
OPPORTUNITIES TO ENHANCE THE QUALITY OF BRETON BAY

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SUMMARY

The Potomac River Association commissioned Community & Environmental Defense Services (CEDS) to assess the current quality of Breton Bay and to look for opportunities to enhance this extremely important estuary. The Association has a long history of concern regarding Breton Bay and has taken a number of actions over the years to protect the Bay. Following are the results of the research commissioned by the Association.

Breton Bay has a surface area of about five square miles and drains a land area (watershed) of about 60 square miles. More than half the watershed is forest, a fourth is agricultural, a tenth is developed, and the remainder is wetlands and other land uses.

The Breton Bay watershed supports (supported) at least one endangered species and 125 acres of wetlands that are crucial to this and other imperiled species. But of the nearly 18,000 acres of wetlands that may have once existed in the watershed, only 1% remain.

Forested buffers extend along 91% of the stream banks in the Breton Bay watershed. This is the highest stream buffer percentage in the County.

Approximately 13,000 people live in the Breton Bay watershed, many in the Leonardtown area at the head of the Bay. Thus Breton Bay provides recreational and aesthetic benefits to a large number of people. Two fish species important to recreational and commercial fisherfolk spawn in Breton Bay tributaries. However, the quality of the Bay has already limited public use at times.

While the nontidal streams tributary to Breton Bay appear to be of generally good quality, Breton Bay proper has significant water quality problems. This statement is based upon the following factors, which are described in detail in the body of this report:

- A. Sampling conducted in the major nontidal tributaries to Breton Bay show that they are of good quality, with the possible exception of Nelson Run. Several of the tributaries appear to carry excessive amounts of eroded soil.
- B. Fecal coliform bacteria are an indicator of the presence of organisms which may cause disease in humans. With the exception of a small area near the mouth, the tidal waters of Breton Bay fail to meet the State standard for shellfish consumption.
- C. The extent and diversity of submerged aquatic vegetation (SAV) is a good indicator of the health of a tidal water body. SAV abundance is substantially lower in Breton Bay when compared to other water bodies.
- D. Oyster mortality rates are higher in Breton Bay when compared to most other waterways in the Lower Potomac River system.

It appears that Breton Bay has significant water quality problems due to excessive inputs of nutrients, sediment, and bacteria.

Algae can proliferate when nutrients enter a waterway in excessive quantities. As algal populations increase in the water column, light penetration to SAV beds decreases. Cropland accounts for roughly half of the nutrients entering Breton Bay yet occupies only a fifth of the watershed. The Leonardtown sewage treatment plant presently accounts for a fifth of the phosphorus entering Breton Bay, but this will be cut by 2/3rds when plant upgrades are completed in 2003. The Saint Clements Shores treatment plant releases an unknown quantity of nutrients into the Breton Bay system. A third treatment plant will release treated sewage into the soil at the proposed Forest Farms subdivision.

The Breton Bay watershed soil erodibility index is very high. In fact it is the second highest of all six major watersheds in Saint Mary's County. This means great care must be taken when soil is exposed to the erosive effects of rainfall and runoff. Particular care must be taken where large expanses of soil are exposed, such as on cropfields, construction sites, mining operation, during logging, and similar activities.

During an initial survey of the watershed for potential erosion hotspots, CEDS generally found that erosion and sediment control quality on construction sites has improved since the last survey was done four years ago in Saint Mary's County. Nevertheless, significant problems were found and further action is needed to minimize sediment pollution from construction sites and all other activities which expose soil to erosion.

RECOMMENDATIONS

The Association may wish to consider some or all of the following actions for enhancing the quality of Breton Bay.

1. The Association should call a meeting of those who own property on or near Breton Bay and its tributaries along with all others concerned about the Bay. The primary purpose of the meeting would be to:
 - a. brief watershed residents on what is known about the current condition of Breton Bay and its tributaries,
 - b. gather any additional information they have about Bay and tributary conditions,
 - c. to discuss actions to improve Breton Bay (*many of which are described in the remainder of these recommendations*), and
 - d. to recruit volunteers who will assume leadership for specific actions.

2. A compilation of homeowner and boater tips will be found in the appendix to this report. This compilation could be used to prepare a brief publication(s) for distribution to watershed residents. The recommendations contained in the publication may receive greater acceptance if a committee of watershed residents - perhaps recruited at the meeting suggested above - were to review the compilation and select those actions which seem most important and doable.

3. The very preliminary sampling conducted thus far indicates that Nelson Run may have a significant water quality problem and that other tributaries suffer from excessive sediment inputs. The Association may wish to recruit volunteers for participation in a more thorough stream sampling effort next spring through the Maryland Department of Natural Resources Stream Waders Program. Of course, if the Association wishes CEDS could return and conduct the more exhaustive sampling.
4. The road survey initiated by CEDS should be completed. Recent aerial photos of the watershed should be inspected for the presence of potential sediment pollution sources not visible from roads. In addition there would be value in walking tributaries, such as Town Run, to search for gullies, other erosion sites, or unvegetated sediment deposits that might move downstream if not stabilized. Once the road survey, the aerial photo review, and the stream survey is completed the Association has the option of either asking CEDS to investigate each source or we could train volunteers how to do this research. Obviously the volunteer approach is far more desirable from both a financial and public involvement perspective.
5. The Association may wish to meet with Dr. Bergstrom around November to discuss the water quality data he is gathering for the U.S. Fish & Wildlife Service. During the meeting it would be helpful to get Dr. Bergstrom's conclusions and recommendations regarding the quality of Breton Bay and possible corrective actions. A similar discussion should be held with MDE staff involved in the Total Maximum Daily Load monitoring.
6. The Association may wish to meet with DNR shellfish program staff to review the water quality data gathered by Dr. Bergstrom, the MDE TMDL effort and the MDE Shellfish Certification Division. From this review DNR may then determine if Breton Bay is suitable for a restoration project through the Oyster Recovery Partnership.
7. The Association may wish to meet with staff of the Saint Mary's Natural Resources Conservation District to discuss what steps could be taken to reduce nutrient loads from the croplands located in the Breton Bay watershed. The District anticipates shortly completing the task of getting a Soil and Water Conservation Plan on every farm in the County. This tremendous accomplishment may make it easier to support farm owners in switching to conservation tillage and other practices that minimize nutrient releases.
8. It appears that periodic flooding will continue to cause releases of partially treated sewage from the Leonardtown sewage treatment plant. There would be value in supporting the efforts of Town officials to correct this problem. The easiest solution appears to be removal of the sand bar at the mouth of Town Run. However, this may have significant adverse environmental effects and sand bar removal may be only a temporary solution. Obviously all possible solutions should be considered and more lasting options may be available.

9. CEDS is awaiting various documents requested from MDE files for the Saint Clements Shores sewage treatment plant. It may be possible to discern nutrient loadings from these documents and thereby complete the analysis of nutrient sources presented in Table 2. However, it may take four- to eight-hours to complete this analysis. Would the Association like us to proceed with this?
10. There are a number of possible sources of funds for the restoration efforts described above (plus the many more potential projects these actions will no doubt uncover). These sources are described in the DNR publication *Habitat Restoration Guide to Funding and Technical Assistance*, which can be downloaded from the website:

<http://www.dnr.state.md.us/irc/grantspathfinder.htm>

by clicking on *Selected bibliographies, Grants & Grantwriting*, then scrolling down to *Habitat restoration funding guide*. I also suggest that once the Association compiles a list of possible Breton Bay restoration projects, that we meet with County and State staff familiar with the various funding sources. This is probably the easiest of learning which projects are most likely to receive funding and which funders should be approached.

EXISTING ENVIRONMENTAL CONDITIONS

First, some basic facts and figures. Breton Bay is a tributary to the Potomac River. The tidal portion of Breton Bay has a surface area of nearly five square-miles. Channel depth ranges from 8 feet at the head to 15 feet in the central and lower portions of Breton Bay. The Bay drains a land area - *watershed* - of 60 square miles. A map appears on the next page of this report which shows Breton Bay and its watershed. The watershed perimeter is delineated with a dashed line.

Following is a review of available information regarding the health of Breton Bay and tributary streams. Some of this information is more than five years old and may not reflect current conditions. But more recent data is also presented below.

Watershed Profile Indicators

The Maryland Department of Natural Resources (DNR) Watershed Profiles website provides data on a number of indicators relevant to the quality of Breton Bay.¹ Table 1 provides the indicator values for Breton Bay and the other five major watersheds of Saint Mary's County. Figure 2 shows the boundaries for all six major watersheds. Data for these other watersheds is provided so one can judge how Breton Bay is doing in relation to the rest of the County. The

¹ The address for the MDE Watershed Profiles website is:
<http://mddnr.chesapeakebay.net/wsprofiles/surf/prof/prof.html>



Table 1: Comparison of Indicators for Saint Mary's County Watersheds (Source: Maryland Department of Natural Resources Watershed Profiles website: <http://mddnr.chesapeakebay.net/wsprofiles/surf/prof/prof.html>)

	Breton Bay	Lower Patuxent River	Lower Potomac River	St. Clement Bay	St. Mary's River	Wicomico River
Forest	62%	57%	52%	52%	61%	51%
Agriculture	27%	26%	33%	41%	25%	38%
Developed	12%	16%	12%	7%	14%	8%
Impervious Surfaces	4.3%	5.0%	1.1%	1.9%	5.3%	2.0%
Wetlands Existing	184 ac	5,364 ac	1,782 ac	241ac	358 ac	2,151 ac
Historical	17,931 ac	42,599 ac	42,383 ac	14,522 ac	26,406 ac	23,879 ac
Net Loss/Gain Since 1991	0 ac	0.9 ac	-0.42 ac	-0.42 ac	0.68 ac	-0.65 ac
Wetlands of Special Concern	125 ac	437 ac	178 ac	323 ac	105 ac	699 ac
Unforested Stream Buffer	9%	10%	19%	13%	17%	19%
Soil Erodibility	0.33	0.26	0.08	0.34	0.25	0.29
SAV Abundance	1.0	1.0	1.0	1.0	1.0	1.0
Habitat	3.3	3.3	3.3	3.3	3.3	3.3
Tidal Benthic Index	-	4.67	5.67	-	-	-
Fish Index	-	5.00	-	-	-	5.00
Anadromous Fish Index	-	7.59	-	-	-	5.78
Nontidal Benthic Index	6.57	5.81	-	7.43	7.43	4.78
Fish Index	8.00	7.69	-	6.40	6.00	-
Instream Habitat Index	5.21	4.41	-	4.44	4.75	3.93
Imperiled Aquatic Species Indicator	0.00	8.00	-	0.00	0.00	0.00
Migratory Fish Spawning Area	2.00	6.00	4.00	2.00	1.00	3.00

