# Report on Nutrient Synoptic Survey in the Collington Branch, Northeast Branch, and Lottsford Branch Watersheds, Prince George's County, Maryland, April 2003 as part of the Watershed Restoration Action Strategy.

Maryland Department of Natural Resources
Watershed Services
Landscape and Watershed Analysis
Management Studies
November, 2003

Acknowledgements

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This work supports Department of Natural Resources Outcomes –
#2 Healthy Maryland watershed lands, streams, and non-tidal rivers.
#3 A natural resources stewardship ethic for Marylanders.
#4 Vibrant local communities in balance with natural systems.

Significant field collection assistance was provided by Jennifer Rusko Rebecca Zeiber, Matt Evans, and Kevin R. Coyne of MD Dept of Natural Resources, Watershed Services, Landscape and Watershed Analysis, Management Studies.

Cover photo: Collington Branch by Niles Primrose

Comments or questions about this report can be directed to :
Niles L. Primrose
MD Dept of Natural Resources
Watershed Services
Landscape and Watershed Analysis
Management Studies.

nprimrose@dnr.state.md.us
410-260-8804

## Executive Summary

A nutrient synoptic survey was conducted during April, 2003 in the Collington Branch, Northeast Branch, and Lottsford Branch watersheds as part of the Western Branch WRAS. Prince George's County personnel provided locations for 40 sampling sites within these three watersheds. Biological samples were requested from 24 of these sites. Nine sites were not sampled due to beaver or storm water control ponds (7), or map errors. Nitrate/nitrite concentrations were found to be baseline at all but one site. Nitrate/nitrite yields where baseline at all but two sites. Excessive concentration of orthophosphate where found in 2 subwatersheds, high concentrations in 1, moderate concentrations in 10, and the remainder below baseline. Orthophosphate yields were baseline throughout the watersheds. The elevated orthophosphate concentrations appear to be associated with systems that had fine suspended sediment loads lingering in the water column several days after rain events. No anomalies where found in the insitu measurements of dissolved oxygen and temperature. Specific conductivity and pH anomalies were found in 7 subwatersheds. Benthic macroinvertebrate communities at the eighteen sites sampled were poor to very poor. Fish communities at the four sites sampled would be considered poor. The degradation in the biotic community was attributed to degraded habitat associated with storm water flows.

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## Introduction

A nutrient synoptic survey was conducted during April, 2003 in the Collington Branch, Northeast Branch, and Lottsford Branch watersheds as part of the Western Branch WRAS

Nutrient synoptic sampling was scheduled for early spring to coincide with the period of maximum nitrogen concentrations in the free flowing fresh water streams. The major proportion of the nitrogen compounds are carried dissolved in the ground water rather than in surface runoff. The higher nitrogen concentrations in the late winter and early spring reflect the higher proportion of nitrogen rich shallow ground water present in the base flow at this time of year. Nitrogen concentrations are reduced in summer as the proportion of shallow ground water is reduced through plant uptake, and replaced by deeper ground water that may have lower nitrate concentrations, or has been denitrified through interaction with anoxic conditions in the soils below the streambed. Point sources can also contribute to in stream nitrate concentrations.

Orthophosphate is generally transported bound to suspended sediments in the water column. In stream orthophosphate concentrations can also be produced through mobilization of sediment bound phosphorus in anoxic water column and/or sediment conditions, sediment in surface runoff from areas having had surface applied phosphorus, ground water from phosphorus saturated soils, and point source discharges.

Ranges used for nutrient concentrations and yields (Table 1) were derived from work done by Frink (1991). The low end values are based on estimated nutrient exports from forested watersheds, and the high end values are based on estimated nutrient exports from intensively agricultural watersheds. As an additional benchmark, the Chesapeake Bay Program uses 1 mg/L total nitrogen as a threshold for indicating anthropogenic impact. The dissolved nitrogen fraction looked at in these synoptic surveys constitutes approximately 50% to 70% of the total nitrogen.

Table 1. Nutrient Ranges and Rating

| Rating | NO2+NO3 Concentration mg/L | NO2+NO3 Yield Kg/ha/day | PO4 Concentration mg/L | PO4 Yield Kg/ha/day |
|---|---|---|---|---|
| Baseline | <1 | <.01 | <.005 | <.0005 |
| Moderate | 1 to 3 | .01 to .02 | .005 to .01 | .0005 to .001 |
| High | 3 to 5 | .02 to .03 | .01 to .015 | .001 to .002 |
| Excessive | >5 | >.03 | >.015 | >.002 |

*A Note of Caution*

*Estimates of annual dissolved nitrogen loads/yields from spring samples will result in inflated load estimates, but the relative contributions of subwatersheds should remain reasonably stable. More accurate nitrate/nitrite load/yield estimates need to include sampling during the growing season to account for potential lower concentrations and discharges. Storm flows can also significantly impact loads delivered to a watershed outlet.*

*The tendency of orthophosphate to be transported bound to sediments makes any estimates of annual orthophosphate loads/yields derived from base flow conditions very conservative. More accurate estimates of orthophosphate loads/yields in a watershed must include samples from storm flows that carry the vast majority of the sediment load of a watershed. Residual suspended sediments from recent rains, or instream activities of livestock or construction can produce apparently elevated orthophosphate concentrations and yields at base flow.*

## METHODS

### *Water Chemistry Sampling*

Synoptic water chemistry samples were collected in early spring throughout the watershed. Sampling was halted for a minimum of 24 hours after rainfall events totaling more than .25 inches. Grab samples of whole water (500 ml) were collected just below the water surface at mid-stream and filtered using a 0.45 micron pore size (Gelman GF/C) filter. The samples were stored on ice and frozen on the day of collection. Filtered samples were analyzed by the Nutrient Analytical Services Laboratory at the University of Maryland's Chesapeake Biological Laboratory (CBL) for dissolved inorganic nitrogen ($NO_3$, $NO_2$), and dissolved inorganic phosphorus ($PO_4$). All analyses were conducted in accordance with U.S. Environmental Protection Agency (EPA) protocols. Stream discharge measurements were taken at the time of all water chemistry samples. Water temperature, dissolved oxygen, pH, and conductivity were measured in the field with a Hydrolab Surveyor II at selected sites at the time of water quality collections. Watershed areas used to calculate nutrient yields per unit area were determined from a digitized watershed map using Arcview software.

Where sites are nested in a watershed the mapped concentration data for the downstream site is shown only for the area between the sites. Yield calculations for a downstream site are based on the entire area upstream of the site, but are mapped showing just the area between sites. The downstream sites therefore illustrate the cumulative impact from all upstream activities.

### *Benthic Macroinvertebrate Sampling*

Aquatic macroinvertebrates were collected at the time of water chemistry samples during the spring to be within the MBSS spring index period. Macroinvertebrate collections were made over a $2m^2$ area of the best available habitat using a 0.3m wide dip net with a mesh size of 500 microns. The best available habitats include: gravel riffles, snags, submerged vegetation and root mats. Habitats were sampled in the proportion to their occurrence at the station. Samples were composited in a sieve bucket, fine sediments washed out, and large debris rinsed and discarded. The remaining sample was preserved in 70% ethanol and returned to the laboratory for subsampling. Subsampling was done using a gridded tray. Grids were chosen at random until the grid with the 100th organism had been completed. Organisms were identified to genus, recorded on a bench sheet, and archived for future reference. Insitu water quality data (dissolved oxygen, pH, conductivity, temperature) were collected during each sampling episode with a Hydrolab Surveyor II. A macroinvertebrate index of biotic integrity (IBI)(MD DNR, 1998) was calculated to facilitate ranking of site quality.

