition of Nutrients

The Chesapeake Bay Program Air Subcommittee provided the Modeling Subcommittee with a regression model designed to simulate the daily wet deposition of nitrate and ammonia. The regression method is based on the basic logarithmic relationship between the amount of precipitation and the nutrient concentrations in that precipitation. The regression method uses this relationship in conjunction with daily summations of the Phase IV Watershed Modeling precipitation data sets, resulting in deposition inputs with the same temporal and spatial resolution as the precipitation inputs.

The regression relationship was developed using weekly data collected over an eight year period at fifteen National Air deposition Program (NADP) sites. Due to the weekly sampling protocol of NADP, the data were quality controlled by selecting those data where the precipitation event occurred only on the last day of the weekly sample. Using this criteria, 265 samples were selected from the approximately 5000 samples collected at the NADP sites. These selected data were then treated as daily samples and employed in developing the regression model.

The regression equations are as follows:

$$N[NO_3] = 0.2222 * \text{EXP}(-0.3852 * \ln(\text{ppn}) - 0.0037 * \text{month}^2 + 0.0744 * \text{latitude} - 1.289)$$

$$N[NH_4] = 0.7778 * \text{EXP}(-0.3549 * \ln(\text{ppn}) + 0.3966 * \text{month} - 0.0337 * \text{month}^2 - 1.226)$$

$$\text{with lbs/acre} = ((\text{mg/l} * \text{ppn}) / 100) * 0.89$$

where N is expressed in mg/l,
 ppn is expressed in millimeters
 month is expressed as an integer, and
 latitude is the precipitation model segment centroid Y component in decimal degrees.

Atmospheric Deposition of Organic N, Organic P, and Phosphate

Constant annual loads applied on a daily basis are employed in the Phase IV. Loading rates were obtained from the September, 1982 EPA publication Chesapeake Bay Program Technical Studies: A Synthesis. Annual loading rates are as follows:

P [Organic P]	0.423 lbs/acre
P [Phosphate]	0.143 lbs/acre

Measured Annual Wet Deposition of NO₃ and NH₄

The following table, Table E.19.1, lists observed measurements of wetfall ammonia as reported by the National Air Deposition Program (NADP) for twelve sites in and around the Chesapeake Bay Watershed. The tables were obtained from an article by Valigura, et. al. entitled "Atmospheric Deposition of Nitrogen and Contaminants to the Chesapeake Bay and it's Watershed" in the 1994 Chesapeake Research Consortium publication Perspectives on the Chesapeake Bay : Advances in Estuarine Sciences.

Table E.18.1

Annual wet deposition of NO₃ at NADP sites in Kg N / Ha yea							
NADP Site	1985	1986	1987	1988	1989	1990	1991
White Rock, MD	2.97	3.67	3.66	3.92	4.44	3.85	3.10
Wye, MD	2.95	3.10	2.50	2.61	4.31	3.52	3.37
Lewiston, NC	1.97	2.30	2.45	2.62	2.85	2.31	2.30
Finely Farms, NC	2.04		2.53	2.97	3.75	2.28	2.22
Chautauqau, NY	5.80	5.94	3.89	4.32	4.07	4.76	3.57
Jasper, NY	2.41	3.10	3.00	2.85	3.03	3.01	2.31
Penn State, PA	3.94	4.19	4.52	3.25	4.17	4.52	3.91
Leading Ridge, PA	4.29	5.48	5.48	4.04	5.39	5.30	3.99
Milford, PA	4.40		4.54	4.14	4.55	5.07	3.61
Charlottesville, VA	3.76	3.33	3.53	2.97		3.61	3.28
Babcock State Park, WV	3.40	3.93	3.09	2.09	3.97	3.14	2.83
Parsons, WV	5.49	6.25	4.07	3.88	5.27	4.26	3.97