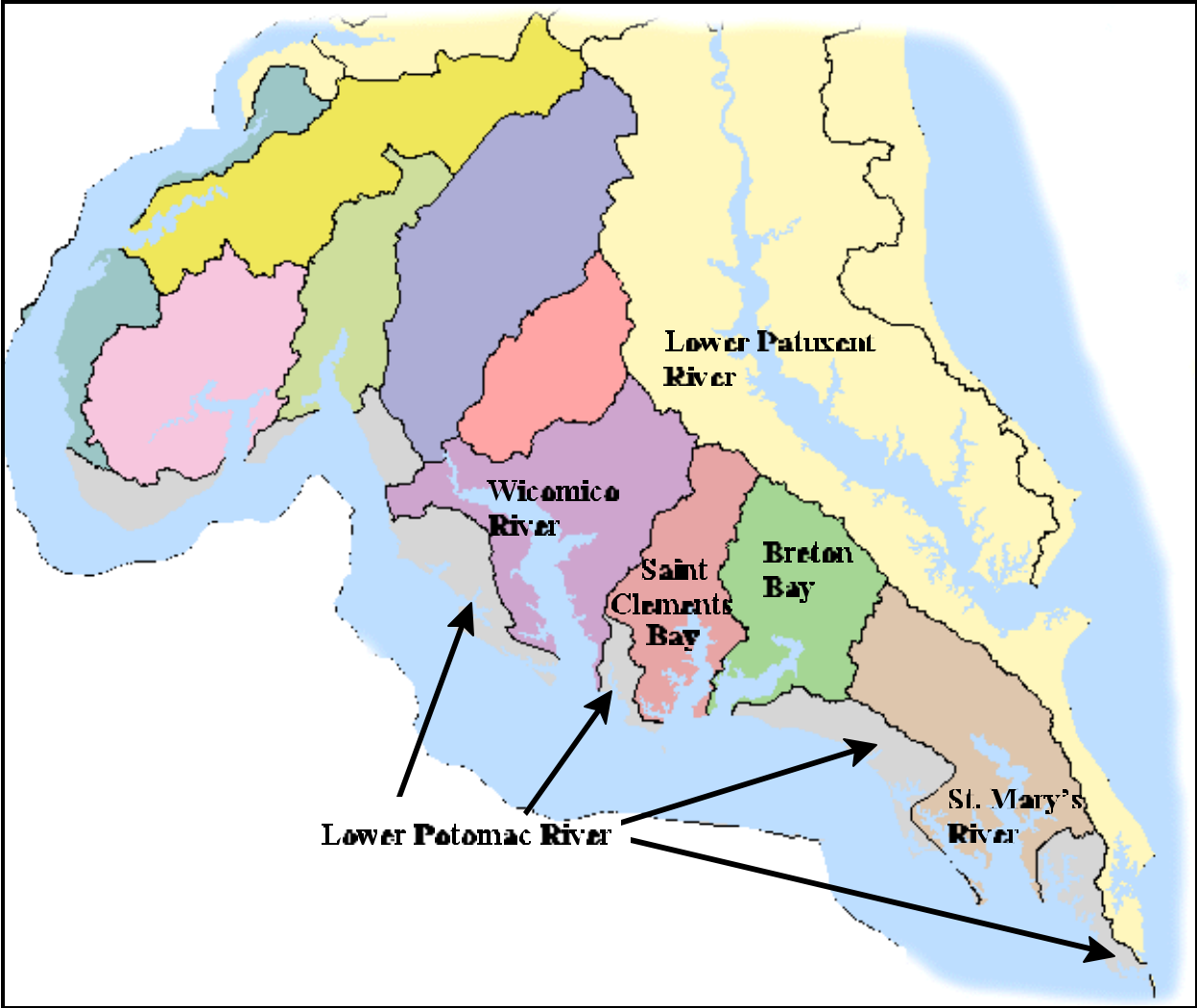


Figure 2: Major Watersheds of Saint Mary's County

reader is advised to take this data with a bit of caution. There appears to be several errors in the Profiles. These apparent errors are discussed below.

Forest, Agriculture & Developed Land: Table 1 shows that as of 1994, Breton Bay watershed land use was composed of: 62% forest, 27% agricultural, and 12% developed. Generally, the more forest and the less developed land in a watershed, the higher the quality of the associated waterways.² The effect of agricultural land is variable.³

Impervious Surfaces: Streets, buildings, and parking lots and other impervious surfaces cover 4.3% of the Breton Bay watershed. For highly-sensitive aquatic communities, significant impacts occur when watershed imperviousness exceeds 2% - 4%.⁴ Examples of highly sensitive aquatic resources includes bogs, fens, other sensitive wetlands, and brook trout streams. Other aquatic resources begin exhibiting signs of stress when 7% to 10% of a watershed is covered by impervious surfaces.⁵ While the imperviousness of the entire Breton Bay watershed may not exceed a critical threshold, most of the developed lands are concentrated around Leonardtown and the western shore of Breton Bay. Large volumes of impervious surface runoff entering the head of Breton Bay (from Leonardtown) could cause localized water quality degradation. As

² Carmichael, J.T., B.M. Richardson, M. Roberts, and S.J. Jordan, 1992. Fish assemblages and dissolved oxygen trends in eight Chesapeake Bay tributaries during the summers of 1989 - 1991: A data report. Chesapeake Bay Research and Monitoring Division, Maryland Department of Natural Resources, Tawes State Officer Building, Annapolis, MD 21401.

³ Lenat, D.R., 1982. Agriculture and stream water quality: A biological evaluation of erosion control practices. Biological Series No. 107, North Carolina Department of Natural Resources & Community Development, Raleigh NC.

⁴ Hicks, A.L. and J.S. Larson. 1997. Aquatic invertebrates as an index for estimating the impacts of urbanization on freshwater wetlands. The Environmental Institute, University of Amherst, MA. Report submitted to U.S. Environmental Protection Agency, Corvallis, OR. Reinelt, L.E. and R.R. Horner, 1991. Urban storm water impacts on the hydrology and water quality of palustrine wetlands in the Puget Sound region. In: Puget Sound Research '91 Proceedings, Puget Sound Water Quality Authority, Vol. 1, pp. 33-42. Boward, D., P. Kayzak, S. Stanko, M. Hurd, and A. Prochaska, 1999. From the mountains to the Sea: The state of Maryland's freshwater streams. Maryland Department of Natural Resources, Tawes State Office Building, Annapolis, MD 21401.

⁵ Klein, R.D., 1979. Urbanization and stream quality impairment. Water Resources Bulletin 15(4):948-963. Shaver, E., J. Maxted, G. Curtis, and D. Carter. 1994. Watershed protection using an integrated approach. Delaware Department of Natural Resources and Environmental Control.

will be seen later in this report, existing water quality information does indicate that the head of Breton Bay is of poorer quality when compared to down-Bay areas.

Wetlands: Swamps, marshes, and other wetlands provide many important benefits. They support species which occur nowhere else, thus enhancing the diversity of life. Wetlands also provide floodwater and pollutant retention benefits along with helping to maintain dry-weather inflow to streams and tidal waters.

Table 1 shows that Breton Bay currently has 184 acres of wetlands. Based upon soils data, as much as 17,931 acres of the watershed may have been wetlands at one time. If this is true then Breton Bay retains only 1% of the historical wetland area. This is the lowest percentage of retained wetlands for all six major watersheds.

Table 1 also shows that there has been no net loss or gain of wetland acreage within the Breton Bay watershed since 1991. Two-thirds of the wetlands in the watershed are designated *Wetlands of Special State Concern*. This status is usually conferred on wetlands supporting threatened or endangered species and affords some additional protection from potential impacts. The DNR Watershed Profile for Saint Clements Bay shows that there are more acres of Wetlands of Special State Concern than the total acreage of existing wetlands. This is probably an error since the acreage of Wetlands of Special Concern cannot exceed existing wetland acreage.

Unforested Stream Buffer: The DNR website provides the following description for this indicator:

“Many ecological benefits are associated with maintaining forest along streams--riparian forest. These include taking up nutrients in ground and surface water flow, as a buffer between streams and adjacent land uses; stabilizing stream banks; shading the water and maintaining its temperature; and providing food for aquatic and terrestrial animals alike. The presence of unforested riparian areas is an indicator of aquatic and terrestrial system stress within a watershed.

In a natural state, the percentage of *unforested* riparian buffer should be close to zero; it should be noted, however, that where most of the shoreline areas are estuarine this indicator has less relevance than in free-flowing stream corridors. In Maryland's Unified Watershed Assessment, completed under the Clean Water Action Plan in 1998, watersheds with more than 49% of stream lengths unforested were considered to be in need of restoration.”

Table 1 shows that the percentage of Breton Bay streams/waterways lacking a forested buffer is 9%, which is relatively low. In fact it is the lowest of all six major watersheds in the County and no doubt contributes to the relatively good condition of the streams tributary to Breton Bay.

Soil Erodibility: This indicator reflects the relative susceptibility of watershed soils to the erosive effects of rainfall and runoff. As will be seen later in this report, past erosion in the watershed appears to have greatly diminished the extent of oyster beds in Breton Bay and may have an ongoing impact upon submerged aquatic vegetation (SAV). Soil erodibility is considered high if it ranges between 0.275 and 0.314 and very high when it is between 0.314 and 0.37. The Breton Bay watershed soil erodibility is 0.33 or very high. In fact it is the second highest of all six major watersheds.

SAV (Submerged Aquatic Vegetation): The aquatic grasses composing SAV provide vitally important habitat for fish, shellfish, and other organisms inhabiting tidal waters. In addition, these grasses serve as an important indicator of the overall quality of a tidal system. If SAV are doing well, then environmental quality is also probably suitable for most other aquatic plants and animals.

The Chesapeake Bay Program has set the goal of restoring SAV to all tidal waters with a depth of two meters (6.2 feet) or less.

The SAV Abundance indicator shown in Table 1 ranges from 1 to 10 with 1 being the poorest extent of abundance and 10 being full restoration of SAV to the *two*-meter depth. All six major watersheds, including Breton Bay, have an SAV Abundance value of 1.

The SAV Habitat indicator is based upon several parameters which determine if water quality is adequate to support SAV to a depth of *one* meter (3.1 feet). The SAV Habitat indicator ranges from 1 to 10 with 1 being the worse conditions and 10 should permit good SAV growth at one meter. Any waterway with an SAV Habitat indicator less than 7 is considered in need of restoration efforts.

Both the SAV Abundance and Habitat values presented in Table 1 are based upon 1996 data and show that all six major watersheds scored the same:

- SAV Abundance of 1 and
- SAV Habitat of 3.3.

In other words, all six watersheds scored very poorly for both indicators.

Figures 3a and 3b show SAV distribution in Breton Bay in 1996 and 1999, respectively. In 1996 no SAV beds are present while in 1999 substantial beds were found below Lovers Point and in the vicinity of Pawpaw Point. Thus if the SAV Abundance analysis were recalculated using the 1999 data then the indicator value would be a bit higher.