### *Fish Sampling*

Fish were sampled during the summer to coincide with the MBSS index period for fish sampling. Backpack electroshockers were used for two passes through a 75 meter reach of stream with block nets at each end of the reach. All species were enumerated and weighed to obtain taxa richness and biomass estimates.

## Results

The Collington Branch, Northeast Branch, and Lottsford Branch watersheds in Prince George's County were delineated into 40 subwatersheds based on the sampling site locations provided by the county. Station locations are noted in Table 2, and subwatersheds are shown in Figure 1. Grab samples for dissolved nutrient analysis were collected at 31 of these sites. Nine of the 40 sites identified were not sampled due to beaver or storm water control ponds (7), or map errors (2). Benthic samples were collected at a subset of 18 sites and fish at 4 sites.

Nutrient concentrations and yields from the Collington Branch, Northeast Branch, and Lottsford Branch watersheds are shown in Table 3. Nitrate/nitrite concentrations were found to be baseline at all but one of the 31 sites sampled. The one site with a moderate nitrate/nitrite concentration was located in the headwaters of Lottsford Branch (Figure 2). Nitrate/nitrite yields where baseline at all but two sites. The two subwatersheds with moderate nitrate/nitrite yields were the one with the elevated nitrate/nitrite concentration noted above, and the one immediately downstream (Figure 3). Excessive concentration of orthophosphate where found in 2 subwatersheds, high concentrations in 1, moderate concentrations in 10, with the remainder below baseline (Figure 4). Orthophosphate yields were baseline throughout the watersheds (Figure 5). No anomalies where found in the insitu measurements of dissolved oxygen and temperature. Specific conductivity and pH anomalies were found in 7 subwatershed (Table 4, Figures 6 & 7). Benthic macroinvertebrate communities at the eighteen sites sampled were poor to very poor (Table 5. Fish communities at the four sites sampled would be considered poor (Table 6).

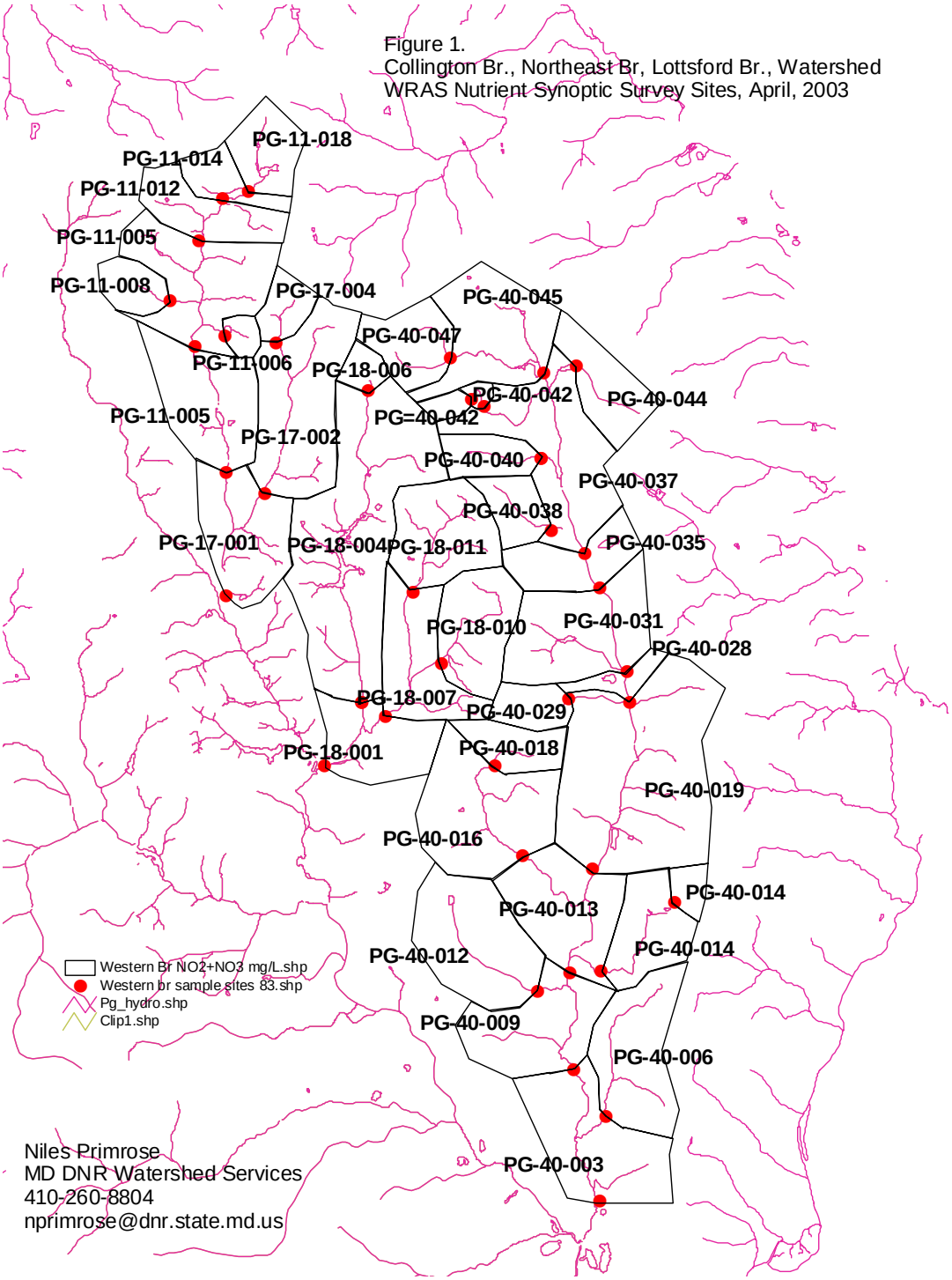
## Discussion

The predominance of low nutrient concentrations and yields within the three watersheds sampled is typical of urban/suburban watersheds that have been sampled for other WRAS projects (Table 7). The subwatershed in the headwaters of Lottsford Branch with the moderate nitrate/nitrite concentration and yield has a number of large (10 acre+) lots that may contain small agricultural operations. The continuation of the moderate nitrate/nitrite yield in the subwatershed directly downstream of the one mentioned above may be associated with the sod farm within this subwatershed. As noted previously, orthophosphate tends to travel bound to sediment. The two subwatersheds with excessive and one with high orthophosphate concentrations were at or near the watershed outlet indicating that the sediment sources are probably localized in these subwatersheds. The high spring rainfall produced almost continuous discharges of muddy water from the large number of storm water and/or beaver ponds within these subwatersheds. These discharges are a significant contributing factor to extended periods of turbid water during