Annual wet deposition of NH₄ at NADP sites in Kg N / Ha yea							
NADP Site	1985	1986	1987	1988	1989	1990	1991
White Rock, MD	1.36	1.87	1.98	1.71	2.69	2.24	1.76
Wye, MD	1.59	1.68	1.36	1.18	2.65	2.14	2.05
Lewiston, NC	1.27	1.37	1.63	0.81	1.72	1.87	1.44
Finely Farms, NC	1.42		2.00	1.49	4.36	2.57	2.56
Chautauqau, NY	3.41	4.18	2.15	2.42	2.43	2.89	2.00
Jasper, NY	1.36	1.42	1.68	1.30	2.01	1.73	1.16
Penn State, PA	1.81	1.68	1.99	1.41	2.54	2.33	1.91
Leading Ridge, PA	2.05	2.54	2.57	1.77	3.04	2.87	1.98
Milford, PA	2.19		1.56	1.17	1.77	2.31	1.59
Charlottesville, VA	1.79	1.76	1.63	1.09		2.47	1.86
Babcock State Park, WV	1.58	2.00	1.78	0.86	2.12	1.98	1.18
Parsons, WV	2.64	3.02	2.15	1.40	2.89	2.22	1.7

Section E.19

Clean Air Act (CAA), Ozone Transport Commission (OTC), and 2005 Limit of Technology (LOT) Reduction in Nitrogen Deposition to the Chesapeake Bay Watershed

The RADM and Watershed models have incompatible simulation periods. Accordingly, when RADM loads are used in the Watershed Model, the loads are generated on a proportional basis. That is, a nitrate reduction scenario is run on RADM and the proportional difference between the RADM base load and the RADM nitrate reduction scenario load is calculated for each RADM cell. The proportional reduction of RADM nitrate is transferred to the model segments and the Watershed model is run with a proportional reduction of the Watershed Model base atmospheric deposition nitrate.

Nitrate (wet and dry) loads under Base, Clean Air Act (CAA), and Ozone Transport Commission Scenarios (OTC) are tabulated for each model segment as a proportion of the Watershed Model Reference Scenario nitrate wet and dry deposition loads. Full documentation of the RADM scenarios can be obtained through the CBP Air Subcommittee (in preparation).

Table E.19.1

High Resolution RADM Annual Total Nitrogen Deposition**Averaged Over Watershed Model Segments (CAA)**

SEG = Chesapeake Bay Watershed Model Segment

BASE = 1990 base nitrogen deposition (kg-N/Ha)

**FUTURE = Base 2005 with Clean Air Act Reductions
nitrogen deposition (Kg-N/Ha)****% REDUCTION = % reduction of Base 2005 from 1990 Base Case**

SEG	BASE	FUTURE	CAA % REDUCTION	SEG	BASE	FUTURE	CAA % REDUCTION
10	8.6394	7.2707	15.8425	490	14.6580	12.7256	13.1832
20	8.9075	7.5346	15.4129	500	14.2174	12.3964	12.8082
30	10.1496	8.5548	15.7129	510	14.9586	13.0329	12.8735
40	11.6970	9.7914	16.2914	540	14.9725	12.9635	13.4179
50	14.4462	12.0099	16.8646	550	11.6146	10.0863	13.1584
60	11.4894	9.6379	16.1149	560	11.3585	10.1463	10.6722
70	10.8146	9.0493	16.3233	580	11.4298	10.2985	9.8978
80	11.9392	9.9753	16.4492	590	11.6050	10.6272	8.4257
90	12.2347	10.2268	16.4115	600	12.1910	11.3328	7.0396
100	12.4837	10.3984	16.7042	610	12.7593	11.6987	8.3124
110	13.0655	10.9435	16.2412	620	12.0396	11.3586	5.6563
120	13.5781	11.5400	15.0102	630	10.8386	10.2336	5.5819
140	14.4260	12.2491	15.0901	650	12.7105	10.9363	13.9585
160	12.9042	10.9373	15.2423	700	8.4971	7.1285	16.1067
170	11.3967	9.7684	14.2875	710	14.4663	12.1326	16.1320
175	11.4302	9.7981	14.2788	720	13.0908	11.0552	15.5499
180	11.2388	9.5525	15.0043	730	11.9770	10.1557	15.2066
190	10.5253	9.2852	11.7821	740	11.5593	9.8948	14.3997
200	10.3047	8.9442	13.2027	750	12.1656	10.2435	15.7995
210	11.9831	10.2085	14.8092	760	12.7105	10.9363	13.9585
220	11.0189	9.5194	13.6084	770	12.7782	11.1795	12.5112
230	10.5425	9.2280	12.4686	780	13.8923	12.2103	12.1074
235	11.2617	9.9652	11.5125	800	12.8890	11.1039	13.8498
240	11.7043	10.4555	10.6696	810	11.1970	9.6151	14.1279
250	10.8374	9.6484	10.9713	820	9.2165	7.9994	13.2057
260	11.3365	10.2018	10.0093	830	11.7741	10.3160	12.3840
265	11.9572	10.5346	11.8974	840	10.8606	9.7186	10.5151
270	11.5197	10.3682	9.9959	850	11.6137	9.9357	14.4485
280	10.4528	9.4731	9.3726	860	13.7649	11.9281	13.3441
290	12.1576	11.0916	8.7682	870	11.8435	10.3239	12.8307
300	10.7830	9.9059	8.1341	880	13.5753	11.8593	12.6406
310	11.4924	10.6162	7.6242	890	13.8657	12.0163	13.3379
330	13.1264	11.3469	13.5566	900	13.2591	11.5510	12.8825
340	14.8086	12.8187	13.4375	910	14.0835	12.2160	13.2602
370	11.3803	9.8075	13.8204	920	12.1700	10.7113	11.9860
380	11.7833	10.1498	13.8628	930	11.0947	10.0624	9.3044
390	11.2679	9.7597	13.3849	940	10.5613	9.6978	8.1761
400	12.8482	11.2323	12.5769	950	10.8306	10.2180	5.6562
410	13.0736	11.6017	11.2586	960	10.9954	10.3440	5.9243
420	11.7763	10.5751	10.2001	970	11.9968	10.4783	12.6575
430	11.4916	10.3307	10.1022	980	11.2279	9.9562	11.3262
440	7.1406	6.5385	8.4321	990	9.3139	8.4507	9.2679
450	13.2028	11.3078	14.3530				
470	13.7257	11.8005	14.0262				
480	14.5038	12.5137	13.7212				