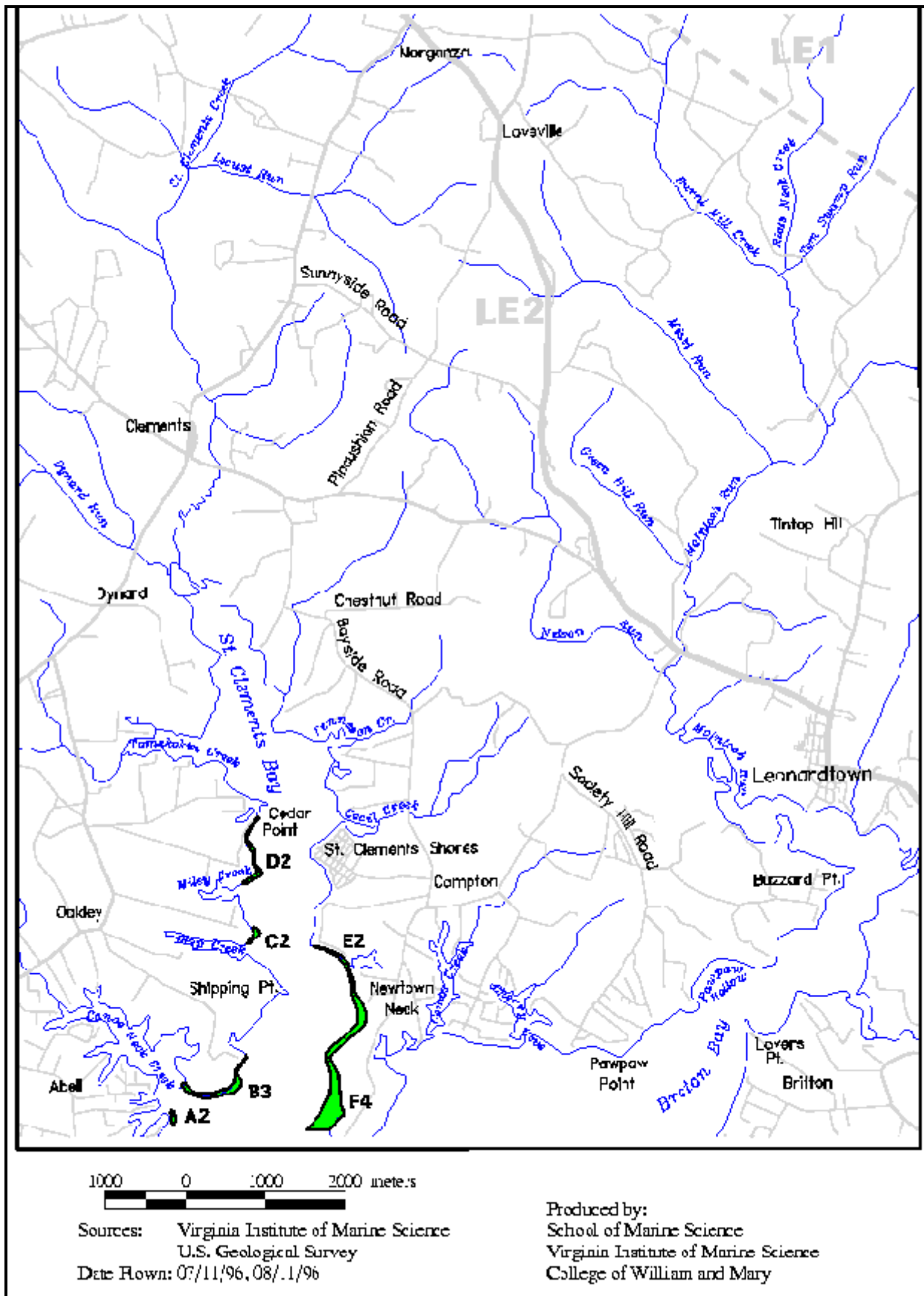


Figure 3a: 1996 SAV Distribution in Breton Bay

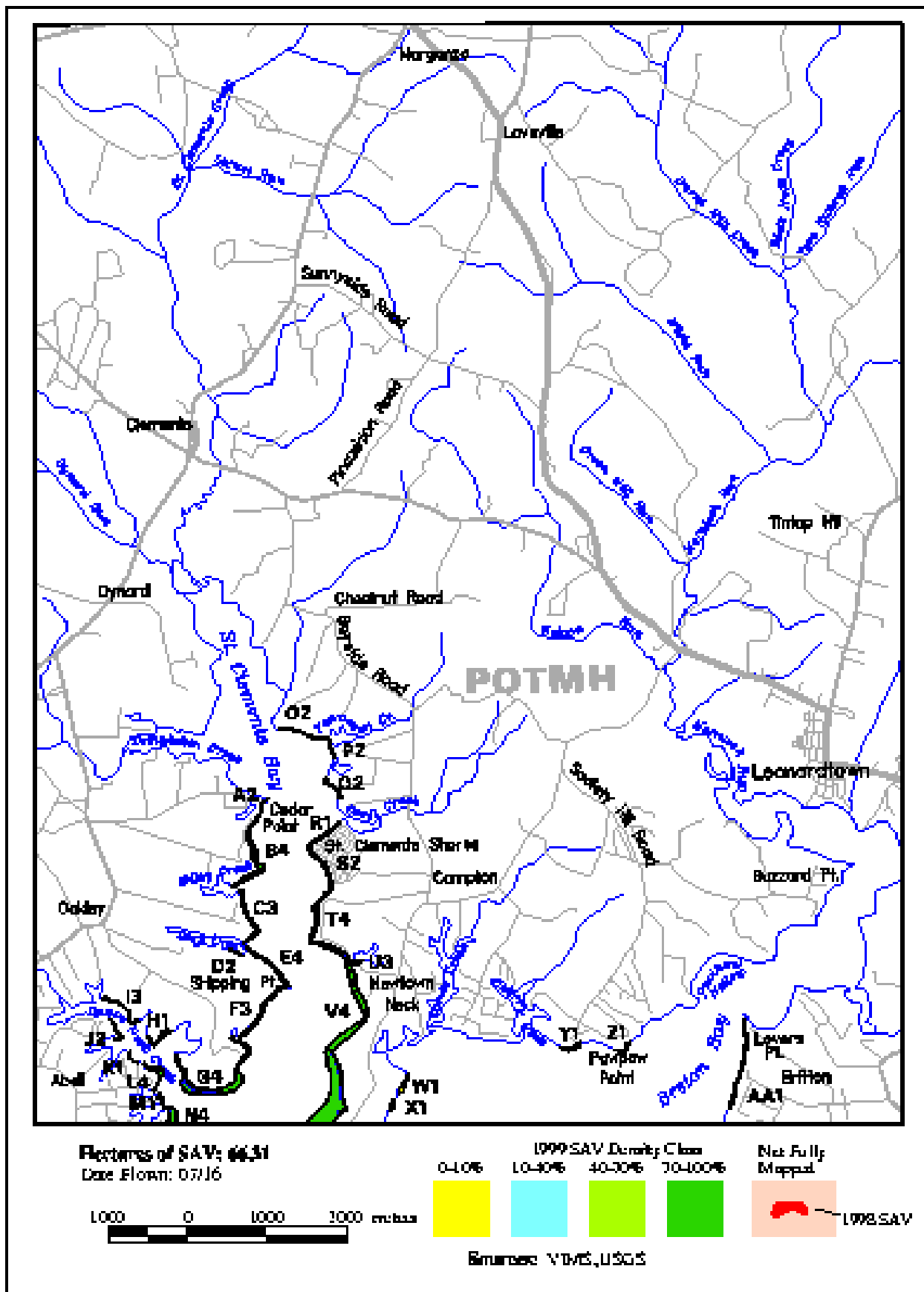


Figure 3b: 1999 SAV Distribution in Breton Bay

Dr. Peter Bergstrom, of the U.S. Fish & Wildlife Service (USFWS), is heading a water quality monitoring effort on Breton Bay. Dr. Bergstrom hopes to learn what aspects of poor water quality are limiting SAV growth in Breton Bay, and thus make recommendations on how to improve water quality to restore SAV to Breton Bay. The USFWS data can also be used to determine if the SAV Habitat indicator value for Breton Bay has changed since 1996. But sufficient data will not be available until the fall.

Thus far Dr. Bergstrom has observed that Breton Bay appears to support much lower SAV populations than surrounding waters, and thus probably has lower water quality. For example, he noted that Saint Clements Bay, just to the west, exhibited a greater increase in SAV when 1997 and 1999 distribution maps are compared. The same pattern can be seen in the 1996 and 1999 maps contained in Figures 3a and 3b in this report. In other words, St. Clements Bay shows more of an increase in SAV abundance than Breton Bay when 1996-1997 distribution maps are compared with 1999 maps.

Dr. Bergstrom feels that the excessive inputs of nutrients and suspended sediment may be limiting SAV. These inputs may be coming from sources within the tidal portion of Breton Bay as opposed to tributaries. He bases this possibility on several observations.

1. The principle tributary to Breton Bay - McIntosh Run - is of rather high quality. (McIntosh Run data is discussed below in the section of this report headed *Nontidal Benthic, Fish & Instream Habitat Index*.) If the nutrients and sediment were entering via McIntosh Run then stream quality should be much poorer than monitoring data has shown thus far.

2. The Potomac River is also of relatively high quality so it is unlikely that excessive nutrients and sediment are being transported into Breton Bay with each high tide.

Dr. Bergstrom cited the following as possible sources of nutrients and suspended sediment: wastewater treatment plant and mining discharges; resuspension of bottom sediment and shore erosion caused by barges, other boat traffic, and wind-driven waves; fertilizer runoff; failing septic systems; and the poor flushing characteristics of Breton Bay which limit exchange with the cleaner waters of the Potomac River.

Tidal Benthic & Fish Index: These two indexes are used to rate the overall health of fish and bottom-dwelling (benthic) communities. Unfortunately the data needed to assess both indicators has not been collected in Breton Bay.

Anadromous Fish Index: As with the Tidal Benthic and Fish Index, the data needed to compute this index has not been collected in Breton Bay.

Nontidal Benthic, Fish & Instream Habitat Index: Like the tidal indicators, the nontidal benthic and fish indexes reflect the relative health of organisms inhabiting nontidal streams. The instream habitat index is based upon a number of variables relating to the degree of

in-channel siltation, the quality of streamside buffering, and so forth. All three indexes are based on a scale of 1 to 10 with 1 being the worse conditions and 10 the best.

Data for benthic, fish and instream habitat is available for McIntosh Run and two sampling points on Burnt Mill Creek, which is a tributary to McIntosh Run. The Burnt Mill Creek data was gathered in 1995 and showed that this stream was of moderate to good quality for all three indexes.