**Table 2. Collington Branch, Northeast Branch, and Lottsford Branch Watersheds WRAS, April 2003**
**Station Location**

| STATIONID | STREAM | LATITUDE | LONGITUDE | NOTES |
|---|---|---|---|---|
| 11-005A | Folly Bra | 38.94491 | -76.81925 | was recent beaver pond |
| 11-005C | Folly Bra | 38.96516 | -76.82563 | beaver pond |
| 11-006 | UT to Fol | 38.96708 | -76.81947 | no sample beaver pond |
| 11-008 | UT to Fol | 38.97272 | -76.83100 | |
| 11-012 | Folly Bra | 38.98231 | -76.82453 | no sample beaver pond |
| 11-014 | Folly Bra | 38.98908 | -76.81947 | no sample beaver pond |
| 11-018 | Folly Bra | 38.99036 | -76.81465 | |
| 17-001 | Lottsford | 38.92499 | -76.81934 | |
| 17-002A | Lottsford | 38.94138 | -76.81139 | |
| 17-004 | Lottsford | 38.96594 | -76.80939 | |
| 18-001 | Northeast | 38.89733 | -76.79907 | |
| 18-004 | Northeast | 38.90764 | -76.79125 | |
| 18-006 | Northeast | 38.95806 | -76.78992 | |
| 18-007 | UT to Nor | 38.90535 | -76.78659 | |
| 18-010 | UT to Nor | 38.91403 | -76.77478 | |
| 18-011 | UT to Nor | 38.92589 | -76.78056 | beaver dam below obstructing flow |
| 40-003 | Collingto | 38.82671 | -76.74243 | |
| 40-006 | East Bran | 38.84049 | -76.74117 | no sample construction site |
| 40-009 | Collingto | 38.84811 | -76.74783 | |
| 40-012 | UT to Col | 38.86072 | -76.75507 | very heavy filamentous, turbid |
| 40-013 | Collingto | 38.86377 | -76.74859 | |
| 40-014 | UT to Col | 38.86402 | -76.74199 | |
| 40-014C | UT to Col | 38.87504 | -76.72679 | no sample sediment pond |
| 40-016 | Black Bra | 38.88275 | -76.75811 | |
| 40-018 | Black Bra | 38.89731 | -76.76385 | |
| 40-019 | Collingto | 38.88044 | -76.74384 | |
| 40-028 | Collingto | 38.89869 | -76.73518 | |
| 40-029 | Collingto | 38.90744 | -76.73588 | |
| 40-031 | Collingto | 38.91249 | -76.73655 | |
| 40-035 | Collingto | 38.92591 | -76.74200 | |
| 40-037 | Collingto | 38.93155 | -76.74505 | |
| 40-038 | UT to Col | 38.93532 | -76.75208 | no sample beaver pond |
| 40-040 | UT to Col | 38.94697 | -76.75417 | same stream braided channel |
| 40-042A | UT to Col | 38.95540 | -76.76582 | |
| 40-042B | UT to Col | 38.95672 | -76.76853 | no sample no stream |
| 40-044 | UT to Col | 38.96209 | -76.74682 | |
| 40-045 | Collingto | 38.96090 | -76.75351 | no sample beaver pond |
| 40-047 | Collingto | 38.96326 | -76.77282 | |

Figure 1.
Collington Br., Northeast Br, Lottsford Br., Watershed
WRAS Nutrient Synoptic Survey Sites, April, 2003




Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

**Table 3. Collington Branch, Northeast Branch, and Lottsford Branch Watersheds WRAS, April 2003**

**Nutrient Synoptic Survey Results**

| DATE | SAMPLE SITE | Watershed Area Hectares | L/sec discharge | PO4 mg/L | NO2+NO33 mg/L | PO4 yield KG/H/day | NO2+NO33 yield KG/H/day |
|---|---|---|---|---|---|---|---|
| 04/14/03 | PG-11-005A | 1383 | 651 | 0.005 | 0.04 | 0.000203 | 0.001628 |
| | PG-11-005C | 1032 | 11 | | | 0.000000 | 0.000000 |
| | PG-11-006 | 42 | | | | 0.000000 | 0.000000 |
| 04/14/03 | PG-11-008 | 100 | 15 | 0.003 | 0.54 | 0.000039 | 0.006998 |
| | PG-11-012 | | | | | 0.000000 | 0.000000 |
| | PG-11-014 | 273 | | | | 0.000000 | 0.000000 |
| 04/14/03 | PG-11-018 | 166 | 25 | 0.005 | 0.10 | 0.000066 | 0.001323 |
| 04/14/03 | PG-17-001 | 2269 | 687 | 0.003 | 0.17 | 0.000079 | 0.004448 |
| 04/14/03 | PG-17-002A | 563 | 192 | 0.003 | 0.39 | 0.000089 | 0.011519 |
| 04/14/03 | PG-17-004 | 92 | 14 | 0.003 | 1.23 | 0.000040 | 0.016381 |
| 04/04/03 | PG-18-001 | 2100 | 239 | 0.018 | 0.41 | 0.000177 | 0.004037 |
| 04/04/03 | PG-18-004 | 963 | 85 | 0.002 | 0.59 | 0.000015 | 0.004495 |
| 04/04/03 | PG-18-006 | 54 | 2 | 0.002 | 0.06 | 0.000008 | 0.000227 |
| 04/04/03 | PG-18-007 | 881 | 100 | 0.002 | 0.24 | 0.000020 | 0.002360 |
| 04/16/03 | PG-18-010 | 275 | 31 | 0.003 | 0.01 | 0.000029 | 0.000098 |
| 04/04/03 | PG-18-011 | 311 | 85 | 0.002 | 0.06 | 0.000047 | 0.001418 |
| 04/03/03 | PG-40-003 | 6000 | 735 | 0.007 | 0.20 | 0.000074 | 0.002117 |
| | PG-40-006 | | | | | 0.000000 | 0.000000 |
| 04/16/03 | PG-40-009 | 5215 | 577 | 0.013 | 0.08 | 0.000124 | 0.000765 |
| 04/16/03 | PG-40-012 | 412 | 72 | 0.005 | 0.31 | 0.000076 | 0.004711 |
| 04/16/03 | PG-40-013 | 4458 | 486 | 0.008 | 0.09 | 0.000075 | 0.000848 |
| 04/16/03 | PG-40-014 | 282 | 19 | 0.006 | 0.23 | 0.000036 | 0.001363 |
| | PG-40-014C | 54 | | | | 0.000000 | 0.000000 |
| 04/04/03 | PG-40-016 | 606 | 56 | 0.023 | 0.09 | 0.000184 | 0.000720 |
| 04/16/03 | PG-40-018 | 138 | 5 | 0.003 | 0.04 | 0.000010 | 0.000134 |
| 04/16/03 | PG-40-019 | 3209 | 359 | 0.007 | 0.12 | 0.000068 | 0.001161 |
| 04/16/03 | PG-40-028 | 2208 | 188 | 0.005 | 0.04 | 0.000037 | 0.000294 |
| 04/04/03 | PG-40-029 | 104 | 19 | 0.005 | 0.26 | 0.000079 | 0.004093 |
| 04/16/03 | PG-40-031 | 2145 | 193 | 0.004 | 0.03 | 0.000031 | 0.000234 |
| 04/14/03 | PG-40-035 | 1732 | 233 | 0.003 | 0.08 | 0.000035 | 0.000930 |
| 04/14/03 | PG-40-037 | 1532 | 159 | 0.004 | 0.05 | 0.000036 | 0.000449 |
| | PG-40-038 | 119 | | | | 0.000000 | 0.000000 |
| 04/17/03 | PG-40-040/41 | 120 | 9 | 0.003 | 0.23 | 0.000019 | 0.001487 |
| 04/17/03 | PG-40-042A | 52 | 4 | 0.008 | 0.43 | 0.000052 | 0.002794 |
| | PG=40-042B | 33 | | | | 0.000000 | 0.000000 |
| 04/17/03 | PG-40-044 | 203 | 5 | 0.003 | 0.52 | 0.000007 | 0.001173 |
| | PG-40-045 | 561 | | | | 0.000000 | 0.000000 |
| 04/04/03 | PG-40-047 | 187 | 6 | 0.005 | 0.01 | 0.000013 | 0.000026 |

