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**National Coastal Assessment Program 2003 Assessing Virginia's Estuaries and Tidal Tributaries to Chesapeake Bay and the Atlantic Ocean July through September 2003**

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**National Coastal Assessment Program 2003**  
**Assessing Virginia's Estuaries and Tidal Tributaries to**  
**Chesapeake Bay and the Atlantic Ocean**  
**July through September 2003**

**VA DEQ Contract No. 9293**

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Submitted to:

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## **INTRODUCTION**

The Virginia Institute of Marine Science (VIMS) participated in the Environmental Protection Agency's (EPA) National Coastal Assessment (NCA) in 2003. As in the previous three years, the Virginia Department of Environmental Quality (DEQ) through EPA grant funds contracted VIMS to collect fish at pre-determined stations. Data on invertebrate community structure and bottom habitat were collected also. VIMS' responsibilities included collection, documentation and verification of all data and the storage of samples for future delivery to DEQ.

## **METHODS**

From Mid-July through Mid-September 2003, VIMS sampled 51 randomly selected stations received from DEQ (Figure 1 and Table 1). These stations were located in tributaries of lower Chesapeake Bay and in the seaside coastal lagoon system (Figure 1 and Table 2). At each station, at least one trawl was conducted using a standard otter trawl (dimensions: 16' headrope, 1.5" stretch bar body, 0.75" stretch bar cod-end, 0.25" cod-end liner, 75' rope bridle), at speeds between 1.0 knots and 3.0 knots for 5 minutes as is employed by various VIMS monitoring surveys. Beginning and ending latitudinal and longitudinal coordinates were recorded at each station, along with beginning and ending time, compass heading, depth, scope, speed over ground, tidal stage, tow direction relative to stream (upstream or downstream), tow direction relative to current (with, against, perpendicular, oblique with, oblique against, or slack), air temperature, observed weather, and sea state (wave height). Hydrographic data were taken using a YSI 85 Dissolved Oxygen/Salinity/Conductivity Meter. Water temperature, salinity, and dissolved oxygen were recorded at the surface and on the bottom. Secchi Disk measurements, wind speed and wind direction were also recorded at this time. Fish samples were collected from the first five minute tow at each location. A second tow was conducted if fish samples from the first haul were not adequate for tissue chemistry analyses. Only target species and fish that exhibited abnormalities were collected from the replicate tow. At each site, all fish were identified to species and at least thirty specimens (when applicable), were measured to the nearest millimeter using the appropriate meristic character (Table 3). Invertebrates were measured, counted, or recorded based on VIMS Trawl Survey criteria (Table 4). In some cases, invertebrates of a particular taxon were grouped (e.g., mud crabs). Abundance of submerged aquatic vegetation, algal mats, and other types of habitat were measured on a qualitative basis (Table 5).

At each site five to ten individuals of all target species (Atlantic croaker, hogchoker, spot, summer flounder and white perch) were collected for chemistry tissue analyses. In some instances, ten to twenty hogchoker specimens were collected per site due to their small size. The fish were first measured and recorded as fish for chemical analyses. These were then rinsed with site water and individually wrapped in heavy-duty aluminum foil. All specimens of each target species were labeled, bagged and stored on ice in the field then transferred to freezers for later transport to DEQ. Examinations were performed on all fish for external gross abnormalities. Fish exhibiting any symptoms were preserved in Dietrich's solution. An incision was made in the abdominal cavity of the abnormal fish to ensure proper preservation for future pathological and histological examination.

## **RESULTS**

Sampling was conducted over 14 days between July 21, 2003 and August 29, 2003. A total of 86 trawls were made (51 for community structure and 35 for additional chemistry fish) (Table 6). A total of 6,040 specimens were processed (Table 7). Seventy species (46 fish and 24 invertebrates) were captured from the community structure trawls (Tables 8- 19). Four hundred ninety seven specimens were collected and frozen for tissue chemistry analyses ( 42 Atlantic croaker , 142 hogchoker, 198 spot, 44 summer flounder, and 71 white perch) (Table 20). One spot and one Atlantic menhaden were observed with abnormalities and thus collected for pathological and histological analyses (Table 20).

## **ACKNOWLEDGEMENTS**

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Table 1. NCA 2003 site locations and station information.