Dr. Bergstrom, who is heading the U.S. Fish & Wildlife Service water quality monitoring effort referenced above, provided the following information on 1994 sampling conducted in McIntosh Run. This same sampling was performed at three other sites where the endangered Dwarf Wedgemussel (*Alasmidonta heterodon*) was known to occur. Dr. Bergstrom said that the sampling showed that:

“McIntosh Run generally had the best habitat quality, and the highest mussel populations, of the four sites. For example, in 1994 McIntosh Run had the highest Index of Biological Integrity (IBI) score of the four sites; it was scored 52 (Good) and the other sites were scored 30-40 (Poor to Fair).”

Imperiled Aquatic Species Indicator: This indicator rates watersheds according to the number of species present which are listed as rare, endangered, threatened, or otherwise of special concern. Table 1 shows that the Breton Bay watershed does not have any Imperiled Aquatic Species sites. This appears to be an error since McIntosh Run was known to support the endangered Dwarf Wedgemussel (*Alasmidonta heterodon*). Also, Wetlands of Special State Concern are usually established to protect imperiled species. Since Table 1 shows that the Breton Bay watershed has 125 acres of these wetlands, there must be at least one imperiled species present.

Migratory Fish Spawning Area: The DNR website provides the following description for the indicator:

“A number of the most valuable fish species found in the Chesapeake Bay must migrate up tributary streams to spawn. This living resources indicator rates watersheds based on the diversity of spawning habitat for American Shad, Hickory Shad, Alewife, Blueback Herring, White Perch, Striped Bass, and Yellow Perch. It deals with a highly valued function of non-tidal streams and for this reason can be considered an indicator of vulnerability to human-induced damage. It also reflects the condition of the resource. The Migratory Fish Spawning Areas indicator was developed using Maryland DNR Fisheries Service information and Habitat Requirements for Chesapeake Bay Living Resources. This indicator scores watersheds based on the number of migratory fish species from 0 - 7 that spawn within the watershed.”

Table 1 shows that two of the seven fish species migrate into Breton Bay tributaries for spawning purposes.

Maryland Water Quality Inventory, 1993-1995

In the 1996 report *Maryland Water Quality Inventory, 1993-1995*, the Maryland Department of the Environment (MDE) provided the following description of water quality conditions in Breton Bay:

“There are no routine water quality monitoring stations in this [Breton Bay] segment. Based on land use and resource information, water quality in this segment is probably Good. Elevated bacteria and nutrient levels are primarily due to agricultural and urban runoff. Elevated suspended sediment levels are due to agricultural runoff and erosion. Bioassessment of one site (McIntosh Run) showed unimpaired habitat and severely impacted biological communities, because sampling occurred at the head of tide (Primrose, 1993 a). Because of elevated bacteria levels in tidal waters due to municipal discharges and non-point source runoff, 0.1 square miles of shellfish waters are classified as restricted and shellfish harvesting is prohibited; 2.1 square miles of shellfish waters are classified as conditionally approved and may be closed if rain exceeds one inch in a 24-hour period.”

In 1996 MDE placed Breton Bay on the list of “Water Quality Limited Basin Segments.” Substances causing this listing were: nutrients, fecal coliform bacteria, and suspended sediment.⁶ MDE attributed these substances to nonpoint sources (farm and urban runoff) and natural sources (forest runoff).

The 1998 edition of the MDE *Maryland Water Quality Inventory* did not contain any additional information and simply stated that 2.1 square miles of shellfish waters which were classified as conditionally approved in 1993-1995 continue with this same classification.

Water Quality Monitoring

Three groups are monitoring water quality in the Breton Bay system: the U.S. Fish & Wildlife Service (USFWS) and two sections of MDE.

As stated above, Dr. Bergstrom is carrying out monitoring on behalf of USFWS. The five sampling stations are shown in Figure 4. A number of physical, chemical, and biological parameters are monitored monthly at each station.

The section gathering data for preparation of Total Maximum Daily Loads (TMDL) is monitoring eight stations in Breton Bay and one at the mouth of McIntosh Run. Sampling at these eight stations occurred once in the spring with another sampling scheduled for this summer.

⁶ See 1996 303(d) List of Water Quality Limited Basin Segments at: <http://www.mde.state.md.us/tmdl/303dlist2.html>

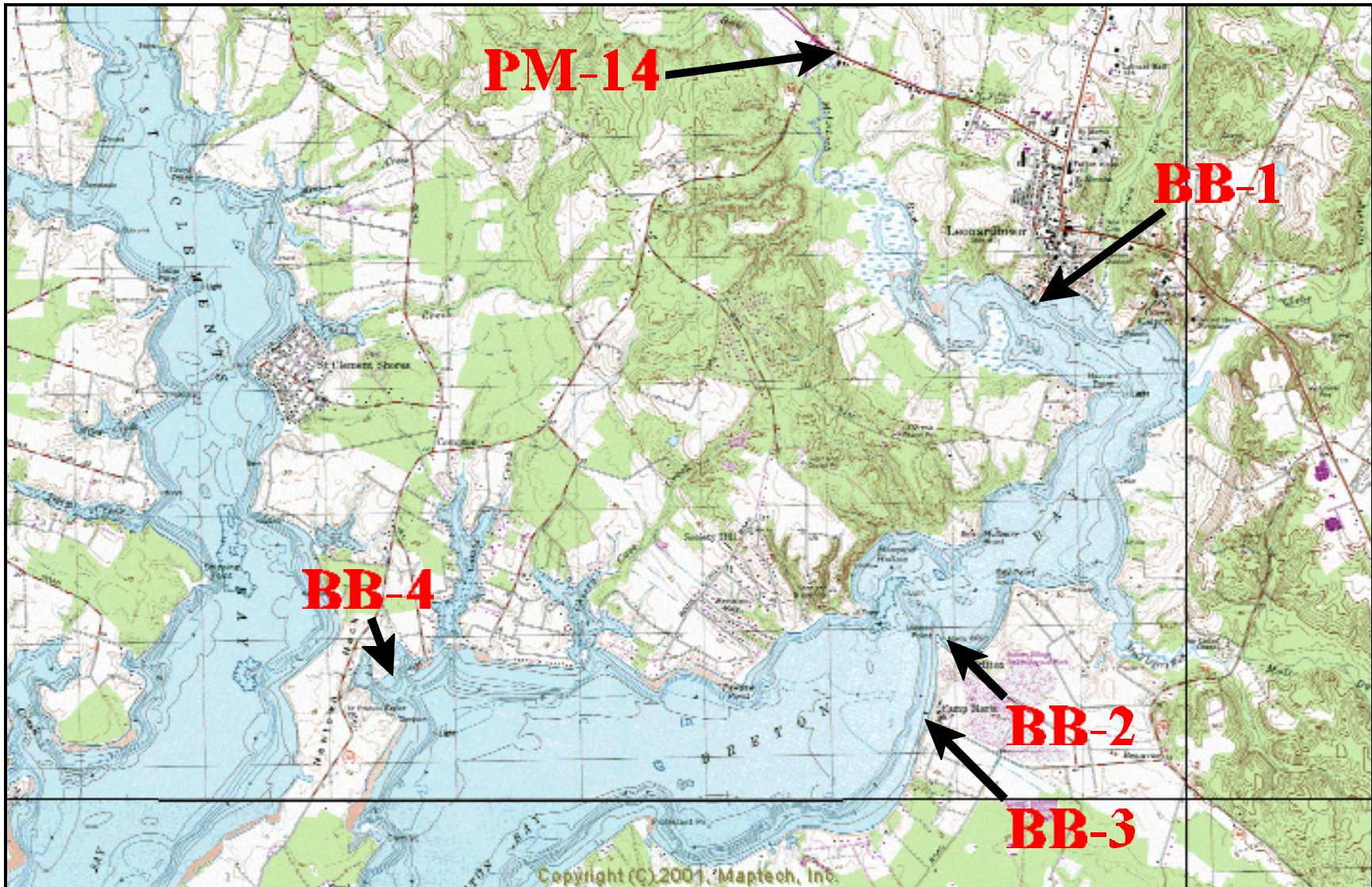


Figure 4: US Fish & Wildlife Service Sampling Stations

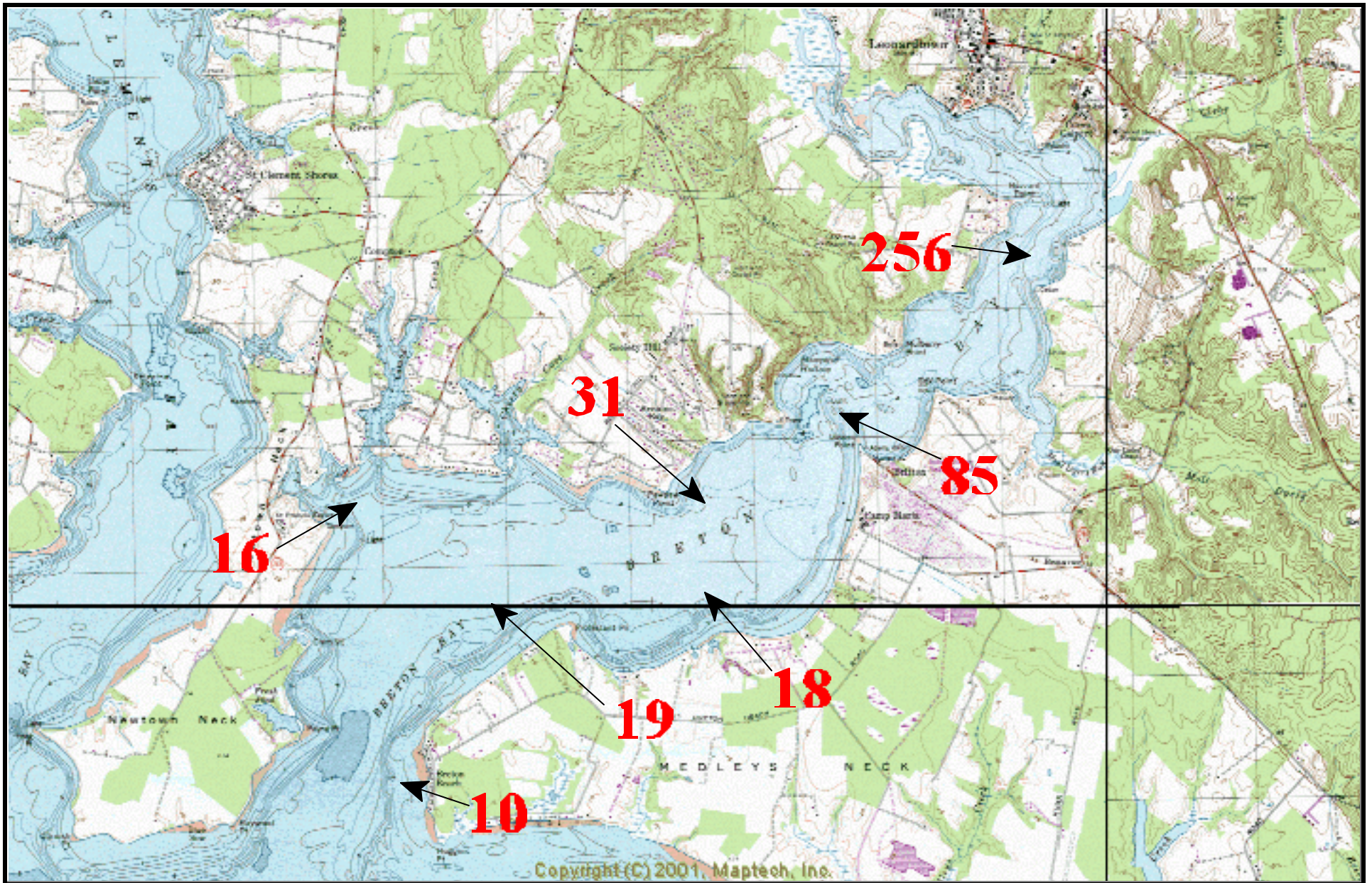


Figure 5: Mean Fecal Coliform Bacteria Densities in Breton Bay (Based Upon Year 2000 Data Gathered By the Shellfish Certification Division - Maryland Department of the Environment)

average fecal coliform bacteria densities for year 2000 data at the seven stations. This data reveals that bacteria levels are highest at the uppermost station and decrease steadily downbay.