baseflow conditions, thus producing elevated orthophosphate concentrations. As noted in the results, all orthophosphate yields were below baseline.

The six subwatersheds with elevated specific conductivity appear to be associated with intense development. Residual road salt in shoulder and median soils from the preceding winter in these areas of intense road networks could be a significant contributor to the elevated specific conductivity. The specific conductivities found during this sampling episode would not necessarily be considered detrimental to the stream biota. The concern would be that, if road salts are the source, at peak application rates and times the salt content of the receiving streams could reach detrimental levels in portions of the watershed.

The low pH values found in four subwatersheds are most likely associated with the underlying geology of the area. Several streams in the adjacent watershed of Mill Branch in Bowie drain acidic soils exposed during construction activities resulting in stream pH values of less than 4. The same acidic soil strata may have been exposed in the Collington Branch subwatersheds through construction activities or stream channel erosion. While the 5.5 to 6.5 pH values noted in these subwatersheds are not significantly detrimental to the biota, they make the stream much more susceptible to periodic significant reductions in pH due to acidic precipitation that would be detrimental to the stream biota.

The overall poor condition of the biotic community was attributed to the prevalence of degraded habitat throughout the watersheds associated with storm water flows.

## Conclusion

Dissolved nutrients in the Collington Branch, Northeast Branch, and Lottsford Branch watersheds are not considered significant from the information collected during this synoptic survey. This is consistent with other urban/suburban watersheds sampled for WRAS projects. The elevated specific conductivity found in high density road areas indicates a significant potential for impact to stream biota from road salt applications. The overwhelming presence of degraded instream habitat due to storm water flows has the most significant impact on the quality of the stream biota.

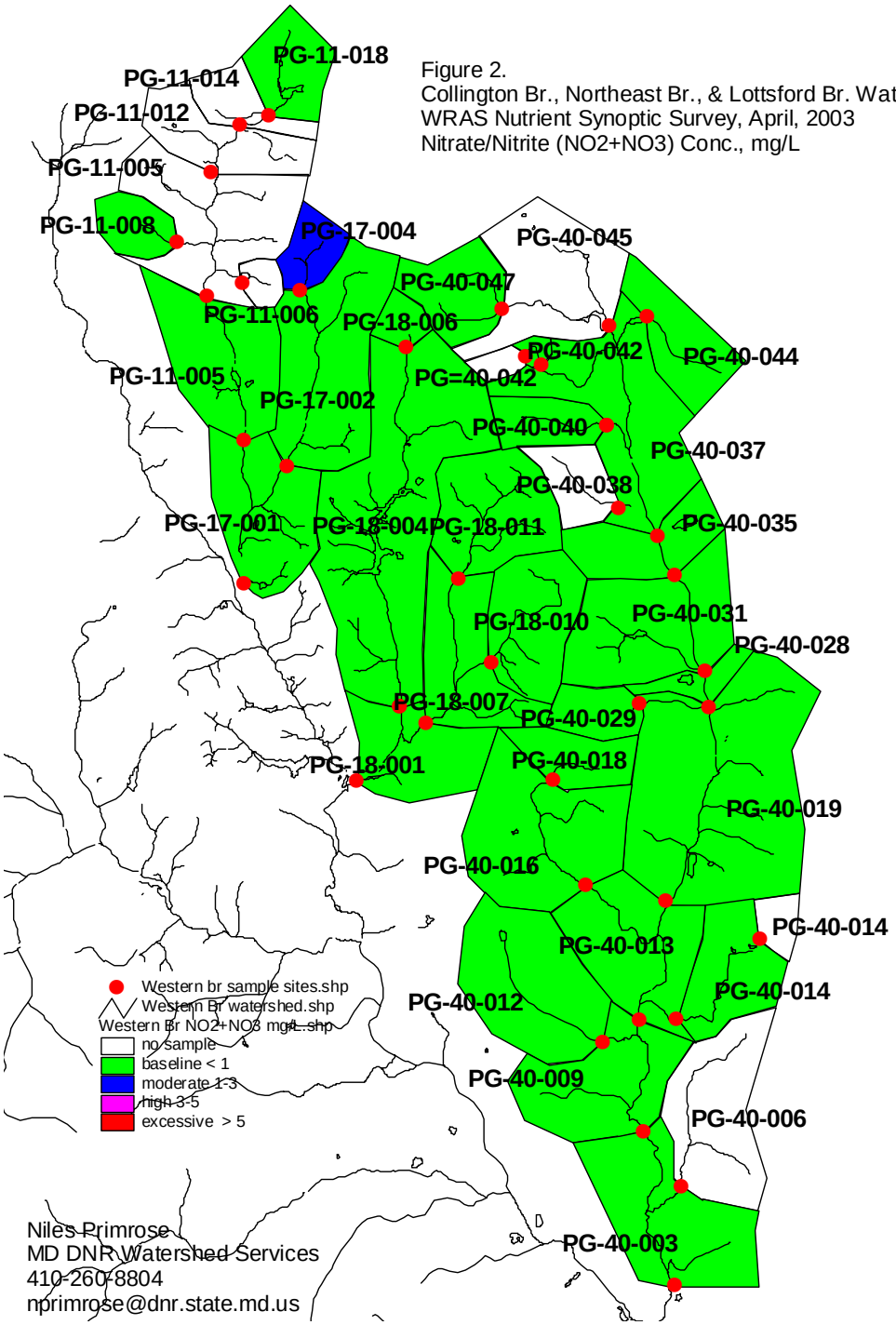



Figure 2.
Collington Br., Northeast Br., & Lottsford Br. Watersheds
WRAS Nutrient Synoptic Survey, April, 2003
Nitrate/Nitrite (NO2+NO3) Conc., mg/L