| River | Station Identifiers |          |              | Time | Gear Code | Location  |         |         |         | Tow Parameters |          |       |
|-------|---------------------|----------|--------------|------|-----------|-----------|---------|---------|---------|----------------|----------|-------|
|       | VIMS                | DEQ      | EPA          |      |           | Beginning |         | Ending  |         | Duration       | Distance | Depth |
|       |                     |          |              |      |           | Lat.      | Lon.    | Lat.    | Lon.    | (min)          | (m)      | (m)   |
| AC    | 0003                | VA03-003 | VA03003TWL01 | 1135 | 035       | 3717.37   | 7553.76 | 3717.41 | 7553.88 | 5              | 196.8    | 4.6   |
| AC    | 9003                | VA03-003 | VA03003TWL02 | 1155 | 035       | 3717.47   | 7553.99 | 3717.37 | 7553.80 | 5              | 343      | 3.4   |
| AC    | 0012                | VA03-012 | VA03012TWL01 | 1233 | 035       | 3717.89   | 7550.30 | 3717.88 | 7550.42 | 5              | 183.2    | 5.2   |
| AC    | 9012                | VA03-012 | VA03012TWL02 | 1256 | 035       | 3717.88   | 7550.65 | 3717.87 | 7550.44 | 5              | 319.5    | 4.3   |
| AS    | 0007                | VA03-007 | VA03007TWL01 | 1430 | 035       | 3756.45   | 7519.19 | 3756.49 | 7519.08 | 5              | 182.8    | 1.5   |
| AS    | 9007                | VA03-007 | VA03007TWL02 | 1450 | 035       | 3756.45   | 7519.17 | 3756.38 | 7519.33 | 5              | 275.5    | 1.5   |
| CH    | 0005                | VA03-005 | VA03005TWL01 | 1220 | 035       | 3757.73   | 7522.14 | 3757.63 | 7522.23 | 5              | 230.3    | 1.8   |
| CH    | 9005                | VA03-005 | VA03005TWL02 | 1244 | 035       | 3757.76   | 7522.12 | 3757.90 | 7522.09 | 5              | 263.4    | 1.8   |
| CH    | 0053                | VA03-053 | VA03053TWL01 | 1312 | 035       | 3800.70   | 7520.79 | 3800.81 | 7520.69 | 5              | 254.2    | 1.8   |
| CH    | 9053                | VA03-053 | VA03053TWL02 | 1340 | 035       | 3800.73   | 7520.84 | 3800.64 | 7520.96 | 5              | 247      | 1.8   |
| CH    | 0054                | VA03-054 | VA03054TWL01 | 1118 | 035       | 3759.12   | 7525.66 | 3759.03 | 7525.60 | 5              | 190      | 0.6   |
| CH    | 9054                | VA03-054 | VA03054TWL02 | 1159 | 035       | 3759.04   | 7525.57 | 3758.99 | 7525.49 | 5              | 152.8    | 0.9   |
| MG    | 0013                | VA03-013 | VA03013TWL01 | 1054 | 035       | 3706.24   | 7555.69 | 3706.36 | 7555.82 | 5              | 297.4    | 2.1   |
| MG    | 9013                | VA03-013 | VA03013TWL02 | 1110 | 035       | 3706.49   | 7555.89 | 3706.46 | 7555.79 | 5              | 161.7    | 3     |
| MG    | 0052                | VA03-052 | VA03052TWL01 | 1134 | 035       | 3708.36   | 7554.91 | 3708.54 | 7554.98 | 5              | 350.1    | 4.3   |
| MK    | 0004                | VA03-004 | VA03004TWL01 | 1009 | 035       | 3714.44   | 7554.96 | 3714.37 | 7555.14 | 5              | 302.6    | 2.7   |
| MK    | 9004                | VA03-004 | VA03004TWL02 | 1030 | 035       | 3714.35   | 7555.26 | 3714.41 | 7555.06 | 5              | 323.5    | 3.4   |
| MK    | 0006                | VA03-006 | VA03006TWL01 | 1056 | 035       | 3715.50   | 7553.97 | 3715.41 | 7553.98 | 5              | 167.5    | 5.5   |
| MK    | 9006                | VA03-006 | VA03006TWL02 | 1111 | 035       | 3715.33   | 7553.97 | 3715.51 | 7553.99 | 5              | 334.9    | 5.5   |
| SB    | 0008                | VA03-008 | VA03008TWL01 | 955  | 035       | 3740.54   | 7557.94 | 3640.42 | 7558.03 | 5              | 261      | 1.2   |
| SB    | 9008                | VA03-008 | VA03008TWL02 | 1008 | 035       | 3740.39   | 7558.02 | 3640.47 | 7557.92 | 5              | 212.2    | 1.2   |
| BB    | 0009                | VA03-009 | VA03009TWL01 | 1231 | 035       | 3735.74   | 7556.75 | 3635.62 | 7556.84 | 5              | 261      | 1.8   |
| BB    | 9009                | VA03-009 | VA03009TWL02 | 1251 | 035       | 3735.61   | 7556.77 | 3635.50 | 7556.87 | 5              | 254.2    | 1.8   |
| BB    | 0010                | VA03-010 | VA03010TWL01 | 1142 | 035       | 3736.69   | 7558.50 | 3636.56 | 7558.57 | 5              | 263.3    | 1.8   |
| BB    | 9010                | VA03-010 | VA03010TWL02 | 1152 | 035       | 3736.55   | 7558.57 | 3636.42 | 7558.59 | 5              | 242.8    | 1.8   |
| BB    | 0011                | VA03-011 | VA03011TWL01 | 1320 | 035       | 3734.63   | 7557.82 | 3634.51 | 7557.91 | 5              | 261      | 1.5   |
| BB    | 9011                | VA03-011 | VA03011TWL02 | 1330 | 035       | 3734.59   | 7557.89 | 3634.69 | 7557.84 | 5              | 200.3    | 1.5   |
| BB    | 9014                | VA03-014 | VA03014TWL02 | 1110 | 035       | 3736.89   | 7556.57 | 3636.76 | 7556.65 | 5              | 269.8    | 1.8   |
| BB    | 0014                | VA03-014 | VA03014TWL01 | 1158 | 035       | 3737.02   | 7556.45 | 3636.90 | 7556.53 | 5              | 253.4    | 1.5   |
| CB    | 0028                | VA03-028 | VA03028TWL01 | 940  | 035       | 3751.32   | 7600.39 | 3651.43 | 7600.48 | 5              | 245.4    | 2.1   |
| CB    | 9028                | VA03-028 | VA03028TWL02 | 1002 | 035       | 3751.32   | 7600.36 | 3651.43 | 7600.46 | 5              | 254.2    | 2.1   |
| CB    | 0029                | VA03-029 | VA03029TWL01 | 1045 | 035       | 3753.60   | 7602.54 | 3653.47 | 7602.58 | 5              | 248.4    | 2.1   |
| CK    | 0025                | VA03-025 | VA03025TWL01 | 1604 | 035       | 3704.86   | 7620.26 | 3705.00 | 7620.22 | 5              | 266.4    | 1.8   |
| HU    | 0043                | VA03-043 | VA03043TWL01 | 1540 | 035       | 3724.77   | 7557.87 | 3724.62 | 7558.00 | 5              | 340.9    | 1.8   |
| HU    | 9043                | VA03-043 | VA03043TWL02 | 1603 | 035       | 3724.59   | 7558.13 | 3724.63 | 7557.99 | 5              | 225.2    | 2.4   |
| LT    | 0048                | VA03-048 | VA03048TWL01 | 1207 | 035       | 3737.99   | 7619.45 | 3738.14 | 7619.41 | 5              | 284.5    | 1.8   |
| LT    | 9048                | VA03-048 | VA03048TWL02 | 1224 | 035       | 3738.16   | 7619.39 | 3738.03 | 7619.44 | 5              | 252.6    | 3.4   |
| MH    | 0023                | VA03-023 | VA03023TWL01 | 904  | 035       | 3728.38   | 7616.28 | 3728.26 | 7616.23 | 5              | 235      | 2.1   |
| NA    | 0018                | VA03-018 | VA03018TWL01 | 1445 | 035       | 3737.79   | 7553.56 | 3737.67 | 7553.56 | 5              | 222.4    | 1.2   |
| NA    | 9018                | VA03-018 | VA03018TWL02 | 1508 | 035       | 3737.66   | 7553.56 | 3737.73 | 7553.42 | 5              | 249.1    | 1.8   |
| OH    | 0030                | VA03-030 | VA03030TWL01 | 1137 | 035       | 3733.13   | 7554.83 | 3733.13 | 7555.00 | 5              | 258.2    | 1.5   |
| OH    | 9030                | VA03-030 | VA03030TWL02 | 1202 | 035       | 3733.11   | 7554.93 | 3733.14 | 7554.78 | 5              | 234.5    | 1.5   |
| PT    | 0041                | VA03-041 | VA03041TWL01 | 1551 | 035       | 3739.88   | 7549.43 | 3739.91 | 7549.59 | 5              | 249.3    | 1.8   |
| WH    | 0042                | VA03-042 | VA03042TWL01 | 1332 | 035       | 3724.25   | 7615.32 | 3724.14 | 7615.26 | 5              | 223.3    | 0.6   |

Table 1 (continued). NCA 2003 site locations and station information.