Table E.19.2

High Resolution RADM Annual Total Nitrogen Deposition

Averaged Over Watershed Model Segments (OTC)

SEG = Chesapeake Bay Watershed Model Segment

BASE = 1990 base nitrogen deposition (kg-N/Ha)

FUTURE = 2005 with Stringent NOx Reductions in OTC Region

nitrogen deposition (Kg-N/Ha)

% REDUCTION = % reduction of Base 2005 with Stringent NOx Reductions
from 1990 Base Case

SEG	BASE	FUTURE	OTC % REDUCTION	SEG	BASE	FUTURE	OTC % REDUCTION
10	8.6394	6.6134	23.4507	480	14.5038	11.1963	22.8044
20	8.9075	6.7948	23.7182	490	14.6580	11.3348	22.6716
30	10.1496	7.5974	25.1458	500	14.2174	10.9845	22.7390
40	11.6970	8.4891	27.4250	510	14.9586	11.5830	22.5663
50	14.4462	10.5306	27.1047	540	14.9725	11.5756	22.6876
60	11.4894	8.6100	25.0614	550	11.6146	9.1342	21.3559
70	10.8146	7.8943	27.0033	560	11.3585	9.2123	18.8951
80	11.9392	8.6946	27.1760	580	11.4298	9.3617	18.0939
90	12.2347	9.1573	25.1530	590	11.6050	9.9285	14.4464
100	12.4837	9.1191	26.9519	600	12.1910	10.7717	11.6422
110	13.0655	9.4514	27.6614	610	12.7593	11.0391	13.4819
120	13.5781	10.0715	25.8254	620	12.0396	10.8812	9.6216
140	14.4260	10.6826	25.9490	630	10.8386	9.8381	9.2309
160	12.9042	10.1930	21.0102	650	12.7105	9.7893	22.9826
170	11.3967	9.2515	18.8230	700	8.4971	6.3671	25.0674
175	11.4302	9.1515	19.9358	710	14.4663	10.2941	28.8408
180	11.2388	8.6558	22.9829	720	13.0908	9.5668	26.9197
190	10.5253	8.8146	16.2532	730	11.9770	9.1868	23.2963
200	10.3047	8.4201	18.2887	740	11.5593	9.1421	20.9113
210	11.9831	9.1294	23.8144	750	12.1656	9.0668	25.4718
220	11.0189	8.6399	21.5902	760	12.7105	9.7893	22.9826
230	10.5425	8.5517	18.8836	770	12.7782	9.9518	22.1189
235	11.2617	9.0220	19.8878	780	13.8923	10.8949	21.5760
240	11.7043	9.5426	18.4693	800	12.8890	9.8078	23.9057
250	10.8374	8.9138	17.7496	810	11.1970	8.5144	23.9582
260	11.3365	9.4627	16.5289	820	9.2165	7.1139	22.8134
265	11.9572	10.0880	15.6324	830	11.7741	9.2484	21.4513
270	11.5197	9.9758	13.4023	840	10.8606	8.8608	18.4133
280	10.4528	8.9943	13.9532	850	11.6137	8.8290	23.9777
290	12.1576	10.4100	14.3745	860	13.7649	10.6981	22.2799
300	10.7830	9.3840	12.9741	870	11.8435	9.1833	22.4613
310	11.4924	10.0650	12.4204	880	13.5753	10.5727	22.1181
330	13.1264	10.1345	22.7930	890	13.8657	10.7617	22.3862
340	14.8086	11.4293	22.8198	900	13.2591	10.3695	21.7933
370	11.3803	8.6688	23.8263	910	14.0835	10.8070	23.2648
380	11.7833	8.9791	23.7981	920	12.1700	9.5499	21.5292
390	11.2679	8.6386	23.3344	930	11.0947	9.2044	17.0379
400	12.8482	10.0106	22.0856	940	10.5613	9.0254	14.5427
410	13.0736	10.4210	20.2897	950	10.8306	9.7855	9.6495
420	11.7763	9.6262	18.2579	960	10.9954	9.9081	9.8887
430	11.4916	9.4186	18.0393	970	11.9968	9.4216	21.4657
440	7.1406	6.0922	14.6822	980	11.2279	9.0027	19.8185
450	13.2028	9.9884	24.3464	990	9.3139	7.8342	15.8870
470	13.7257	10.5306	23.2782				