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

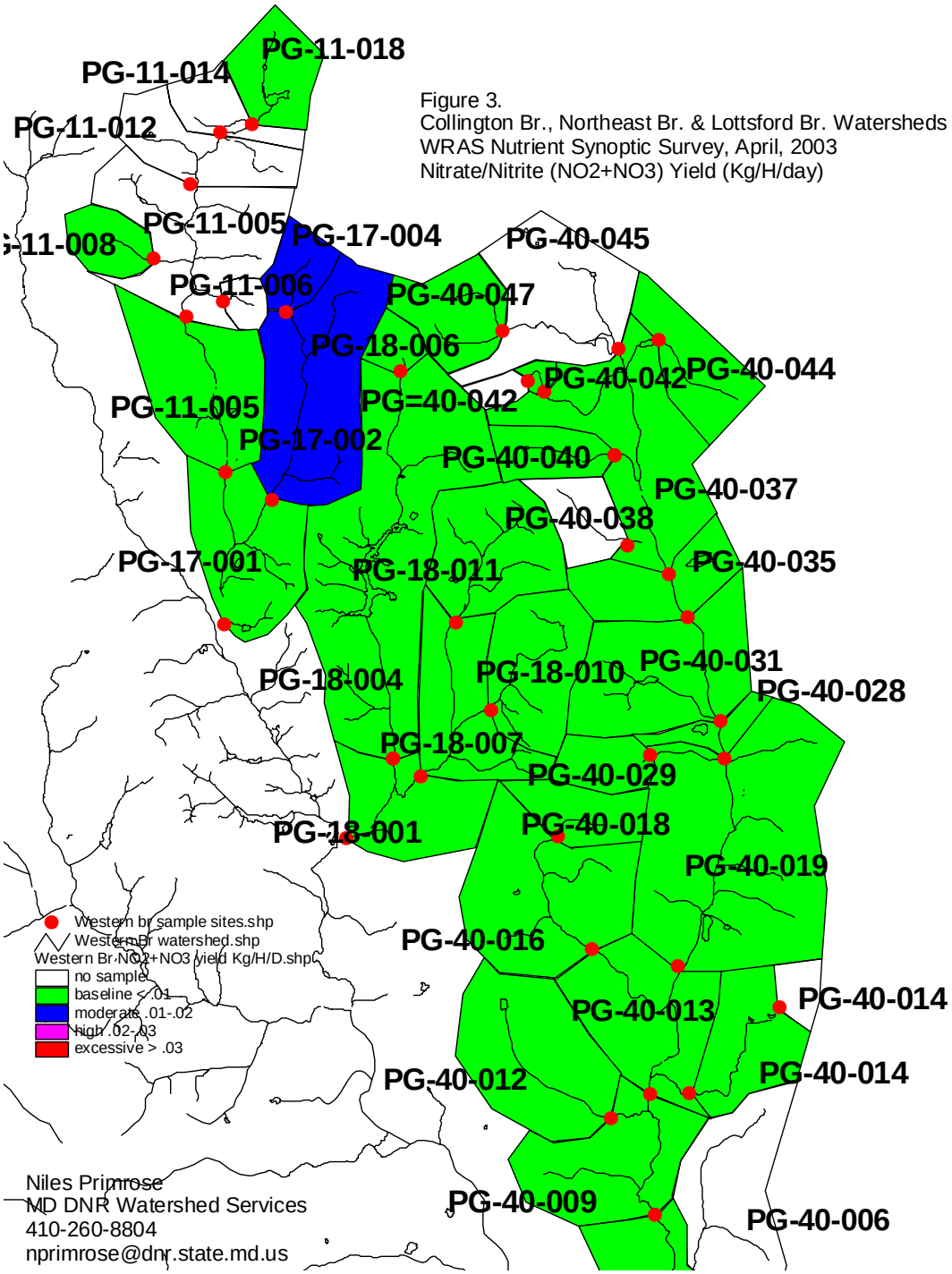



Figure 3.
Collington Br., Northeast Br. & Lottsford Br. Watersheds
WRAS Nutrient Synoptic Survey, April, 2003
Nitrate/Nitrite (NO2+NO3) Yield (Kg/H/day)

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

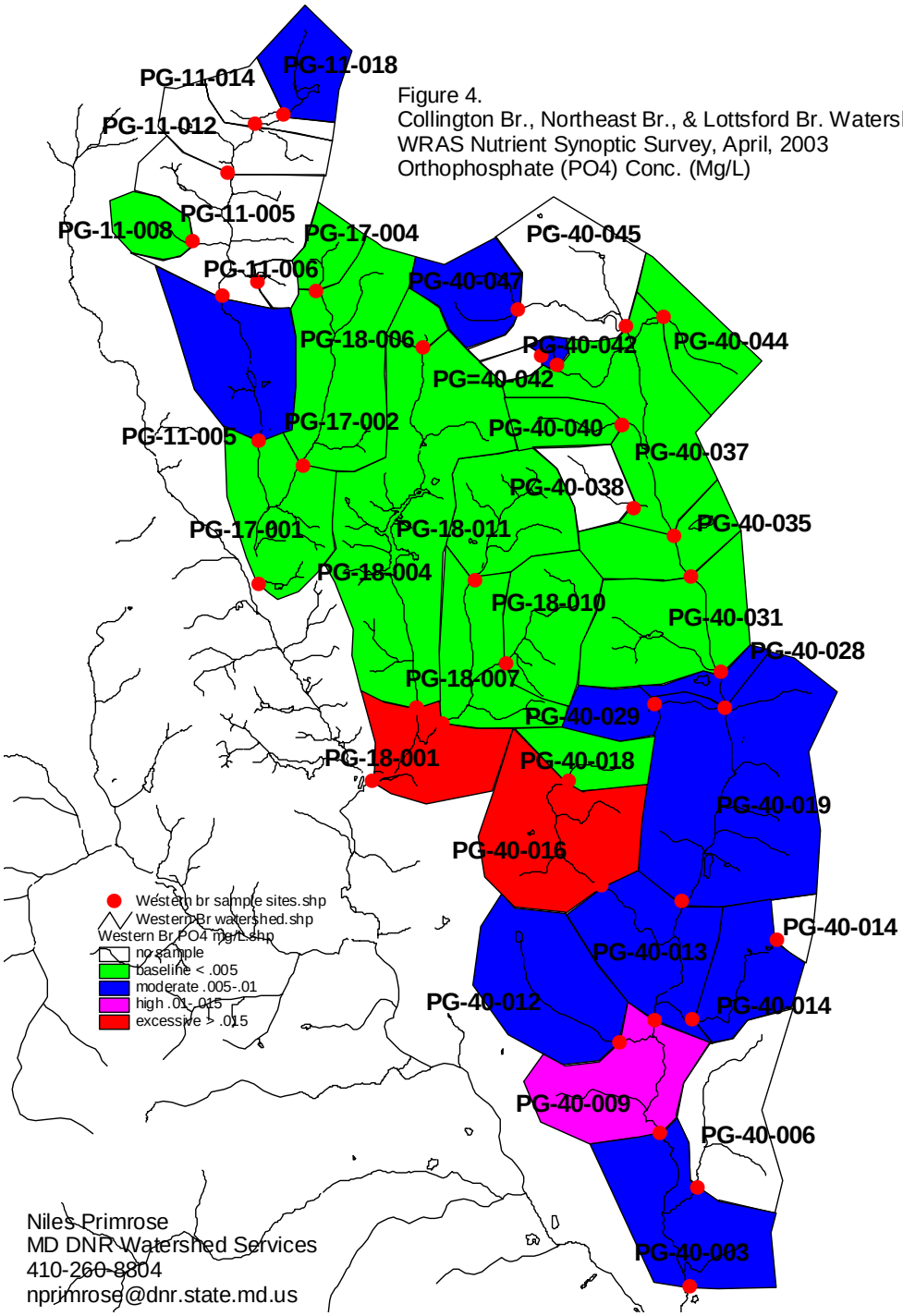



Figure 4.
Collington Br., Northeast Br., & Lottsford Br. Watersheds
WRAS Nutrient Synoptic Survey, April, 2003
Orthophosphate (PO4) Conc. (Mg/L)