| River | Station Identifiers |          |              | Time | Gear Code | Location  |         |         |         | Tow Parameters    |                 |              |
|-------|---------------------|----------|--------------|------|-----------|-----------|---------|---------|---------|-------------------|-----------------|--------------|
|       | VIMS                | DEQ      | EPA          |      |           | Beginning |         | Ending  |         | Duration<br>(min) | Distance<br>(m) | Depth<br>(m) |
|       |                     |          |              |      |           | Lat.      | Lon.    | Lat.    | Lon.    |                   |                 |              |
| CP    | 0037                | VA03-037 | VA03037TWL01 | 1520 | 035       | 3747.73   | 7546.30 | 3747.70 | 7546.15 | 5                 | 234.5           | 1.2          |
| CP    | 9037                | VA03-037 | VA03037TWL02 | 1546 | 035       | 3747.69   | 7546.27 | 3747.66 | 7546.41 | 5                 | 219.8           | 0.9          |
| GF    | 0020                | VA03-020 | VA03020TWL01 | 1710 | 035       | 3750.82   | 7541.42 | 3750.77 | 7541.27 | 5                 | 245.9           | 1.8          |
| GF    | 9020                | VA03-020 | VA03020TWL02 | 1735 | 035       | 3750.80   | 7541.41 | 3750.69 | 7541.34 | 5                 | 229.9           | 1.8          |
| GF    | 0024                | VA03-027 | VA03027TWL01 | 1630 | 035       | 3750.72   | 7541.72 | 3750.64 | 7541.61 | 5                 | 223.4           | 1.2          |
| GF    | 9024                | VA03-024 | VA03024TWL02 | 1655 | 035       | 3750.67   | 7541.72 | 3750.60 | 7541.59 | 5                 | 236.2           | 0.9          |
| GW    | 0045                | VA03-045 | VA03045TWL01 | 937  | 035       | 3747.43   | 7617.75 | 3747.44 | 7617.58 | 5                 | 258.9           | 3.4          |
| GW    | 9045                | VA03-045 | VA03045TWL02 | 1001 | 035       | 3747.44   | 7617.80 | 3747.43 | 7617.97 | 5                 | 258.9           | 4            |
| JK    | 0032                | VA03-032 | VA03032TWL01 | 1224 | 035       | 3755.74   | 7629.56 | 3655.87 | 7629.59 | 5                 | 245.2           | 1.8          |
| JN    | 0035                | VA03-035 | VA03035TWL01 | 1119 | 035       | 3751.19   | 7631.43 | 3651.05 | 7631.43 | 5                 | 259.4           | 2.4          |
| JC    | 0039                | VA03-039 | VA03039TWL01 | 1014 | 035       | 3716.29   | 7650.84 | 3716.36 | 7650.76 | 5                 | 177.7           | 3            |
| MN    | 0033                | VA03-033 | VA03033TWL01 | 1240 | 035       | 3724.53   | 7624.86 | 3724.46 | 7624.79 | 5                 | 167.7           | 0.6          |
| MN    | 9033                | VA03-033 | VA03033TWL02 | 1250 | 035       | 3724.45   | 7624.78 | 3724.58 | 7624.82 | 5                 | 248.4           | 0.9          |
| MN    | 0044                | VA03-044 | VA03044TWL01 | 1157 | 035       | 3723.33   | 7624.71 | 3723.46 | 7624.72 | 5                 | 241.4           | 1.8          |
| MN    | 9044                | VA03-044 | VA03044TWL02 | 1210 | 035       | 3723.45   | 7624.65 | 3723.34 | 7624.62 | 5                 | 208.9           | 2.1          |
| MS    | 0056                | VA03-056 | VA03056TWL01 | 1056 | 035       | 3719.79   | 7626.53 | 3719.62 | 7626.60 | 5                 | 332.5           | 1.8          |
| NL    | 0058                | VA03-058 | VA03058TWL01 | 1317 | 035       | 3742.32   | 7604.77 | 3642.24 | 7604.72 | 3.5               | 166.6           | 4            |
| NL    | 9058                | VA03-058 | VA03058TWL02 | 1330 | 035       | 3742.28   | 7604.73 | 3642.52 | 7604.76 | 5                 | 447             | 3.4          |
| PK    | 0055                | VA03-055 | VA03055TWL01 | 1506 | 035       | 3732.48   | 7630.23 | 3732.06 | 7630.33 | 5                 | 792.9           | 1.2          |
| PK    | 0057                | VA03-057 | VA03057TWL01 | 1618 | 035       | 3731.55   | 7622.23 | 3731.65 | 7622.34 | 5                 | 249.5           | 4.3          |
| PK    | 9031                | VA03-031 | VA03031TWL02 | 1048 | 035       | 3731.51   | 7618.27 | 3731.63 | 7618.22 | 5                 | 235             | 3.7          |
| PK    | 0031                | VA03-031 | VA03031TWL01 | 1048 | 035       | 3731.64   | 7618.18 | 3731.52 | 7618.26 | 5                 | 253.4           | 4.3          |
| PK    | 0040                | VA03-040 | VA03040TWL01 | 1010 | 035       | 3729.74   | 7619.70 | 3729.88 | 7619.75 | 5                 | 270.3           | 0.3          |
| PK    | 9040                | VA03-040 | VA03040TWL02 | 1021 | 035       | 3729.84   | 7619.76 | 3729.74 | 7619.68 | 5                 | 221.6           | 0.6          |
| BC    | 0022                | VA03-022 | VA03022TWL01 | 1447 | 035       | 3807.78   | 7641.88 | 3807.90 | 7641.99 | 5                 | 278.1           | 1.5          |
| PN    | 0059                | VA03-059 | VA03059TWL01 | 1404 | 035       | 3808.61   | 7644.72 | 3808.70 | 7644.82 | 5                 | 225.6           | 0.9          |
| UM    | 0019                | VA03-019 | VA03019TWL01 | 1033 | 035       | 3819.32   | 7702.57 | 3819.19 | 7702.51 | 5                 | 257.6           | 1.5          |
| UM    | 0038                | VA03-038 | VA03038TWL01 | 1114 | 035       | 3819.07   | 7703.19 | 3819.08 | 7703.36 | 5                 | 258.9           | 1.8          |
| LG    | 0026                | VA03-026 | VA03026TWL01 | 1109 | 035       | 3741.04   | 7637.22 | 3740.95 | 7637.13 | 5                 | 215.6           | 0.6          |
| LG    | 9026                | VA03-026 | VA03026TWL02 | 1143 | 035       | 3740.93   | 7637.10 | 3740.89 | 7636.97 | 5                 | 210.9           | 0.6          |
| RB    | 0036                | VA03-036 | VA03036TWL01 | 1227 | 035       | 3739.50   | 7635.49 | 3739.40 | 7635.52 | 5                 | 190.8           | 0.9          |
| RB    | 9036                | VA03-036 | VA03036TWL02 | 1311 | 035       | 3739.40   | 7635.48 | 3739.53 | 7635.48 | 5                 | 240.9           | 1.2          |
| RC    | 9034                | VA03-034 | VA03034TWL02 | 1359 | 035       | 3739.27   | 7628.28 | 3739.38 | 7628.35 | 5                 | 229.9           | 6.1          |
| RC    | 0034                | VA03-034 | VA03034TWL01 | 1423 | 035       | 3739.67   | 7628.24 | 3739.74 | 7628.39 | 5                 | 262.2           | 2.7          |
| RC    | 0049                | VA03-049 | VA03049TWL01 | 1451 | 035       | 3742.43   | 7629.37 | 3742.37 | 7629.22 | 5                 | 253.5           | 3.4          |
| RC    | 9049                | VA03-049 | VA03049TWL02 | 1501 | 035       | 3742.39   | 7629.29 | 3742.48 | 7629.42 | 5                 | 258.5           | 4.3          |
| PM    | 0017                | VA03-017 | VA03017TWL01 | 915  | 035       | 3734.05   | 7701.18 | 3733.98 | 7701.08 | 5                 | 199.7           | 6.1          |
| PM    | 9017                | VA03-017 | VA03017TWL02 | 943  | 035       | 3734.05   | 7701.12 | 3734.16 | 7701.28 | 5                 | 317.2           | 5.2          |
| PM    | 0047                | VA03-047 | VA03047TWL01 | 1033 | 035       | 3733.05   | 7653.02 | 3733.09 | 7652.87 | 5                 | 239.6           | 3.7          |
| PM    | 9047                | VA03-047 | VA03047TWL02 | 1116 | 035       | 3733.06   | 7653.01 | 3733.00 | 7653.16 | 5                 | 253.5           | 3.4          |
| WA    | 0051                | VA03-051 | VA03051TWL01 | 1455 | 035       | 3726.44   | 7645.93 | 3726.49 | 7645.85 | 5                 | 152.8           | 0.9          |
| WA    | 9051                | VA03-051 | VA03051TWL02 | 1506 | 035       | 3726.49   | 7645.89 | 3726.40 | 7645.95 | 4                 | 190             | 1.2          |