Table E.19.3

High Resolution RADM Annual Total Nitrogen Deposition
2005 Limit of Technology (Version 2): Mobile + Utility = Reduction
 Deposition in KG-N/HA, Percent Reduction from 1990 BEIS2 = Base20

Segment	Base Wet N Deposit.	Future Wet N Deposit.	% Wet Reduction	Base Dry N Dep.	Future Dry N Dep.	% Dry Reduction	Base Total N deposition	Future Total N Deposition	% LOT Total Reduction
10	4.2272	1.9203	54.5733	4.7235	2.1431	54.6074	8.9507	4.0634	54.6015
20	4.4600	2.1531	51.7437	4.7169	2.2878	51.4271	9.1769	4.4409	51.5979
30	4.9359	2.3752	51.9462	5.3072	2.3890	55.0460	10.2431	4.7642	53.5464
40	5.3648	2.4846	53.7261	6.2818	2.6196	58.5128	11.6466	5.1042	56.2964
50	7.0032	2.4796	64.4826	7.6642	2.8903	62.2471	14.6673	5.3699	63.3125
60	5.0904	2.1651	57.2242	6.6115	2.7746	58.0139	11.7019	4.9397	57.6901
70	5.0024	2.2434	54.9986	5.8646	2.4370	58.5642	10.8670	4.6804	56.9445
80	5.7061	2.3075	59.4131	6.1117	2.5389	58.4989	11.8178	4.8464	58.9963
90	5.5548	1.9617	64.5638	6.6691	2.4378	63.4143	12.2238	4.3996	63.9397
100	5.7797	2.1385	62.9242	6.6838	2.5968	61.0611	12.4635	4.7353	61.9383
110	6.4764	2.6117	59.5076	6.3322	2.7874	56.0035	12.8086	5.3991	57.8422
120	6.2603	3.0309	50.9680	7.2735	3.4781	52.3071	13.5339	6.5091	51.8191
140	6.6956	3.1388	52.3833	7.5727	3.6288	52.1276	14.2683	6.7677	52.4484
160	6.1022	2.2393	63.0955	6.6519	2.880	65.5496	12.7541	4.5273	64.3889
170	5.3586	2.1597	59.6126	5.8125	2.1373	63.1846	11.1710	4.2970	61.4753
175	5.2927	2.2761	57.0657	5.9555	2.2657	61.9112	11.2482	4.5418	59.6198
180	6.0866	2.4085	60.3079	4.9028	2.1299	56.5708	10.9893	4.5384	58.6225
190	5.5540	2.5949	53.3869	4.5966	2.0353	55.6825	10.1506	4.6302	54.3856
200	5.1302	2.2630	56.1047	4.8815	2.0687	57.5708	10.0117	4.3317	56.7573
210	5.8590	2.4739	57.5538	5.8645	2.7017	54.0020	11.7235	5.1756	55.8281
220	4.6643	2.0809	55.1108	6.1042	2.9517	52.0740	10.7685	5.0326	53.5234
230	4.9102	2.1218	56.7080	5.2590	2.3938	54.5328	10.1692	4.5155	55.6279
235	4.1096	2.0104	51.0607	6.7682	3.1595	53.3140	10.8777	5.1699	52.4704
240	4.3765	2.2356	48.9486	6.9487	3.3782	51.3882	11.3251	5.6138	50.4462
250	4.5333	2.1794	51.8202	5.8901	2.7641	53.0875	10.4233	4.9435	52.5862
260	4.6262	2.3867	48.5137	6.3140	3.0561	51.6569	10.9401	5.4428	50.3254
265	6.0059	2.9423	50.9342	5.6575	2.2521	60.2051	11.6633	5.1944	55.4585
270	5.6688	2.9521	47.7479	5.4566	2.4405	55.2682	11.1254	5.3927	51.5064
280	4.5092	2.2536	49.9399	5.5266	2.6699	51.7231	10.0358	4.9235	50.9592
290	5.2569	2.8657	45.5037	6.4745	3.2264	50.2622	11.7314	6.0920	48.1161
300	4.3898	2.4272	44.7756	5.9405	2.9215	50.8283	10.3303	5.3486	48.2639
310	4.6931	2.6213	44.1278	6.3378	3.3097	47.8124	11.0308	5.9309	46.2433