The MDE fecal coliform bacteria standard for Breton Bay calls for a density of no more than 14 per 100 milliliters.⁷ This standard is set to protect the quality of shellfish harvested from Maryland waters. As shown on the accompanying map, bacteria levels exceed 14 at six of the seven stations. Figure 5 shows that only the station at the mouth of Breton Bay averages less than 14.

According to MDE Shellfish Certification Division staff, it is not unusual to see high bacteria levels at the head of a tributary with levels then declining as one moves down-tributary. This is usually due to the poorer flushing which occurs at the head of a tidal tributary. At headwater stations in Potomac River tributaries MDE usually sees fecal coliform density averaging around 43. The average fecal coliform density at the head of Breton Bay was 256 based upon year 2000 data.

MDE also has a fecal coliform standard to minimize disease among swimmers, water skiers and others who come into direct contact with a waterway. This standard calls for a fecal coliform density of not more than a "log mean" of 200 per 100 milliliters based on a minimum of 5 samples taken within a 30-day period. While the arithmetic mean fecal coliform density is 256 at the head of Breton Bay, this is not the same as the log mean, which would be lower. Also, there are only four samples available for any 30-day period during year 2000.

In addition the U.S. Environmental Protection Agency (EPA) has found that fecal coliform bacteria are not the best organism for assessing the safety of water for human contact.⁸ Instead, EPA is advocating the use of organisms known as enterococci and *E. coli*. EPA recommends setting the enterococci and *E. coli* standard at a level which would reduce the incidence of gastrointestinal illnesses to 19 per 1,000 swimmers in marine waters. Insufficient enterococci and *E. coli* data exists to assess the safety of Breton Bay waters for human contact.

⁷ The MDE fecal coliform standard for shellfish waters calls for no more than 14 *individual bacteria* per 100 milliliters and appears in the Code of Maryland Regulations (COMAR) at 26.08.02.03-3

⁸ DRAFT Implementation Guidance for Ambient Water Quality Criteria for Bacteria - 1986. Office of Water, US Environmental Protection Agency, Washington, D.C., EPA-823-D-00-001, January 2000, <http://www.epa.gov/ost/standards/bacteria/>

Oyster Status

The DNR Shellfish Program provided Figures 6 and 7 which show the location of historical (not existing) oyster bars in Breton Bay.⁹ DNR staff also provided a table comparing oyster spat (larval) survival (set) in the lower Potomac river system. DNR monitoring has shown that Breton Bay and Saint Clements Bay always come in near the bottom with respect to oyster spat survival when compared to other portions of the lower Potomac River system. Monitoring was conducted at two of the bars depicted in the oyster bar maps. Bar #9 (Blue Sow) exhibited a 72% to 89% mortality rate while #11 (Black Walnut) had a 47% to 74% mortality rate.

DNR staff speculated that the low survival rate is probably due to a variety of factors including recent and historical sedimentation which has blanketed formerly productive beds, disease, water quality issues, and possibly other unknown factors.

Oyster spat need shell or other hard substrate on which to settle, attach and grow. It is possible that spat set is low in Breton Bay because of a lack of hard substrate. If it was determined that water quality was adequate in Breton Bay - either portions or the entirety - then it might be possible to grow oysters in trays then transplant them to suitable substrate within the Bay. The data being gathered by the USFWS and the MDE TMDL effort may be sufficient to determine if water quality conditions in Breton Bay are suitable for oysters. If water quality is suitable then the Association may wish to pursue a restoration project through the DNR Oyster Recovery Partnership.

Stream Benthic Monitoring

On May 20, 2001, Association President Erik Jansson, Association Board members Frank and Christina Allen, and CEDS president Richard Klein sampled the aquatic communities inhabiting the major nontidal tributaries to Breton Bay. The purpose was to detect gross indications of pollution problems. The major tributaries are: McIntosh Run, Nelson Run, Town Run, Glebe Run, and Moll Dyers Run. All but Glebe Run were sampled on May 20th. The sampling consisted of collecting organisms inhabiting the riffle areas in each stream using a kick-seine. These organisms are mostly immature aquatic insects and crustaceans along with worms and salamanders. We also examined habitat quality at each sampling point.

The sampling procedures employed were simplistic, but sufficient to detect gross indications of pollution. Nevertheless, all the results presented below must be confirmed with more precise sampling methods. Following is a summary of what this preliminary sampling indicated about each stream.

McIntosh Run upstream of MD 5 appeared to be of good quality as indicated by the presence of the pollution-sensitive mayflies and water-penny beetles. Instream habitat was also of good quality at this point.

⁹ The data was provided by Mr. Chris Judy who can be reached at 410-260-8259.