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

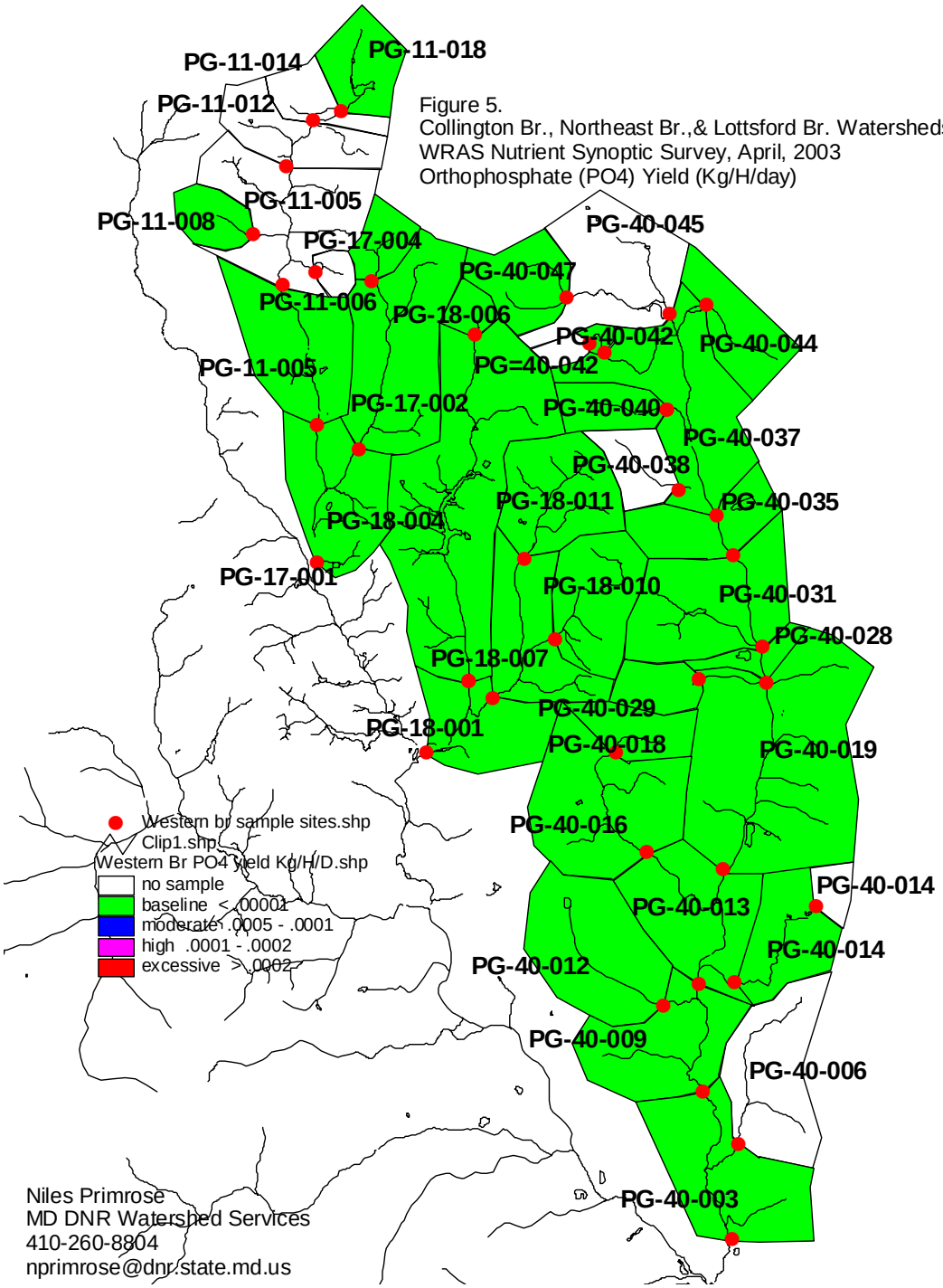



Figure 5.
Collington Br., Northeast Br.,& Lottsford Br. Watersheds
WRAS Nutrient Synoptic Survey, April, 2003
Orthophosphate (PO4) Yield (Kg/H/day)

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

**Table 4. Collington Branch, Northeast Branch, and Lottsford Branch Watersheds WRAS, April 2003**

**Insitu Water Quality Parameters**

| DATE | SAMPLE SITE | time | temp | pH | DO | Cond |
|---|---|---|---|---|---|---|
| 04/14/03 | PG-11-005A | 945 | 13.25 | 7.36 | 11.12 | 324 |
| | PG-11-005C | 1315 | 14.46 | 6.9 | 10.4 | 268 |
| | PG-11-006 | | | | | |
| 04/14/03 | PG-11-008 | | | | | |
| | PG-11-012 | | | | | |
| | PG-11-014 | | | | | |
| 04/14/03 | PG-11-018 | 1130 | 14.85 | 7.24 | 13.62 | 263 |
| 04/14/03 | PG-17-001 | 900 | 12.92 | 7.32 | 10.52 | 330 |
| 04/14/03 | PG-17-002A | 1040 | 13.5 | 6.96 | 11.56 | 320 |
| 04/14/03 | PG-17-004 | 1150 | 15.7 | 6.59 | 8.8 | 192 |
| 04/04/03 | PG-18-001 | 945 | 11.87 | 6.91 | 10.82 | 262 |
| 04/04/03 | PG-18-004 | 845 | 12.3 | 6.9 | 10.4 | 298 |
| 04/04/03 | PG-18-006 | 1100 | 11.07 | 6.98 | 10.87 | 232 |
| 04/04/03 | PG-18-007 | 915 | 11.3 | 6.85 | 10.4 | 169 |
| 04/16/03 | PG-18-010 | 1500 | 22.04 | 6.62 | 7.61 | 165 |
| 04/04/03 | PG-18-011 | 800 | 10.7 | 6.8 | 9.5 | 162 |
| 04/03/03 | PG-40-003 | 1426 | 17.86 | 7.04 | 10.35 | 277 |
| | PG-40-006 | | | | | |
| 04/16/03 | PG-40-009 | 1415 | 18.13 | 7.53 | 10.73 | 247 |
| 04/16/03 | PG-40-012 | 1250 | 19.29 | 7.9 | 13.3 | 339 |
| 04/16/03 | PG-40-013 | 1100 | 16.4 | 6.97 | 11.02 | 229 |
| 04/16/03 | PG-40-014 | 1145 | 17.68 | 7.07 | 11.78 | 247 |
| | PG-40-014C | | | | | |
| 04/04/03 | PG-40-016 | 1305 | 10.7 | 7.21 | 12.16 | 223 |
| 04/16/03 | PG-40-018 | 1530 | 17.7 | 6.47 | 9.59 | 297 |
| 04/16/03 | PG-40-019 | 958 | 15.68 | 6.8 | 10.85 | 244 |
| 04/16/03 | PG-40-028 | 1545 | 20.9 | 6.7 | 10.16 | 244 |
| 04/04/03 | PG-40-029 | 1245 | 11.7 | 6.89 | 10.27 | 241 |
| 04/16/03 | PG-40-031 | 1600 | 20.2 | 6.72 | 9.98 | 243 |
| 04/14/03 | PG-40-035 | 1400 | 14.9 | 6.76 | 11.12 | 247 |
| 04/14/03 | PG-40-037 | 1425 | 18.34 | 6.7 | 11.54 | 252 |
| | PG-40-038 | | | | | |
| 04/17/03 | PG-40-040/41 | 1130 | 13.2 | 6.18 | 11.09 | 485 |
| 04/17/03 | PG-40-042A | 945 | 12.02 | 6.17 | 9.89 | 188 |
| | PG=40-042B | | | | | |
| 04/17/03 | PG-40-044 | 830 | 11.48 | 5.91 | 8.33 | 474 |
| | PG-40-045 | | | | | |
| 04/04/03 | PG-40-047 | 1200 | 11.9 | 7.1 | 8.9 | 156 |