Table 3. List of fish species captured during NCA 2003. TL = total length, TLC = total length center-line, and FL = fork length. Number of species = 46.

| Common Name           | Scientific Name                 | VIMS Species Code | Measurement |
|-----------------------|---------------------------------|-------------------|-------------|
| American eel          | <i>Anguilla rostrata</i>        | 60                | TL          |
| American shad         | <i>Alosa sapidissima</i>        | 30                | FL          |
| Atlantic croaker      | <i>Micropogonias undulatus</i>  | 5                 | TL          |
| Atlantic menhaden     | <i>Brevoortia tyrannus</i>      | 37                | FL          |
| Atlantic silverside   | <i>Menidia menidia</i>          | 150               | FL          |
| alewife               | <i>Alosa pseudoharengus</i>     | 26                | FL          |
| banded killifish      | <i>Fundulus diaphanus</i>       | 121               | TL          |
| bay anchovy           | <i>Anchoa mitchilli</i>         | 103               | FL          |
| black seabass         | <i>Centropristis striata</i>    | 2                 | TLC         |
| blackcheek tonguefish | <i>Symphurus plagiusa</i>       | 152               | TL          |
| blue catfish          | <i>Ictalurus furcatus</i>       | 314               | FL          |
| blueback herring      | <i>Alosa aestivalis</i>         | 27                | FL          |
| bluegill              | <i>Lepomis macrochirus</i>      | 136               | FL          |
| brown bullhead        | <i>Ictalurus nebulosus</i>      | 116               | FL          |
| butterfish            | <i>Peprilus triacanthus</i>     | 4                 | FL          |
| channel catfish       | <i>Ictalurus punctatus</i>      | 40                | FL          |
| common carp           | <i>Cyprinus carpio</i>          | 52                | FL          |
| green goby            | <i>Microgobius thalassinus</i>  | 139               | TL          |
| harvestfish           | <i>Peprilus alepidotus</i>      | 11                | FL          |
| hogchoker             | <i>Trinectes maculatus</i>      | 151               | TL          |
| inland silverside     | <i>Menidia beryllina</i>        | 149               | FL          |
| kingfish spp          | <i>Menticirrhus spp.</i>        | 13                | TL          |
| lookdown              | <i>Selene vomer</i>             | 207               | FL          |
| naked goby            | <i>Gobiosoma bosci</i>          | 144               | TL          |
| northern pipefish     | <i>Syngnathus fuscus</i>        | 131               | TL          |
| northern puffer       | <i>Sphoeroides maculatus</i>    | 50                | TL          |
| northern searobin     | <i>Prionotus carolinus</i>      | 71                | FL          |
| oyster toadfish       | <i>Opsanus tau</i>              | 154               | TL          |
| pigfish               | <i>Orthopristis chrysoptera</i> | 59                | FL          |
| pinfish               | <i>Lagodon rhomboides</i>       | 216               | FL          |
| pumpkinseed           | <i>Lepomis gibbosus</i>         | 135               | FL          |
| scup                  | <i>Stenotomus chrysops</i>      | 1                 | FL          |
| silver perch          | <i>Bairdiella chrysoura</i>     | 213               | TL          |
| skilletfish           | <i>Gobiesox strumosus</i>       | 153               | TL          |
| smallmouth flounder   | <i>Etropus microstomus</i>      | 236               | TL          |
| spot                  | <i>Leiostomus xanthurus</i>     | 33                | FL          |
| spottail shiner       | <i>Notropis hudsonius</i>       | 110               | FL          |
| striped anchovy       | <i>Anchoa hepsetus</i>          | 102               | FL          |
| striped bass          | <i>Morone saxatilis</i>         | 31                | FL          |
| striped blenny        | <i>Chasmodes bosquianus</i>     | 146               | TL          |
| striped burrfish      | <i>Chilomycterus schoepfi</i>   | 241               | TL          |
| striped searobin      | <i>Prionotus evolans</i>        | 72                | TL          |
| summer flounder       | <i>Paralichthys dentatus</i>    | 3                 | TL          |
| weakfish              | <i>Cynoscion regalis</i>        | 7                 | TL          |
| white catfish         | <i>Ictalurus catus</i>          | 39                | FL          |
| white perch           | <i>Morone americana</i>         | 32                | FL          |



Table 4. List of invertebrate species captured during NCA 2003. TL = total length, CW = carapace width, and P = presence only was noted. Number of species = 24.

| Common Name                | Scientific Name                | VIMS Species Code | Measurement |
|----------------------------|--------------------------------|-------------------|-------------|
| Amphipod spp               | <i>Amphipoda spp</i>           | 841               | P           |
| barnacle spp               | <i>Balanus/Chthamalus spp</i>  | 808               | P           |
| bent mussel                | <i>Ischadium recurvum</i>      | 842               | P           |
| big-clawed snapping shrimp | <i>Alpheus heterochaelis</i>   | 591               | P           |
| blue crab, adult female    | <i>Callinectes sapidus</i>     | 6143              | CW          |
| blue crab, juvenile female | <i>Callinectes sapidus</i>     | 6142              | CW          |
| blue crab, male            | <i>Callinectes sapidus</i>     | 6141              | CW          |
| blue crab, sex unknown     | <i>Callinectes sapidus</i>     | 614               | CW          |
| comb jelly spp             | Ctenophora                     | 774               | P           |
| drill & snail spp          | drill & snail spp              | 884               | P           |
| grass shrimp spp           | <i>Palaemonetes spp</i>        | 620               | P           |
| isopod spp                 | <i>Isopoda spp</i>             | 657               | P           |
| leech spp                  | leech spp                      | 883               | P           |
| mantis shrimp              | <i>Squilla empusa</i>          | 621               | TL          |
| moon jelly                 | <i>Aurelia aurita</i>          | 857               | P           |
| mud crab spp               | Xanthidae                      | 594               | P           |
| oyster, common             | <i>Crassostrea virginica</i>   | 819               | P           |
| right-hand hermit crab spp | <i>Pagurus spp</i>             | 758               | P           |
| sand shrimp                | <i>Crangon septemspinosa</i>   | 604               | P           |
| sea cucumber spp           | Holothuroidea                  | 828               | P           |
| sea nettle                 | <i>Chrysaora quinquecirrha</i> | 856               | P           |
| slipper shell spp          | <i>Crepidula spp</i>           | 881               | P           |
| wedge rangia clam          | <i>Rangia cuneata</i>          | 837               | P           |
| worm spp                   | Annelida-(Polychaeta)          | 775               | P           |