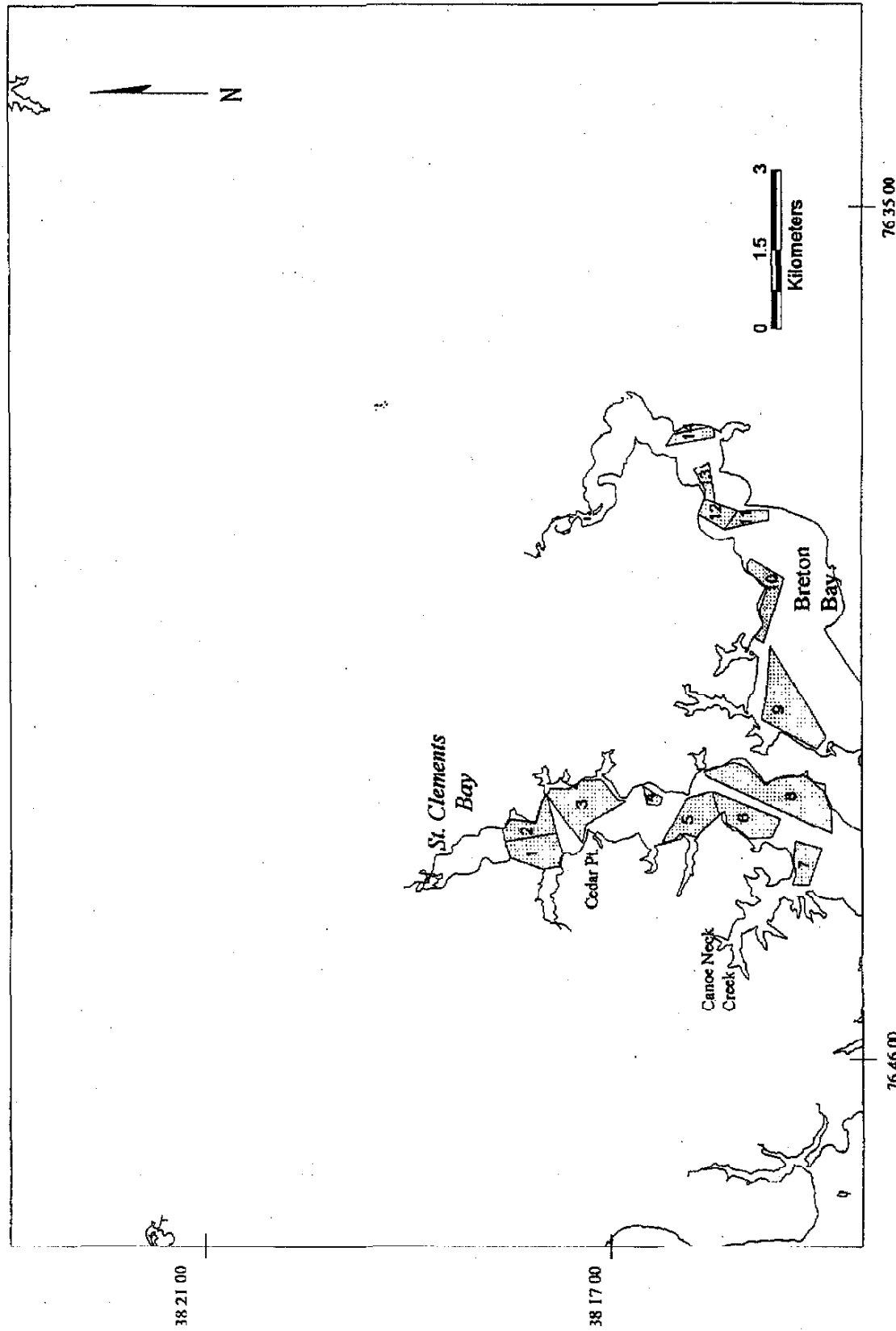


Figure 6: Historic Oyster Bar Locations

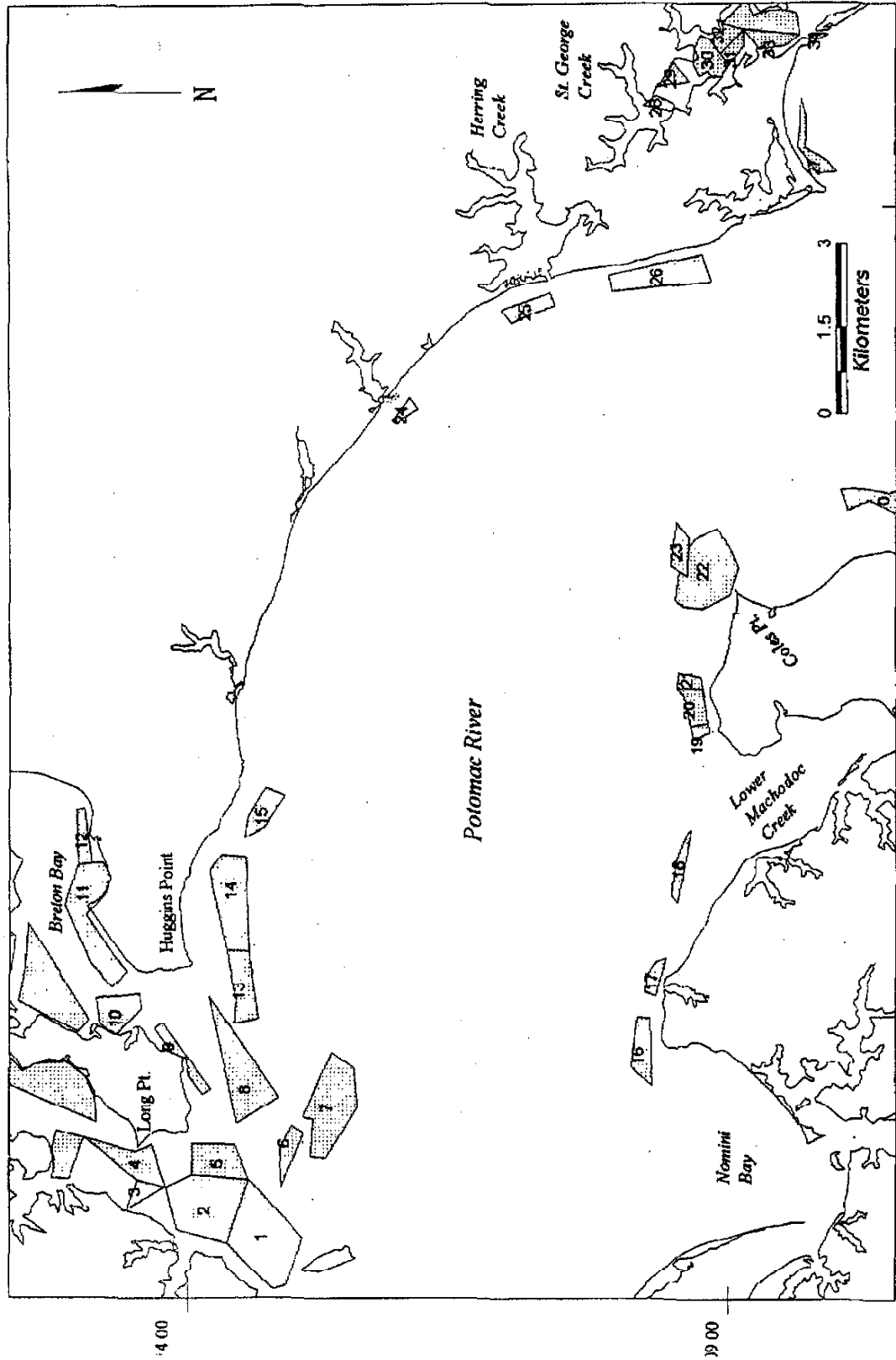


Figure 7: Historic Oyster Bar Locations

Moll Dyers Run above MD 244 had the best quality of the four major tributaries sampled on May 20th. This stream supported stonefly nymphs which are highly pollution sensitive. Instream habitat was of good quality and showed little sign of excessive sediment input.

Nelson Run appeared to be the most degraded tributary. We sampled upstream of the MD 243 crossing. The diversity and abundance of organisms was poor indicating degraded conditions. The stream may have received a moderately high input of sediment in the past as indicated by the abundance of sand.

Town Run upstream of Old Route 5 (Fenwick Street) supported pollution-sensitive organisms indicating good quality and appeared to have moderately degraded habitat due to sediment inputs. The downstream side of the crossing may be a barrier to fish migrations. The concrete apron of the culvert creates about a six-inch water level difference. While generally a one-foot difference is needed to form a migration barrier, a six-inch drop may impede the migration of some species.

Again, the May 20th sampling was very preliminary. These findings should not be used as anything other than a gross indication of stream quality. More exhaustive sampling must be done to determine if these initial results are accurate. Nevertheless, it does appear that generally the nontidal tributaries to Breton Bay are of good quality. However, Nelson Run appears to be impacted by substantial stress and should be sampled more intensively to verify the existence of a problem and then to pin-point a source(s).

The Association may wish to recruit volunteers for participation in a more thorough sampling effort through the Maryland Department of Natural Resources Stream Waders Program. I anticipate that volunteers will step forward if the Association holds watershed resident meetings. Of course, if the Association wishes, CEDS could return and conduct the more exhaustive sampling.

POTENTIAL POLLUTION SOURCES

From the preceding review of existing environmental information, it appears that Breton Bay has significant water quality problems due to excessive inputs of nutrients, sediment and bacteria. Following is a review of potential sources. This section will focus on nutrients since they are somewhat easier to quantify and may be the primary stressor in Breton Bay. Table 2 compares nutrient releases from various sources. Two categories of pollution sources, point and nonpoint, are presented in Table 2.

Nonpoint Pollution Sources

Included in this category are a variety of sources which introduce pollutants into Breton Bay and its tributaries in a diffuse manner. These sources typically include those where pollutants are

transported in runoff, such as: pastures; croplands; logging, mining, and construction sites; impervious surfaces and lawns. But pollutants may also enter Breton Bay via groundwater inflow. Also considered a nonpoint source is *atmospheric deposition* - pollutants settling from the atmosphere - which is a major pathway for pollutants entering the Chesapeake Bay.

The distinction between point and nonpoint sources originated in the Clean Water Act and prior legislation. The Act generally required far more stringent limits on pollution released from point sources, the thinking being that it was easier - more cost-effective - to control pollution at point sources versus the more diffuse nonpoint contributors.

Table 2 shows eight types of nonpoint sources and provides a very rough estimate of the nutrient loads from each source. The loading data should be considered very general and is provided more as an indication of how the various sources compare as opposed to anything more definitive. Nevertheless, Table 2 shows that cropland accounts for roughly half of the nitrogen and phosphorus entering Breton Bay yet only occupies about a fifth of the watershed. Forest covers more than half the watershed but only contributes 3% to 19% of the nutrient load.

On May 20, 2001 CEDS conducted an initial survey for potential sources of sediment pollution in the Breton Bay watershed. The survey focused on sources visible from the roads ramifying the watershed. Examples of potential pollution sources include construction sites, mining operations, logging sites, livestock confinement areas, barren croplands, and so forth. The intent of this survey was to get a feel for potential sources; not to fully investigate each. In other words the goal was to move through the watershed quickly and assume that CEDS or Association volunteers would follow-up later on any significant sources.

CEDS generally found that erosion and sediment control quality was better on construction sites when compared to a survey conducted in Saint Mary's County four years ago on behalf of the Association. While control was not perfect, most disturbed soils had been protected with straw mulch or grass except for where active construction was occurring. Mulching and grass can reduce soil erosion and off-site sediment pollution by 90% to 99%. Disturbed soils not treated with mulch or grass usually drained to perimeter sediment trapping measures such as silt-fence or settling ponds. These measures can retain 30% to 70% of the eroded soil onsite. CEDS also found three mining sites, one logging operations, and four barren croplands which could be potential sediment pollution sources.

Again, the road survey described above was just a first step in identifying potential pollution sources. Only about a fourth of the roads in the watershed were covered. In addition to completing the road survey CEDS recommends a review of recent aerial photos for the presence of other potential sediment pollution sources. Finally, there would be value in surveying some of the tributaries, such as Town Run, for excessive channel erosion or other sources of large volumes of sediment pollution. Once the road survey, aerial photo review, and stream survey is completed the Association has the option of either asking CEDS to investigate each source or we

Table 2: Land Use (1994) & Nutrient Loads in the Breton Bay Watershed

LAND USE & DISCHARGES	Acres	Percent of Total Acres	POUNDS PER YEAR		PERCENT OF TOTAL LOAD	
			Nitrogen	Phosphorus	Nitrogen	Phosphorus
NONPOINT SOURCES¹⁰						
Water	3,174	8%	46,023	1,796	16%	10%
Wetland	184	0%	462	6	0%	0%
Forest	21,483	56%	53,922	644	19%	3%
Pasture	2,299	6%	13,403	506	5%	3%
Cropland Conventional Tillage	3,447	9%	70,664	6,170	25%	33%
Conservation Tillage	3,448	9%	49,651	4,310	18%	23%
Urban	3,960	10%	30,413	1,663	11%	9%
Other	112	0%			0%	0%
Subtotal	38,107		264,538	15,096	95%	81%
POINT SOURCES¹¹					0%	0%
Leonardtwn Sewage Treatment Plant			14,965	3,577	5%	19%
Saint Clements Shores Sewage Treatment Plant			?	?	0%	0%
Forest Farms Sewage Treatment Plant			--	--	0%	0%
Subtotal			14,965	3,577	5%	19%
TOTAL			279,503	18,673	100%	100%
ANNUAL LOAD TO BRETON BAY (pounds per acre of water surface)			96	7		

¹⁰ Nutrient loads from nonpoint sources are based upon the rates presented in Tables 3.5 and 4.35 of *Chesapeake Bay Program Watershed Model Application To Calculate Bay Nutrient Loadings*, U.S. Environmental Protection Agency, 410 Severn Avenue, Annapolis, MD 21403. The acreage for pasture, conventional and conservation tillage cropland are based upon estimates from the Saint Mary's Natural Resources Conservation District.

¹¹ Nutrient loads from point sources are based upon Discharge Monitoring Reports (DMR) obtained from the Maryland Department of the Environment. The DMRs for the St. Clements plant do not show nutrient loads. The Forest Farms plant is not yet discharging..

could train volunteers how to do this research. Obviously the volunteer approach is far more desirable from both a financial and public involvement perspective.

Point Sources of Pollution

A point source releases pollutants into a waterway via a discrete pipe. Most point sources require a National Pollution Discharge Elimination System (NPDES). In Maryland, NPDES permits are issued and enforced by the Maryland Department of the Environment (MDE).

There are two existing point source discharges within the Breton Bay watershed: the Leonardtown Sewage Treatment Plant and the Saint Clements Shores Sewage Treatment Plant. A third point source - the Forest Farms Sewage Treatment Plant - has not yet begun discharging.

CEDS reviewed the Discharge Monitoring Reports (DMRs) and other records maintained by MDE for all three point sources. Following is a summary of what these records showed.

Forest Farms STP: This 209-lot subdivision is proposed for a site off Brown Road in the watershed of the Breton Bay tributary Glebe Run. About 40% of the lots will be on septic systems and the sewage from the remaining 120 homes will go to the proposed sewage treatment plant. The treated effluent will be released into the soil via a trench system. The NPDES Discharge Permit contains effluents limits for other parameters, but not nutrients. This makes it difficult to predict the quantity of nutrients entering Breton Bay from this facility. The MDE file did not contain any DMRs so it is assumed the facility is not yet discharging.

Leonardtown STP: This facility serves the Leonardtown area and discharges into the Breton Bay tributary Town Run. The plant presently has a design flow of 0.68 million gallons per day (mgd). Table 3 provides a summary of the data contained in the monthly DMRs for this facility. The daily nitrogen and phosphorus loadings shown in Table 3 were converted to annual loads and added to Table 2. The data presented in Table 2 shows that the Leonardtown discharge may account for 5% of the nitrogen entering Breton Bay and 19% of the phosphorus.