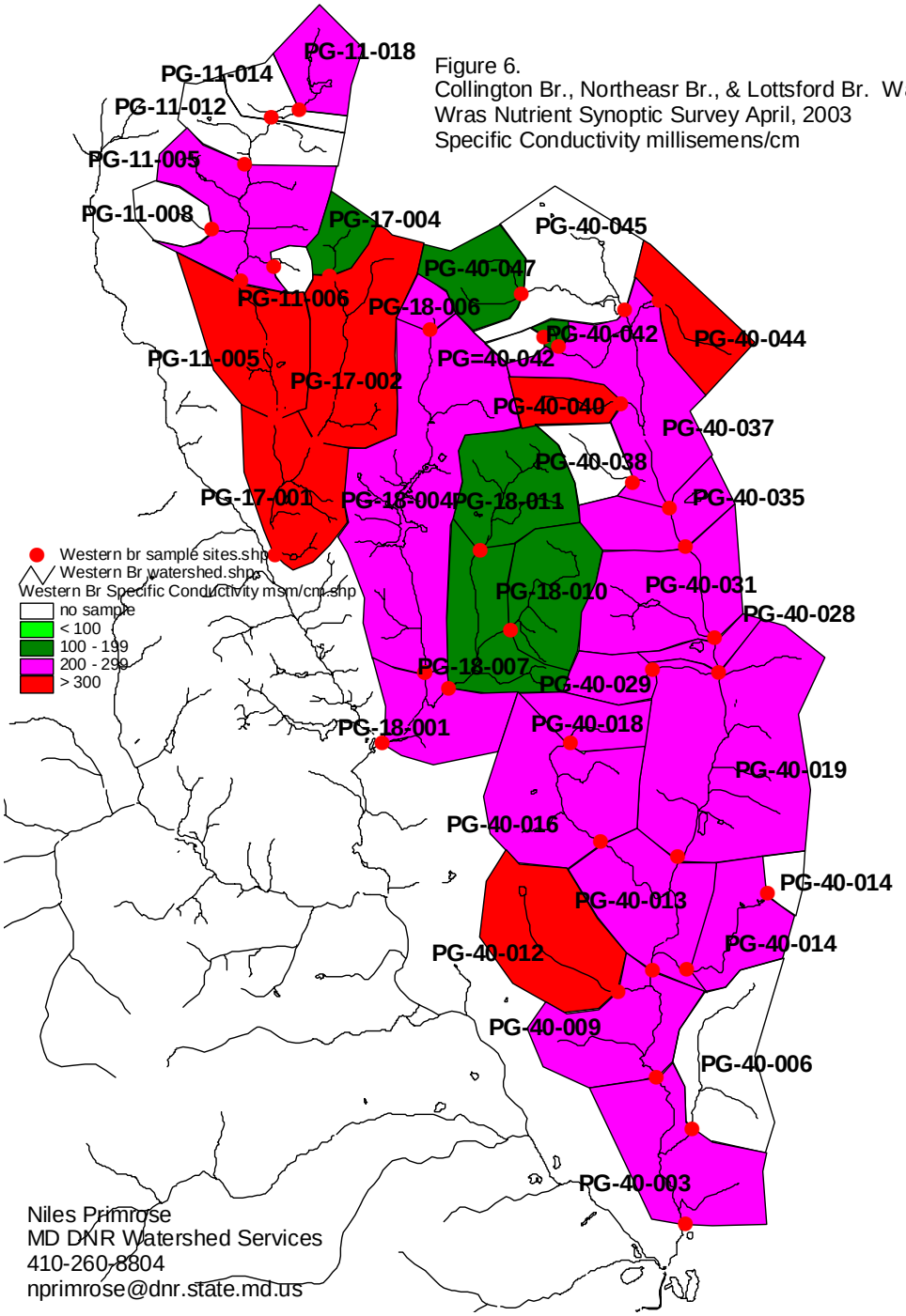



Figure 6.
Collington Br., Northeasr Br., & Lottsford Br. Watersheds
Wras Nutrient Synoptic Survey April, 2003
Specific Conductivity millisemens/cm