Table 5. Habitat codes used during the NCA 2003 sampling period.

| Code | Description   |
|------|---|
| SND  | Sand (hard) bottom  |
| MUD  | Mud (soft) bottom   |
| HYD  | Hydroids:<br><i>Sertularia cupressina</i> - "White Hair"<br><i>Garveia franciscana</i> - "Rope Grass"<br><i>Pennaria disticha</i> - "Feather Hydroid"   |
| DMF  | Dead man's fingers/Rubbery Bryozoan:<br><i>Alcyonidium sp.</i>  |
| SPG  | Sponges:<br><i>Microciona prolifera</i> - "Redbeard Sponge"<br><i>Haliclona loosanoffi</i> - "Loosanoff's Haliclona"  |
| SQT  | Sea squirts:<br><i>Mogula sp.</i>   |
| SHL  | Shell bottom:<br><i>Crassostrea virginica</i> - "Common Oyster"<br><i>Rangia cuneata</i> - "Wedge Rangia"<br><i>Ischadium recurvum</i> - "Bent Mussel"<br><i>Mytilus edulis</i> - "Blue Mussel" |
| SAV  | Submerged Aquatic Vegetation:<br><i>Zostera marina</i> - "Eelgrass"<br><i>Ruppia maritima</i> - "Widgeon grass"   |
| SWD  | Seaweeds:<br><i>Ulva lactuca</i> - "Sea Lettuce"<br><i>Agardhiella tenera</i> - "Tapered Red Weed"<br><i>Gracilaria sp.</i>   |
| COR  | Coral:<br><i>Leptogorgia virgulata</i> - "Sea Whip"<br><i>Astrangia danae</i> - "Star Coral"  |
| TUB  | Tube Worms:<br><i>Chaetopterus sp.</i>  |
| DET  | Detritus  |
| ART  | Artificial (Trap Stakes, Ballast Rocks, Coal, Tires, Trash, etc.)   |
| UNK  | Unknown   |

Table 6. Number of trawls conducted by date and system for NCA 2003. Second tows for chemistry fish collection are shown in parentheses.

| System                     | Jul. |      |      |      |      |      |      |      | Aug. |      |      |      |      |      | Total  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
|                            | 21   | 22   | 24   | 25   | 28   | 29   | 30   | 31   | 1    | 20   | 21   | 27   | 28   | 29   |        |
| Atlantic Ocean             |      |      |      |      |      |      |      |      |      | 2(1) |      | 4(4) |      | 4(4) | 10(9)  |
| Back Bay                   |      |      |      |      |      | 5(5) |      |      |      |      |      |      |      |      | 5(5)   |
| Chesapeake Bay, Lower (VA) |      |      |      |      | 1(1) |      | 2(1) | 1(0) | 2(0) | 2(1) |      | 1(1) | 1(1) |      | 10(5)  |
| Great Wicomico River       |      |      |      |      | 1(1) |      |      |      |      |      |      |      |      |      | 1(1)   |
| James River                |      |      |      |      |      |      |      | 2(0) |      |      | 1(0) |      |      |      | 3(0)   |
| Mobjack Bay                | 3(2) |      |      |      |      |      |      |      |      |      |      |      |      |      | 3(2)   |
| North Landing River        |      |      |      |      |      |      |      | 1(1) |      |      |      |      |      |      | 1(1)   |
| Piankatank River           |      |      |      |      | 2(0) |      |      |      | 2(2) |      |      |      |      |      | 4(2)   |
| Pocomoke Sound             |      |      |      |      |      |      |      |      |      |      |      |      | 3(3) |      | 3(3)   |
| Potomac River              |      | 3(0) |      |      |      |      |      |      |      |      | 1(0) |      |      |      | 4(0)   |
| Rappahannock River         |      |      |      | 4(4) |      |      |      |      |      |      |      |      |      |      | 4(4)   |
| York River                 |      |      | 3(3) |      |      |      |      |      |      |      |      |      |      |      | 3(3)   |
| <b>Total</b>               | 3(2) | 3(0) | 3(3) | 4(4) | 4(2) | 5(5) | 3(2) | 3(0) | 4(2) | 4(2) | 2(0) | 5(5) | 4(4) | 4(4) | 51(35) |