Leonardtown is in the process of upgrading the treatment plant by adding biological nutrient removal (BNR). The treatment plant operator anticipates that this will cut the phosphorus concentration by two-thirds and nitrogen loads would also be reduced.

The Leonardtown plant has experienced problems with sludge build-up and flooding. These problems have resulted in the release of partially treated sewage into Town Run and Breton Bay. Last year these problems caused a portion of upper Breton Bay to be posted against swimming and other forms of water contact recreation. The plant operator believes that the flooding problem could be reduced if a sand deposit at the mouth of Town Run were removed. When floods occur the bar impedes water flow and causes the

Table 3: Leonardtown Sewage Treatment Plant Monthly Flow & Average Pollutant Loadings

Month	Average Flow mil gal/day	Biochemical Oxygen Demand lbs/day	Total Phosphorus lbs/day	Nitrite + Nitrate lbs/day	Ammonia lbs/day	Organic Nitrogen lbs/day	Total Nitrogen lbs/day
Effluent Limit	0.68	170	11.0	--	--	--	--
January 2000	0.39	47	14.0	0.2	57.0	19.0	76.2
February	0.45	19	6.8	11.4	1.2	32.4	45.0
March	0.44	44	8.4	0.2	6.7	73.9	80.8
April	0.43	34	4.4	0.5	63.1	8.9	72.5
May	0.40	23					0.0
June	0.39	12	10.1	0.5	1.6	2.9	5.0
July	0.48	29	15.1	0.5	50.7	0.0	51.2
August	0.42	64	9.1	1.6	45.5	10.6	57.7
September	0.44	196	16.2	0.3	63.0	4.8	68.1
October	0.43	59	2.0	1.1	14.7	11.2	27.0
November	0.44	13	15.3	0.5	1.4	2.9	4.8
December	0.40	12	10.3	18.3	1.9	3.4	23.6
January 2001	0.41	11	5.7	9.3	2.7	2.8	14.8
February	0.43	25	7.8	1.5	19.2	7.9	28.6
March	0.45	14	12.6	45.8	11.4	3.2	60.4
AVERAGE	0.43	40	9.8	6.6	24.3	13.1	41.0

floodwaters to back-up into the plant. As the floodwaters recede sewage mixed with floodwater flows out of the plant and into Town Run.

The deposit at the mouth of Town Run has formed over the past few decades. Saint Mary's Natural Resources Conservation District staff have observed dramatic channel erosion within the Town Run watershed. This erosion may be responsible for the formation of the bar at the mouth of the Run.

Saint Clements Shores STP: The Saint Clements Shore facility has a design flow of 0.10 mgd and the treated wastewater is applied to soils within the watershed of the Breton Bay tributary Cherry Cove. Flows from January 2000 through March 2001 averaged 0.09 mgd. The DMRs for this facility did not contain data on nutrient loads. Therefore Table 2 does not show a nitrogen or phosphorus loading for the Saint Clements Shore facility. We are awaiting more details records requested from the MDE file. These records may allow an estimate of nutrient releases from this facility.

Acceptable Nutrient Loads

How much nitrogen and phosphorus can enter a waterway like Breton Bay without causing significant adverse effects, such as those leading to the loss of SAV? A very gross rule of thumb was provided in a paper published two decades ago.¹² The author of the paper reviewed data for a number of estuaries and found that those exhibiting few signs of excessive nutrient input received an average of 48.6 and 6.7 pounds, respectively, of nitrogen and phosphorus per acre of water surface per year. Using this very gross, inexact rule of thumb the last row in Table 2 shows that Breton Bay is receiving twice as much nitrogen as it should and is slightly more phosphorus than recommended. Given the initial observations from the USFWS monitoring and SAV distributions, it appears that Breton Bay does suffer from excessive nutrient inputs.

APPENDIX: WAYS TO CONSERVE BRETON BAY AROUND THE HOME, YARD, AND WHILE BOATING & DRIVING

Following are excerpts from two DNR websites providing information on how to minimize the aquatic resource impact of the home, yard, boat and car. These websites are:

<http://www.dnr.state.md.us/bay/protect/intro.html>

<http://www.dnr.state.md.us/boating/cleanmarina/resources.html>

IN THE YARD

When most people think about the sources of water pollution, they identify industry and agriculture as the primary culprits. They rarely consider that actions they take or practices they

¹² Jaworski, N.A. 1981. Sources of nutrients and scale of eutrophication problems in estuaries. In: Estuaries and Nutrients, pages 83 -110, Humana Press.

follow in their own yards can have a huge impact on the quality of the water they drink, cook with, swim in or sail on. The fact is, however, that our yards can be a major source of water pollution. So the next time you're out admiring your home landscape, think about the things that you can do to protect Maryland's water quality.

Bay-friendly lawn care

Whether living in single-family homes, townhouses, condominiums or apartments, many Marylanders like to see lush, green, weed-free lawns as a major element of their residential landscape. Unfortunately, this desire for great grassy expanses has led to an excessive use of fertilizers and pesticides. Nutrients in fertilizers and toxic chemicals in pesticides end up polluting our streams, rivers, lakes and the Chesapeake Bay, as well as groundwater in underground sources and drinking water reservoirs. You can help prevent such pollution if you:

Choose grasses suited to Maryland conditions. Turf-type tall fescue and zoysia grass are two lawn grasses that generally resist damage from insects and diseases and can be maintained with lower amounts of fertilizer. Apply the correct amount of fertilizer -- as determined by a soil test -- at the proper time of year. When applied at the wrong time of the year or in improper amounts, fertilizers leach into groundwater or run off the soil into surface water. They can also harm lawns by causing rapid, lush growth that is more susceptible to disease and more attractive to pests. Applying fertilizer in the early fall helps reduce runoff and leaching because rainfall patterns, temperature and plant growth rates tend to maximize nitrogen uptake. Mow your grass to the proper height. Most people don't mow their lawns often enough, and when they do, they mow it too short. This weakens and kills the grass, allowing for bare soil areas that increase runoff and weed encroachment. Most grasses shouldn't be mowed to heights shorter than 3 inches. Leave grass clippings on the lawn. These clippings release nitrogen into the soil, reducing the amount of fertilizer needed. Another good alternative is to compost the grass clippings with brush, dried leaves and other garden materials.

Build a sustainable landscape

Areas of your yard not devoted to grass can also have an impact on water quality. Water and fertilizer are wasted when they are allowed to run over the surface of the ground and into storm drains. Soil erosion occurs when soil is washed by rain from bare areas of land into storm drains or ditches -- and eventually into streams, rivers, drinking water reservoirs or groundwater supplies -- carrying nutrients and chemicals with it. Most non-native plants require more water, fertilizer and pesticides. You can reduce runoff, erosion and excessive water use in your gardens if you:

Improve your soil by adding organic matter. This creates a better environment for plant roots to grow, which in turn holds the soil in place.

Plant trees, shrubs and flowers native to Maryland. These plants are adapted to this region and require much less water, fertilizer and pesticides to stay healthy than do exotic or non-native plants.

Use hand tools, reel mowers or electric lawn tools. Unlike gas-powered equipment, they produce no emissions that can pollute both the air and water.

Minimize impervious paved surfaces, such as sidewalks and driveways. Use wood chips, gravel, stepping stones or bricks laid in sand as an alternative to reduce surface runoff into storm drains, streams and ditches.

Dealing with seasonal changes

Water is sometimes in short supply, especially during periods of summer drought. People waste enormous amounts of water trying to keep lawns green in hot, dry summer months, when grass naturally goes dormant. Many don't realize that lawns will automatically "re-green" when the weather cools and rainfall returns. To conserve water during periods of drought -- or at any other time:

Let nature take its course. Some grasses turn brown during summer drought, but will become green again in the fall even without supplemental water.

If you do water the lawn, water deeply and slowly --about 1 inch per week. Light, infrequent watering can actually do more harm than good.

Collect rainwater in a covered barrel or cistern for watering landscape plants. Irrigate with soaker hoses or drip irrigation. The initial cost for the hose may be higher, but it saves both water and money over time.

Addressing pet waste issues

Pet waste left to decay on the sidewalk or on grass near the street may be washed into storm drains by rain or melting snow. Storm drains do not go to a sewage treatment plant, but drain directly into our waterways, carrying pollutants along with the water. In Maryland, most of this drainage eventually enters the Chesapeake Bay. To prevent pet waste from entering surface and ground water supplies, you can:

Flush waste down the toilet.

Bury waste in a hole about 5 inches deep, away from vegetable gardens, wells or bodies of water.

Wrap waste securely and put it in the trash.

IN THE HOME

You can reduce the amount of pollutants and wastewater from your home while saving money and time, as well as benefiting your health, streams, rivers, drinking water supplies and the Chesapeake Bay. Learn more about the products you use in your home and how waste is managed in your community.

Household Cleaners

Your choice of products and how you use and dispose of them have a direct impact on water quality. Many commonly used household products contain hazardous ingredients. If used

improperly, these products could be dangerous to you, your family and the environment. The best way to know if products can be hazardous is to check labels for words such as: flammable, caustic, corrosive, caution, danger, warning or poison.

Use extreme care with these products. Follow label directions and store them in a safe place, away from children. Never mix products unless directed by the label. Never mix products containing bleach and ammonia. Buy only the amount you need to avoid disposal of spoiled or outdated products. Dispose of hazardous household products at a local hazardous waste collection center or an authorized recycling center.

Reduce, Reuse and Recycle

The average American generates 1,500 pounds of trash per year, more than citizens of any other country. This means more landfills to contain our waste. What can we do to reduce garbage and improve the health of our natural resources?

Choose durable goods and reusable products. Buy fewer disposable products. Look for "refillable" and "rechargeable" labels. Recycle paper, plastic, glass and cans according to your community's guidelines. Recycling an aluminum can saves 95 percent of the energy it would take to make a new one from scratch! Buy recycled products and materials. Borrow, rent or share with family and friends items that are used infrequently. Buy bulk items, concentrates and products with less packaging. Packaging is nearly one-third of the cost of our purchases and an even greater percentage of our trash. Carry purchases in reusable bags. Return plastic bags to grocery stores. Use old clothing as cleaning rags around the house or garage.

Repair or refurbish old or broken machinery, appliances and furniture. Buy second-hand items. Donate unwanted, usable items to charity. Be creative -- find new uses for old things!

Water Conservation

We take clean water for granted. In the United States, the average person uses 125 gallons of water a day! Conserving water is environmentally smart and saves money. By conserving water in your home, you can help increase our water resources and reduce the need for, and cost of, wastewater treatment. A leaking faucet can waste up to 100 gallons of water a day! Billions of gallons of water are wasted each day because of dripping faucets, leaks, running toilets and excess use of water.

Here are ways you can conserve:

Repair all drips and leaks.

Turn off the faucet while brushing teeth, shaving and lathering.

Don't use the toilet as a trash can.

Install low-flow fixtures such as faucets, shower heads and toilets.

Take short showers instead of baths.