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

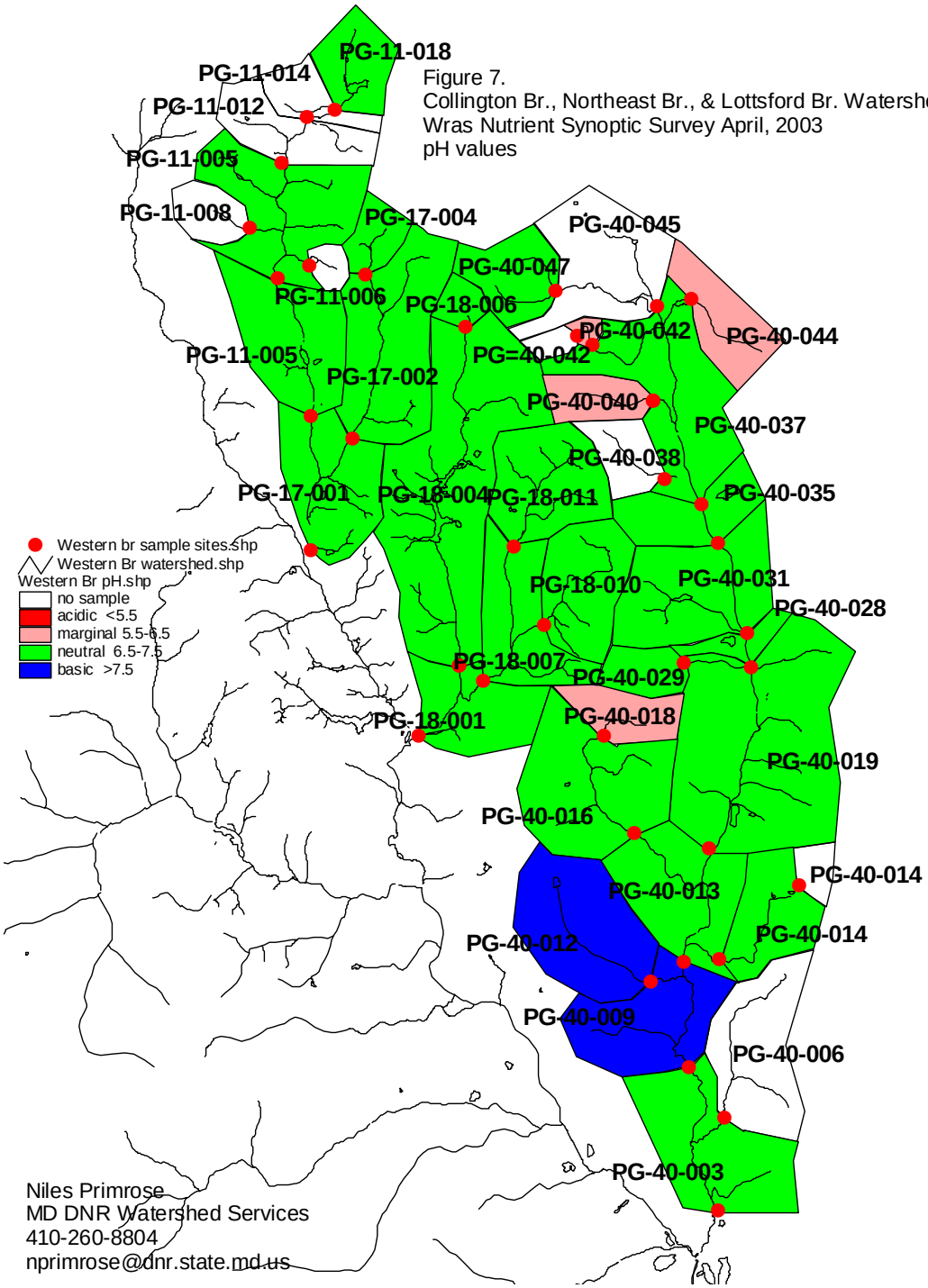



Figure 7.
Collington Br., Northeast Br., & Lottsford Br. Watersheds
Wras Nutrient Synoptic Survey April, 2003
pH values

Niles Primrose
MD DNR Watershed Services
410-260-8804
nprimrose@dnr.state.md.us

**Table 5. Collington Br., Northest Br., Lottsford Br. WRAS Synoptic Survey, April 2003**
**Macroinvertebrate Index of Biotic Integrity**

| Station | # of Taxa | # of EPT | % Ephemoptera | % Tanytarsini of Chironomids | Becks Index | # of Scrapers | % Clingers | IBI Calc*** | IBI Score |
|---|---|---|---|---|---|---|---|---|---|
| 11-005A | 9/1 | 0/1 | 0/1 | 0/1 | 0/1 | 2/3 | 1/1 | 9/7 | 1.3 |
| 17-001 | 17/3 | 1/1 | 0/1 | 0/1 | 1/1 | 3/3 | 0/1 | 11/7 | 1.6 |
| 17-002A | 8/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 7/7 | 1 |
| 17-004 | 10/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 7/7 | 1 |
| 18-001 | 13/3 | 1/1 | 0/1 | 8/3 | 1/1 | 1/3 | 0/1 | 13/7 | 1.9 |
| 18-006 | 10/1 | 0/1 | 0/1 | 6/3 | 0/1 | 0/1 | 0/1 | 9/7 | 1.3 |
| 18-007 | 18/3 | 2/1 | 0/1 | 0/1 | 2/1 | 3/3 | 0/1 | 11/7 | 1.6 |
| 18-010 | 8/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 1/1 | 7/7 | 1 |
| 18-011 | 21/3 | 1/1 | 2/3 | 8/3 | 1/1 | 0/1 | 0/1 | 13/7 | 1.9 |
| 40-009 | 15/3 | 2/1 | 2/3 | 0/1 | 2/1 | 1/3 | 2/1 | 15/7 | 1.9 |
| 40-012 | 15/3 | 3/3 | 1/1 | 0/1 | 3/1 | 2/3 | 0/1 | 13/7 | 1.9 |
| 40-013 | 20/3 | 4/3 | 1/1 | 0/1 | 6/3 | 2/3 | 6.1 | 17/7 | 2.1 |
| 40-014 | 14/3 | 2/1 | 1/1 | 0/1 | 2/1 | 2/3 | 4/1 | 11/7 | 1.6 |
| 40-016 | 14/3 | 3/3 | 0/1 | 0/1 | 2/1 | 1/3 | 2/1 | 13/7 | 1.9 |
| 40-019 | 12/3 | 2/1 | 7/3 | 1/3 | 2/1 | 1/3 | 0/1 | 15/7 | 2.1 |
| 40-040/41 | 11/3 | 1/1 | 0/1 | 0/1 | 1/1 | 0/1 | 0/1 | 9/7 | 1.3 |
| 40-044 | 5/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 7/7 | 1 |
| 40-047 | 7/1 | 2/1 | 0/1 | 6/1 | 2/1 | 0/1 | 5/1 | 7/7 | 1 |

**Table 6. Collington Br., Northeast Br., & Lottsford Br Watersheds**
**WRAS Fish Sampling, September, 2003**
**Species totals by site**

| Common name | Genus | species | PG18010 | PG18006 | PG17004 |
|---|---|---|---|---|---|
| Leastbrook lamprey | *Lampetra* | *aepyptera* | 1 | - | - |
| Goldfish | *Carassius* | *auratus* | - | 4 | - |
| Blacknose dace | *Rhinichthys* | *atratulus* | 1 | - | - |
| Creek Chubsucker | *Erimyzon* | *oblongus* | 5 | - | 1 |
| Redfin Pickerel | *Esox* | *americanus* | 6 | - | 1 |
| Pirate perch | *Aphredoderus* | *sayanus* | 1 | - | - |
| Eastern mudminnow | *Umbra* | *pygmaea* | 6 | 62 | 19 |
| Yellow bullhead | *Amerius* | *natalis* | - | - | 4 |
| Pumpkinseed | *Lepomis* | *gibbosus* | - | - | 1 |
| Tessellated Darter | *Etheostoma* | *olmstedi* | 48 | - | - |

**Table 7. Annual & Spring Nutrient Concentration Averages from Other Nutrient Synoptic Surveys**

| Mg/L | Piney | German Br. | Pocomoke | **Lower Patuxent** | Western Branch | Upper Patuxent | Choptank | Liberty |
|---|---|---|---|---|---|---|---|---|
| **NO2+NO3 Spring** | 3.742 | 3.832 | 3.734 | **.75** | 0.214 | 0.439 | 2.892 | 3.410 |
| **NO2+NO3 Annual** | 4.823 | 4.704 | 2.384 | | | | | |
| **PO4 Spring** | 0.800 | 0.043 | 0.028 | **0.007** | 0.005 | 0.012 | 0.023 | 0.004 |
| **PO4 Annual** | 1.177 | 0.067 | 0.022 | | | | | |

Literature Cited

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