Table E.19.3

High Resolution RADM Annual Total Nitrogen Deposition
 2005 Limit of Technology (Version 2): Mobile + Utility = Reduction
 Deposition in KG-N/HA, Percent Reduction from 1990 BEIS2 = Base20

Segment	Base Wet N Deposit.	Future Wet N Deposit.	% Wet Reduction	Base Dry N Dep.	Future Dry N Dep.	% Dry Reduction	Base Total N deposition	Future Total N Deposition	% LOT Total Reduction
330	5.3411	2.7096	49.2467	7.6271	3.8158	50.0506	12.9881	6.5254	49.7446
340	5.1724	2.6592	48.5700	9.4897	4.8400	49.0639	14.6621	7.4992	48.8791
370	5.1048	2.5757	49.4750	6.2847	3.1461	50.0189	11.3895	5.7218	49.7695
380	5.2910	2.6310	50.2644	6.5005	3.1822	51.0786	11.7915	5.8132	50.6938
390	6.3570	3.0963	51.2236	4.8930	2.4463	49.9954	11.2500	5.5426	50.7285
400	6.5488	3.3841	48.4293	6.3166	3.1947	49.3745	12.8653	6.5789	48.8795
410	6.3399	3.5428	44.0077	6.7124	3.4294	48.8310	13.0523	6.9723	46.5276
420	5.4509	3.1747	41.7516	6.2642	3.2601	47.9053	11.7151	6.4348	45.0474
430	5.2847	3.1011	41.2865	6.1464	3.1949	47.9977	11.4311	6.2960	44.8036
440	3.6616	2.1889	40.1694	3.4042	1.8048	46.7811	7.0557	3.9937	43.3318
450	5.5015	2.7874	49.0952	7.6968	3.7670	51.1060	13.1984	6.5544	50.3149
470	5.8628	2.9878	48.9880	7.8178	3.8499	50.9286	13.6806	6.8377	50.1211
480	5.4236	2.7982	48.4230	9.0109	4.6092	48.8422	14.4344	7.4073	48.6756
490	5.1909	2.7030	47.9314	9.3830	4.8813	47.9763	14.5739	7.5843	47.9780
500	6.2504	3.1469	49.8828	7.8418	3.9138	50.1729	14.0921	7.0607	49.7921
510	5.3227	2.7691	47.9183	9.5600	5.0100	47.5889	14.8826	7.7791	47.7142
540	4.8784	2.4908	48.9466	9.9229	5.0801	48.8062	14.8013	7.5710	48.8375
550	4.3879	2.0149	54.0087	6.8983	3.2961	52.4442	11.2862	5.3110	53.1062
560	4.8507	2.5548	47.4919	6.2677	3.1135	50.1958	11.1183	5.6683	49.0138
580	5.8401	3.2519	44.6896	5.4917	2.8601	47.9384	11.3318	6.1120	46.0373
890	4.6074	2.5521	44.6957	6.6180	3.5047	46.8520	11.2254	6.0569	45.9874
600	4.9956	2.8408	43.2083	6.8021	3.8352	43.5661	11.7977	6.6760	43.3935
610	4.9095	2.6698	45.6126	7.3659	3.9524	46.3916	12.2754	6.6222	46.0477
620	5.2377	3.2460	38.0342	6.6474	3.9617	40.6304	11.8951	7.2076	39.3439
630	5.0768	3.1654	37.6492	5.6795	3.4712	38.8822	10.7563	6.6366	38.3002
700	4.3059	1.9863	53.8619	4.3829	1.9077	56.4774	8.6888	3.8940	55.1781
610	7.5942	3.1379	58.4583	6.6063	2.9774	54.9811	14.2006	6.1153	56.8907
720	6.2709	2.9443	52.7602	6.7871	3.1505	53.6115	13.0580	6.0948	53.2703
730	6.2858	2.6622	57.5027	5.5587	2.2656	59.2444	11.8446	4.9278	58.3489
740	5.8832	2.5604	56.6079	5.4872	2.2184	59.4333	11.6704	4.7789	57.9862
750	5.9963	2.3018	61.5662	5.9101	2.6089	55.8371	11.9064	4.9107	58.7204
760	5.1108	2.5941	49.2195	7.5187	3.6774	51.2195	12.6295	6.2716	50.4011