Wash only full loads of clothes and use the machine's water-saving settings.

Avoid using a garbage disposal. Compost kitchen scraps or discard in trash.

Keep a bottle of water in the refrigerator to avoid running the water to get it cold.
Wash only full loads in your dishwasher. If washing by hand, turn off the water until you are ready to rinse.

Septic Systems

Human and pet waste contains nitrogen and phosphorus, the two leading nutrients harming the Chesapeake Bay. Fortunately, as a society, we no longer dump raw sewage directly into our water.

One in five Maryland residents relies on one of nearly 400,000 private septic systems. When a septic system malfunctions, it not only causes problems for your home, it becomes a serious source of ground and surface water contamination as well. The average life of a septic system is 12 to 20 years -- not forever. In Maryland there are nearly 30,000 households with acknowledged failing septic systems. Fixing them could cost as much as \$250 million! Improperly functioning septic systems are a major source of well contamination.

If you own a private septic system, you are responsible for maintaining it. Without regularly scheduled pumping, septic tanks will fail. Signs of failure are not always obvious. Left unpumped, solids will leave the tank and clog the drain field. If this happens, a new septic system must be installed.

Here's how to care for your septic system:

- Ask your local health department for a copy of your septic system layout and location.
- Do not plant trees or build decks, driveways, sheds and pools over septic systems. These activities can interfere with systems and lead to costly repairs.
- Have your septic system pumped every one to five years (depending on use) by a licensed professional.
- Check your phone book under "septic tank cleaners."
- Make sure the tank is completely cleaned. See that baffles are checked and the tank is inspected for leaks.
- Do not flush toxic substances down the drain.
- Keep deep-rooted trees away from your septic tank or drain field.
- Avoid using a garbage disposal. Garbage disposals cause tanks to fill faster.
- Do not run the dishwasher and washing machine during the same times when your family members may take showers -- this can over-burden your system.
- Put paper towels, tissues, cigarette butts, disposable diapers, baby wipes, sanitary napkins and tampons in the trash, not the toilet.
- Direct downspouts and runoff away from the septic field to avoid saturating the area with excess water.
- Protect your well water
- Follow these simple steps to keep your well water safe:

Grade your lot so that water drains away from your well casing and doesn't puddle around the well.

Make sure your well cap is not cracked and is tightly secured. If water tests show contamination, have a well driller check the grout.

Have your fuel tank checked for leaks, especially if it is underground.

Avoid using gasoline, automotive products, solvents, pesticides or excessive amounts of fertilizers near your well.

Contact your county health department for directions for shock chlorinating your well.

Where Does Your Drinking Water Come From?

Two-thirds (67%) of the households in Maryland depend on surface water sources (such as the Patuxent River or Gunpowder Falls) treated and delivered by public or private water companies. Surface water sources include reservoirs and river intakes. The other one-third (33%) of households depend on groundwater sources provided by either public or private companies (17%) or individual wells (16%).

Check the Label on Your Faucet

You will soon know exactly what is in your drinking water. Under new Environmental Protection Agency requirements, your community water provider must tell you by October 1999 what's in the water, from low levels of lead and copper, to pesticides, disinfectants and chemicals. This information must then be updated at least once a year. Think of it as a label of ingredients for what's coming out of your faucet. So when the details come with your water bill, take a look. If you have any questions, call your water supplier. It's your legal right to know.

After You Flush

If your wastewater goes to a sewage treatment plant, chances are that you are already helping to protect the Bay and its rivers. Maryland has some of the most advanced wastewater treatment systems in the nation. More than 90 percent of the large wastewater treatment plants in Maryland have installed or agreed to install biological nutrient removal (BNR). BNR goes beyond conventional treatment in protecting river and Bay ecosystems by removing nitrogen and phosphorus. Since 1985, the state's wastewater treatment plants have reduced their nitrogen emissions by 36 percent and phosphorus emissions by 55 percent. You can control the flow of water and products into and out of your home. Buy fewer toxic products and help reduce pollutants that enter our water. A healthier home and a healthier environment will be your reward!

ON THE ROAD

When it comes to protecting the Chesapeake Bay and its tributaries, most people don't think about their cars and trucks. But the fact is that what goes up, must come down. That means air pollution from Maryland's nearly 4 million registered vehicles and those in neighboring states often ends up in our rivers, streams and, ultimately, the Chesapeake Bay. It is estimated that nearly one-third of the nitrogen in the Bay comes from the air.

Fortunately, minimizing the negative impact that automobiles have on Maryland's water quality is easy, inexpensive and good for your vehicle. The next time you turn on your air conditioner, sit in line at a drive-through window or are tempted to postpone changing your oil, think about the impact your decisions will have on your automobile as well as on the quality of the water you drink, fish in, boat on, swim in or live near.

Auto maintenance matters

Proper automobile maintenance is good for your checkbook and the environment. It extends the life of your car, improves its performance, prevents some costly repairs, and eliminates or minimizes leaks and emissions that are harmful to the environment. To maintain your vehicle in tip-top condition:

- ! Read the owner's manual. Maintaining your vehicle begins with reading and following the advice in your owner's manual, which contains tips on subjects such as oil-change intervals and driving techniques that will help reduce pollution.
- ! Get regular tuneups. Dirty carburetors or fuel injectors, clogged air filters, worn points or plugs and an ignored ignition system not only waste gas, but they also lower engine performance and increase emissions. Any complete tuneup should include a thorough examination and repair of the engine's sensors and computer, and the exhaust emissions and evaporative control emissions systems.
- ! Keep your air conditioning system leak-free. Leaks allow the refrigerant Freon found in most vehicles to enter the atmosphere, where it can damage the earth's protective ozone layer. Have your air conditioning system checked annually for leaks, and run the air conditioning every once in a while during the cold months to keep the system's seals soft and pliable.
- ! Look for liquid leaks. Fluids such as gasoline, oil and antifreeze that leak from automobiles can harm human and animal health and the environment, especially water supplies. So check regularly for leaks and get them fixed before a loved pet samples poisonous antifreeze or rain showers wash oil into storm drains and the Bay.
- ! Change oil properly. If you change your own oil, be sure that you drain the used oil into a suitable container. An ordinary plastic milk jug or other gallon container with a tight-fitting cap will do, and a funnel will make it easier to pour the oil into the container. Take the used oil to a collection facility -- located at many neighborhood service and inspection stations -- for reprocessing.
- ! Take care of your tires. Check tire pressure every two weeks when tires are cool. The manufacturer's recommended maximum pressure is printed on the side of

each tire in pounds per square inch (psi). Maintain tire alignment and rotate your tires every 6,000 to 8,000 miles. These simple steps save you money by improving your vehicle's gas mileage and extending the life of your tires, while also reducing air pollution and preventing tires from being added to Maryland's waste stream.

- ! Have your vehicle's emissions inspected. Federal law requires regular emissions inspection of all registered vehicles. The new treadmill test is the most advanced method of testing available. Unlike the tailpipe test, it measures nitrogen oxides -- an air pollutant that can end up in the Bay. For more information on Maryland's Vehicle Emissions Inspection Program (VEIP) call 1-800-638-VEIP.

CLEAN MARINA BOATING TIPS

For use around marinas and while on the water anywhere.

Contain Trash

Do not let trash get thrown or blown overboard
 If trash blows overboard, retrieve it--consider it "crew-overboard" practice
 Pack food in reusable containers
 Buy products without plastic or excessive packaging--plastic is deadly to fish and birds
 Do not toss cigarette butts overboard--they are made of plastic (cellulose acetate)
 Purchase refreshments in recyclable containers

Recycle

Recycle cans, glass, plastic, newspaper, antifreeze, oil and lead batteries
 Call 1-800-4-RECYCLE for locations or visit <http://www.mde.state.md.us/was/>
 Bring used monofilament fishing line to recycling bins at your marina or tackle shop

Fuel Cautiously

Remember, fuel expands as it warms up
 Fill your tank just before leaving on a trip
 If you fill your tank upon your return to port, fill it only 90%
 Use oil absorbent material to catch drips from the fuel intake and the vent overflow
 Fill portable fuel tanks ashore--where spills are less likely to occur and easier to clean up
 Add a fuel conditioner to your tank if you use your engine infrequently

Control Oil In The Bilge

Keep your engine well tuned--no leaking seals, gaskets or hoses
 Place oil absorbent material or a bioremediating bilge boom in the bilge

- Place an oil absorbent pad under the engine
- Replace oil absorbent materials regularly
- Check fuel lines for damage--replace with alcohol resistant hoses
- Secure fuel hoses to prevent chafing and leaks
- Never discharge bilge water with a sheen--it is illegal

Properly Dispose of Oil Absorbent Materials

- If the pad is saturated with gas, allow it to air dry. Reuse.
- If the pad is saturated with diesel or oil, double bag it in plastic--one bag sealed inside another. Dispose in your regular trash.
- Bioremediating bilge booms should not be sealed in plastic bags--the microbes need oxygen to function. Discard in regular trash.

Clean Gently

- Wash your boat frequently with a sponge and plain water
- Use detergents sparingly
- Use phosphate-free, biodegradable and non-toxic cleaners
- Wax your boat--a good coat of wax prevents surface dirt from becoming ingrained
- Clean wood with a mild soap powder and a nylon brush--not harsh chemical cleaners
- Conserve water--put a spray nozzle on your hose

Maintain Your Vessel Wisely

- Collect all paint chips, dust and residue. Dispose in regular trash.
- Share leftover paint and varnish
- Bring used solvents and waste gas to local hazardous waste collection day
- Keep your engine clean so you can spot leaks
- Slip a plastic bag over used oil filters before they are removed to capture drips
- Use premium two-cycle engine oil
- Use alternatives to toxic bottom paints

Sewage

- Never discharge raw sewage in Maryland waters
- Use restrooms on shore
- Under way, use approved Marine Sanitation Devices (MSDs)
- Discharge Type I or II MSDs over deep water--avoid discharging in swimming areas, marinas, anchorages or over oyster bars
- Establish regular maintenance schedule for your MSD based on manufacturer's recommendations
- Pumpout and rinse hold tanks regularly

Use enzyme based products to control odor and reduce solids in holding tanks
Avoid holding tank products that contain quarternary ammonium compounds (QAC) and formaldehyde

Dispose Of Fish Waste Properly

Do not throw fish waste into marina waters
Use fish cleaning stations where provided on docks or at marinas
Discard waste over deep water or in the trash
Save waste and use as chum or bait

Protect Sensitive Habitat

Proceed slowly in shallow areas
Do not disturb wildlife
Avoid contact with submerged aquatic vegetation (SAV)
Watch your wake--it can lead to shoreline erosion and disturb wildlife

Be A Responsible Boater

Learn about products and practices which are environmentally safe
Share the information with other boaters
Help guests understand that, on your boat, no trash is thrown overboard
Obey laws governing speeding, littering and discharge
Encourage boating facilities to provide trash cans, recycling bins and pumpout stations
Support marinas that are environmentally responsible