Table 7. Species composition and length statistics for all water systems combined during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - All - Pooled  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 86                               |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 46                                     |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| white perch  | 1,892                | 20        | 31.32            | 22              | 44.11                     | 1,308              | 78                  | 1.96                    | 23                  | 221                 |
| bay anchovy  | 1,519                | 33        | 25.15            | 17.66           | .                         | 1,346              | 39                  | 0.43                    | 18                  | 78                  |
| spot   | 637                  | 46        | 10.55            | 7.41            | 14.85                     | 633                | 94                  | 1.34                    | 49                  | 235                 |
| weakfish   | 369                  | 21        | 6.11             | 4.29            | 8.6                       | 360                | 90                  | 1.91                    | 25                  | 308                 |
| striped bass   | 284                  | 9         | 4.7              | 3.3             | 6.62                      | 284                | 50                  | 1.6                     | 20                  | 91                  |
| blue crab, male  | 260                  | 34        | 4.3              | 3.02            | 6.06                      | .                  | 84                  | 1.41                    | 15                  | 176                 |
| hogchoker  | 232                  | 34        | 3.84             | 2.7             | .                         | 103                | 87                  | 1.95                    | 21                  | 182                 |
| blue crab, juvenile female                                   | 222                  | 31        | 3.68             | 2.58            | 5.18                      | .                  | 76                  | 1.14                    | 18                  | 132                 |
| silver perch   | 147                  | 11        | 2.43             | 1.71            | 3.43                      | 143                | 81                  | 2.7                     | 52                  | 185                 |
| spottail shiner  | 107                  | 3         | 1.77             | 1.24            | 2.49                      | .                  | 53                  | 0.97                    | 39                  | 67                  |
| Atlantic croaker   | 47                   | 16        | 0.78             | 0.55            | 1.1                       | 26                 | 204                 | 11.61                   | 87                  | 367                 |
| summer flounder  | 45                   | 20        | 0.75             | 0.52            | 1.05                      | 35                 | 201                 | 9.38                    | 126                 | 386                 |
| Atlantic silverside  | 45                   | 8         | 0.75             | 0.52            | 1.05                      | 45                 | 56                  | 1.26                    | 38                  | 77                  |
| blue crab, adult female                                      | 27                   | 16        | 0.45             | 0.31            | 0.63                      | .                  | 145                 | 2.09                    | 117                 | 174                 |
| blue catfish   | 22                   | 3         | 0.36             | 0.26            | 0.51                      | 19                 | 106                 | 15.24                   | 40                  | 247                 |
| oyster toadfish  | 21                   | 5         | 0.35             | 0.24            | 0.49                      | .                  | 93                  | 10.55                   | 19                  | 180                 |
| brown bullhead   | 21                   | 3         | 0.35             | 0.24            | 0.49                      | .                  | 88                  | 10.54                   | 43                  | 237                 |
| black seabass  | 14                   | 6         | 0.23             | 0.16            | 0.33                      | 0                  | 144                 | 4.53                    | 126                 | 190                 |
| white catfish  | 13                   | 5         | 0.22             | 0.15            | 0.3                       | 11                 | 61                  | 17.15                   | 31                  | 240                 |
| banded killifish   | 13                   | 1         | 0.22             | 0.15            | 0.3                       | .                  | 55                  | 0.98                    | 50                  | 61                  |
| Atlantic menhaden  | 12                   | 5         | 0.2              | 0.14            | 0.28                      | 12                 | 45                  | 4.54                    | 28                  | 91                  |
| naked goby   | 12                   | 4         | 0.2              | 0.14            | 0.28                      | .                  | 31                  | 1.6                     | 21                  | 40                  |
| American shad  | 9                    | 2         | 0.15             | 0.1             | 0.21                      | 9                  | 56                  | 0.62                    | 52                  | 58                  |
| northern searobin  | 8                    | 3         | 0.13             | 0.09            | 0.19                      | 8                  | 150                 | 2.37                    | 142                 | 162                 |
| pumpkinseed  | 8                    | 1         | 0.13             | 0.09            | 0.19                      | .                  | 44                  | 1.01                    | 39                  | 47                  |
| harvestfish  | 6                    | 3         | 0.1              | 0.07            | 0.14                      | 6                  | 45                  | 4.16                    | 35                  | 61                  |
| striped anchovy  | 4                    | 4         | 0.07             | 0.05            | 0.09                      | 4                  | 66                  | 7.1                     | 54                  | 84                  |
| pinfish  | 4                    | 4         | 0.07             | 0.05            | 0.09                      | .                  | 159                 | 17.76                   | 127                 | 195                 |
| northern puffer  | 3                    | 3         | 0.05             | 0.03            | 0.07                      | 3                  | 80                  | 12.74                   | 59                  | 103                 |
| northern pipefish  | 3                    | 2         | 0.05             | 0.03            | 0.07                      | .                  | 141                 | 15.06                   | 119                 | 170                 |
| inland silverside  | 3                    | 2         | 0.05             | 0.03            | 0.07                      | .                  | 71                  | 2.85                    | 65                  | 74                  |
| alewife  | 3                    | 1         | 0.05             | 0.03            | 0.07                      | 3                  | 57                  | 1.45                    | 55                  | 60                  |
| pigfish  | 3                    | 1         | 0.05             | 0.03            | 0.07                      | .                  | 192                 | 3.33                    | 185                 | 195                 |
| striped blenny   | 2                    | 2         | 0.03             | 0.02            | 0.05                      | .                  | 36                  | 6                       | 30                  | 42                  |
| skilletfish  | 2                    | 2         | 0.03             | 0.02            | 0.05                      | .                  | 30                  | 1                       | 29                  | 31                  |
| blueback herring   | 2                    | 1         | 0.03             | 0.02            | 0.05                      | 2                  | 50                  | 4.5                     | 45                  | 54                  |
| channel catfish  | 2                    | 1         | 0.03             | 0.02            | 0.05                      | 1                  | 129                 | 81                      | 48                  | 210                 |
| bluegill   | 2                    | 1         | 0.03             | 0.02            | 0.05                      | .                  | 26                  | 4                       | 22                  | 30                  |
| blackcheek tonguefish  | 2                    | 1         | 0.03             | 0.02            | 0.05                      | 0                  | 150                 | 3                       | 147                 | 153                 |
| lookdown   | 2                    | 1         | 0.03             | 0.02            | 0.05                      | .                  | 63                  | 2                       | 61                  | 65                  |
| scup   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | 1                  | 139                 | .                       | 139                 | 139                 |
| butterfish   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | 0                  | 127                 | .                       | 127                 | 127                 |
| kingfish spp   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | 0                  | 128                 | .                       | 128                 | 128                 |
| common carp  | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 76                  | .                       | 76                  | 76                  |
| American eel   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 198                 | .                       | 198                 | 198                 |
| striped searobin   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 122                 | .                       | 122                 | 122                 |

Table 7 (continued).