Table E.19.3

High Resolution RADM Annual Total Nitrogen Deposition
 2005 Limit of Technology (Version 2): Mobile + Utility = Reduction
 Deposition in KG-N/HA, Percent Reduction from 1990 BEIS2 = Base20

Segment	Base Wet N Deposit.	Future Wet N Deposit.	% Wet Reduction	Base Dry N Dep.	Future Dry N Dep.	% Dry Reduction	Base Total N deposition	Future Total N Deposition	% LOT Total Reduction
770	5.4787	2.9116	46.9070	7.2935	3.6745	49.6095	12.7722	6.5860	48.4358
780	6.7504	3.6655	45.5573	7.1484	3.6106	49.4900	13.8988	7.2760	47.6390
800	5.3859	2.7469	48.9650	7.5040	3.8116	49.2386	12.8899	6.5585	49.1206
810	5.5503	2.7575	50.2472	5.6574	2.7560	51.3221	11.2077	5.5136	50.7934
820	6.3208	3.0585	51.5754	2.8760	1.4669	48.6853	9.1968	4.5254	50.7897
830	7.5781	3.9348	48.3584	4.2159	2.1467	49.0308	11.7940	6.0815	48.5355
840	6.6205	3.6825	44.3785	4.2145	2.2003	47.9489	10.8350	5.8828	45.6422
850	5.8702	2.9324	50.0186	5.7617	2.7589	52.1322	11.6319	5.6914	51.0789
860	5.6920	2.9634	47.9080	8.0749	4.2305	47.8144	13.7669	7.1940	47.8189
870	5.3498	2.7170	49.1208	6.4467	3.3897	47.7640	11.7964	6.1067	48.6612
880	6.5922	3.3644	49.1842	6.8982	3.5162	49.1421	13.4904	6.8805	48.9144
890	4.8765	2.5146	48.4326	8.8387	4.5576	48.4884	13.7152	7.0722	48.4438
900	4.1970	2.1205	49.4381	8.8564	4.5598	48.5841	13.0535	6.6804	48.8429
910	4.7372	2.3010	51.3740	9.1180	4.5330	50.3873	13.8553	6.8341	50.6504
920	5.9968	3.0878	48.8333	6.0286	2.9030	51.6488	12.0254	5.9908	49.9467
930	5.9083	3.3184	43.8474	5.0833	2.6786	47.2057	10.9916	5.9970	45.3950
940	4.7685	2.7343	42.4541	5.5588	3.0009	45.8420	10.3273	5.7353	44.2858
950	5.6745	3.4275	39.6450	5.0022	3.0158	39.9449	10.6766	6.4433	39.7689
960	5.0049	3.1376	37.1725	5.9050	3.5584	39.8680	10.9098	6.6961	38.6276
970	4.2341	2.1133	50.1749	7.4673	3.6207	51.5547	11.7014	5.7340	50.9954
980	5.3754	2.8171	47.8689	5.6663	2.7436	51.3796	11.0417	5.5608	49.6024
990	6.5555	3.7841	42.1661	2.6827	1.3496	49.5758	9.2382	5.1337	44.2183



Chesapeake Bay Program

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