| Species                      | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
|------------------------------|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| green goby                   | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 45                  | .                       | 45                  | 45                  |
| smallmouth flounder          | 1                    | 1         | 0.02             | 0.01            | 0.02                      | 0                  | 110                 | .                       | 110                 | 110                 |
| striped burrfish             | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 213                 | .                       | 213                 | 213                 |
| blue crab, sex unknown       | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 10                  | 0                       | 10                  | 10                  |
| mantis shrimp                | 1                    | 1         | 0.02             | 0.01            | 0.02                      | .                  | 77                  | .                       | 77                  | 77                  |
| comb jelly spp               | .                    | 29        | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sea nettle                   | .                    | 17        | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp                 | .                    | 14        | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| mud crab spp                 | .                    | 12        | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| grass shrimp spp             | .                    | 12        | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| drill & snail spp            | .                    | 8         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Barnacle spp                 | .                    | 7         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| worm spp                     | .                    | 5         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| right-hand hermit crab spp   | .                    | 4         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| wedge rangia clam (Atlantic) | .                    | 4         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sand shrimp                  | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| isopod spp                   | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| bent mussel                  | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| big-clawed snapping shrimp   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| oyster, common               | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| leech spp                    | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sea cucumber spp             | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| moon jelly                   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| slipper shell spp            | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----                        |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined         | 6,040                |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 8. Species composition and length statistics for the Atlantic Ocean (seaside) sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - Atlantic Ocean                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 19                               |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 21                                     |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| silver perch   | 43                   | 6         | 15.58            | 2.26            | 18.07                     | 42                 | 79                  | 3.14                    | 54                  | 185                 |
| blue crab, male  | 35                   | 5         | 12.68            | 1.84            | 14.71                     | .                  | 86                  | 2.84                    | 15                  | 130                 |
| weakfish   | 33                   | 6         | 11.96            | 1.74            | 13.87                     | 32                 | 102                 | 5.89                    | 25                  | 242                 |
| blue crab, juvenile female                                   | 28                   | 4         | 10.14            | 1.47            | 11.76                     | .                  | 88                  | 1.8                     | 52                  | 109                 |
| Atlantic croaker   | 24                   | 5         | 8.7              | 1.26            | 10.08                     | 4                  | 267                 | 10.61                   | 210                 | 367                 |
| hogchoker  | 24                   | 5         | 8.7              | 1.26            | .                         | 0                  | 120                 | 4.28                    | 97                  | 182                 |
| spot   | 18                   | 6         | 6.52             | 0.95            | 7.56                      | 15                 | 163                 | 5.15                    | 137                 | 215                 |
| summer flounder  | 15                   | 7         | 5.43             | 0.79            | 6.3                       | 13                 | 203                 | 19                      | 146                 | 386                 |
| bay anchovy  | 14                   | 4         | 5.07             | 0.74            | .                         | 11                 | 43                  | 4.88                    | 18                  | 70                  |
| oyster toadfish  | 9                    | 2         | 3.26             | 0.47            | 3.78                      | .                  | 64                  | 12.59                   | 36                  | 147                 |
| blue crab, adult female                                      | 6                    | 5         | 2.17             | 0.32            | 2.52                      | .                  | 134                 | 5.47                    | 118                 | 170                 |
| black seabass  | 6                    | 4         | 2.17             | 0.32            | 2.52                      | 0                  | 136                 | 3.96                    | 126                 | 149                 |
| northern pipefish  | 3                    | 2         | 1.09             | 0.16            | 1.26                      | .                  | 141                 | 15.06                   | 119                 | 170                 |
| Atlantic silverside  | 3                    | 2         | 1.09             | 0.16            | 1.26                      | 3                  | 71                  | 3.84                    | 64                  | 77                  |
| striped anchovy  | 2                    | 2         | 0.72             | 0.11            | 0.84                      | 2                  | 70                  | 14.5                    | 55                  | 84                  |
| pinfish  | 2                    | 2         | 0.72             | 0.11            | 0.84                      | .                  | 129                 | 1.5                     | 127                 | 130                 |
| blackcheek tonguefish  | 2                    | 1         | 0.72             | 0.11            | 0.84                      | 0                  | 150                 | 3                       | 147                 | 153                 |
| scup   | 1                    | 1         | 0.36             | 0.05            | 0.42                      | 1                  | 139                 | .                       | 139                 | 139                 |
| butterfish   | 1                    | 1         | 0.36             | 0.05            | 0.42                      | 0                  | 127                 | .                       | 127                 | 127                 |
| kingfish spp   | 1                    | 1         | 0.36             | 0.05            | 0.42                      | 0                  | 128                 | .                       | 128                 | 128                 |
| striped blenny   | 1                    | 1         | 0.36             | 0.05            | 0.42                      | .                  | 42                  | .                       | 42                  | 42                  |
| inland silverside  | 1                    | 1         | 0.36             | 0.05            | 0.42                      | .                  | 65                  | .                       | 65                  | 65                  |
| smallmouth flounder  | 1                    | 1         | 0.36             | 0.05            | 0.42                      | 0                  | 110                 | .                       | 110                 | 110                 |
| striped burrfish   | 1                    | 1         | 0.36             | 0.05            | 0.42                      | .                  | 213                 | .                       | 213                 | 213                 |
| blue crab, sex unknown                                       | 1                    | 1         | 0.36             | 0.05            | 0.42                      | .                  | 10                  | 0                       | 10                  | 10                  |
| mantis shrimp  | 1                    | 1         | 0.36             | 0.05            | 0.42                      | .                  | 77                  | .                       | 77                  | 77                  |
| comb jelly spp   | .                    | 7         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| drill & snail spp  | .                    | 7         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp   | .                    | 6         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| mud crab spp   | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| right-hand hermit crab spp                                   | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| grass shrimp spp   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| big-clawed snapping shrimp                                   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sand shrimp  | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| worm spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sea cucumber spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sea nettle   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| slipper shell spp  | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 276                  |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 9. Species composition and length statistics for lower Chesapeake Bay sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
|--|----------------------------|-----------|------------------------|-----------------------|---------------------------------|--------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|
| System - Lower Chesapeake Bay, VA                            |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Random Trawls Made - 15                               |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fixed Trawls Made - 0                                 |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fish Species - 21                                     |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Species  | Number<br>of Fish<br>(All) | Frequency | Percent<br>of<br>Catch | Catch<br>Per<br>Trawl | Adjusted<br>Percent of<br>Catch | Number<br>of Fish<br>YOY | Average<br>Length<br>(mm) | Standard<br>Error<br>(length) | Minimum<br>Length<br>(mm) | Maximum<br>Length<br>(mm) |
| bay anchovy  | 533                        | 8         | 45.59                  | 35.53                 | .                               | 485                      | 40                        | 0.92                          | 24                        | 77                        |
| spot   | 181                        | 11        | 15.48                  | 12.07                 | 30.73                           | 180                      | 112                       | 1.69                          | 49                        | 235                       |
| silver perch   | 101                        | 4         | 8.64                   | 6.73                  | 17.15                           | 100                      | 79                        | 3.35                          | 52                        | 136                       |
| weakfish   | 95                         | 6         | 8.13                   | 6.33                  | 16.13                           | 91                       | 97                        | 4.01                          | 34                        | 308                       |
| blue crab, juvenile female                                   | 78                         | 9         | 6.67                   | 5.2                   | 13.24                           | .                        | 73                        | 1.82                          | 18                        | 130                       |
| blue crab, male  | 64                         | 10        | 5.47                   | 4.27                  | 10.87                           | .                        | 83                        | 2.75                          | 26                        | 149                       |
| hogchoker  | 47                         | 8         | 4.02                   | 3.13                  | .                               | 2                        | 110                       | 2.44                          | 21                        | 133                       |
| oyster toadfish  | 10                         | 2         | 0.86                   | 0.67                  | 1.7                             | .                        | 114                       | 15.75                         | 19                        | 180                       |
| naked goby   | 9                          | 2         | 0.77                   | 0.6                   | 1.53                            | .                        | 31                        | 1.97                          | 21                        | 40                        |
| blue crab, adult female                                      | 8                          | 5         | 0.68                   | 0.53                  | 1.36                            | .                        | 143                       | 3.9                           | 117                       | 158                       |
| black seabass  | 8                          | 2         | 0.68                   | 0.53                  | 1.36                            | 0                        | 149                       | 6.95                          | 132                       | 190                       |
| summer flounder  | 7                          | 5         | 0.6                    | 0.47                  | 1.19                            | 5                        | 185                       | 22.92                         | 126                       | 283                       |
| northern searobin  | 6                          | 2         | 0.51                   | 0.4                   | 1.02                            | 6                        | 151                       | 3.16                          | 142                       | 162                       |
| harvestfish  | 4                          | 2         | 0.34                   | 0.27                  | 0.68                            | 4                        | 39                        | 1.49                          | 35                        | 42                        |
| Atlantic silverside  | 4                          | 1         | 0.34                   | 0.27                  | 0.68                            | 4                        | 56                        | 6.1                           | 46                        | 72                        |
| pigfish  | 3                          | 1         | 0.26                   | 0.2                   | 0.51                            | .                        | 192                       | 3.33                          | 185                       | 195                       |
| striped bass   | 2                          | 2         | 0.17                   | 0.13                  | 0.34                            | 2                        | 71                        | 0                             | 71                        | 71                        |
| pinfish  | 2                          | 2         | 0.17                   | 0.13                  | 0.34                            | .                        | 190                       | 5.5                           | 184                       | 195                       |
| lookdown   | 2                          | 1         | 0.17                   | 0.13                  | 0.34                            | .                        | 63                        | 2                             | 61                        | 65                        |
| northern puffer  | 1                          | 1         | 0.09                   | 0.07                  | 0.17                            | 1                        | 103                       | .                             | 103                       | 103                       |
| striped anchovy  | 1                          | 1         | 0.09                   | 0.07                  | 0.17                            | 1                        | 54                        | .                             | 54                        | 54                        |
| green goby   | 1                          | 1         | 0.09                   | 0.07                  | 0.17                            | .                        | 45                        | .                             | 45                        | 45                        |
| striped blenny   | 1                          | 1         | 0.09                   | 0.07                  | 0.17                            | .                        | 30                        | .                             | 30                        | 30                        |
| skilletfish  | 1                          | 1         | 0.09                   | 0.07                  | 0.17                            | .                        | 31                        | .                             | 31                        | 31                        |
| comb jelly spp   | .                          | 10        | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| sea nettle   | .                          | 8         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| mud crab spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| grass shrimp spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| worm spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| Amphipod spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| leech spp  | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| big-clawed snapping shrimp                                   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| sand shrimp  | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| isopod spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| right-hand hermit crab spp                                   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| oyster, common   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| bent mussel  | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| drill & snail spp  | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| All Species Combined   | 1,169                      |           |                        |                       |                                 |                          |                           |                               |                           |                           |

Table 10. Species composition and length statistics for the James River sites during the NCA 2003 sampling period. Second tows are not included.

| System - James River   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| No. of Random Trawls Made - 3                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 13                                     |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| weakfish   | 175                  | 2         | 26.24            | 58.33           | 33.33                     | 175                | 78                  | 1.54                    | 44                  | 102                 |
| white perch  | 162                  | 1         | 24.29            | 54              | 30.86                     | 97                 | 74                  | 4.77                    | 43                  | 162                 |
| bay anchovy  | 93                   | 2         | 13.94            | 31              | .                         | 58                 | 41                  | 1.35                    | 23                  | 61                  |
| spottail shiner  | 55                   | 1         | 8.25             | 18.33           | 10.48                     | .                  | 61                  | 0.67                    | 52                  | 67                  |
| hogchoker  | 49                   | 3         | 7.35             | 16.33           | .                         | 4                  | 100                 | 2.12                    | 75                  | 145                 |
| spot   | 46                   | 2         | 6.9              | 15.33           | 8.76                      | 46                 | 109                 | 2.09                    | 85                  | 151                 |
| blue crab, male  | 21                   | 3         | 3.15             | 7               | 4                         | .                  | 109                 | 5.69                    | 42                  | 172                 |
| blue crab, juvenile female                                   | 17                   | 2         | 2.55             | 5.67            | 3.24                      | .                  | 79                  | 4.01                    | 51                  | 120                 |
| banded killifish   | 13                   | 1         | 1.95             | 4.33            | 2.48                      | .                  | 55                  | 0.98                    | 50                  | 61                  |
| blue catfish   | 13                   | 1         | 1.95             | 4.33            | 2.48                      | 10                 | 89                  | 16.24                   | 40                  | 236                 |
| pumpkinseed  | 8                    | 1         | 1.2              | 2.67            | 1.52                      | .                  | 44                  | 1.01                    | 39                  | 47                  |
| Atlantic croaker   | 6                    | 2         | 0.9              | 2               | 1.14                      | 6                  | 156                 | 4.69                    | 140                 | 175                 |
| silver perch   | 3                    | 1         | 0.45             | 1               | 0.57                      | 1                  | 138                 | 38                      | 62                  | 177                 |
| blueback herring   | 2                    | 1         | 0.3              | 0.67            | 0.38                      | 2                  | 50                  | 4.5                     | 45                  | 54                  |
| striped bass   | 2                    | 1         | 0.3              | 0.67            | 0.38                      | 2                  | 49                  | 3                       | 46                  | 52                  |
| blue crab, adult female                                      | 2                    | 1         | 0.3              | 0.67            | 0.38                      | .                  | 163                 | 6.35                    | 152                 | 174                 |
| sea nettle   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| comb jelly spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| barnacle spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| oyster, common   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| bent mussel  | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 667                  |           |                  |                 |                           |                    |                     |                         |                     |                     |



Table 11. Species composition and length statistics for the York River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - York River  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 6                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 11                                     |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| white perch  | 464                  | 5         | 56.45            | 77.33           | 60.89                     | 442                | 47                  | 3.15                    | 25                  | 145                 |
| striped bass   | 190                  | 3         | 23.11            | 31.67           | 24.93                     | 190                | 37                  | 1.18                    | 20                  | 70                  |
| hogchoker  | 55                   | 5         | 6.69             | 9.17            | .                         | 55                 | 51                  | 1.22                    | 37                  | 71                  |
| spottail shiner  | 52                   | 2         | 6.33             | 8.67            | 6.82                      | .                  | 48                  | 0.87                    | 39                  | 58                  |
| blue crab, male  | 13                   | 1         | 1.58             | 2.17            | 1.71                      | .                  | 79                  | 3.32                    | 43                  | 112                 |
| American shad  | 9                    | 2         | 1.09             | 1.5             | 1.18                      | 9                  | 56                  | 0.62                    | 52                  | 58                  |
| white catfish  | 9                    | 2         | 1.09             | 1.5             | 1.18                      | 9                  | 35                  | 0.99                    | 31                  | 41                  |
| blue catfish   | 9                    | 2         | 1.09             | 1.5             | 1.18                      | 9                  | 130                 | 28.1                    | 45                  | 247                 |
| spot   | 7                    | 2         | 0.85             | 1.17            | 0.92                      | 7                  | 87                  | 5.46                    | 59                  | 104                 |
| bay anchovy  | 5                    | 1         | 0.61             | 0.83            | .                         | 5                  | 30                  | 3.21                    | 21                  | 38                  |
| blue crab, juvenile female                                   | 4                    | 1         | 0.49             | 0.67            | 0.52                      | .                  | 66                  | 4.79                    | 45                  | 77                  |
| alewife  | 3                    | 1         | 0.36             | 0.5             | 0.39                      | 3                  | 57                  | 1.45                    | 55                  | 60                  |
| channel catfish  | 2                    | 1         | 0.24             | 0.33            | 0.26                      | 1                  | 129                 | 81                      | 48                  | 210                 |
| mud crab spp   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| grass shrimp spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| barnacle spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 822                  |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 12. Species composition and length statistics for Mobjack Bay sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - Mobjack Bay   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 5                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 7                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| spot   | 19                   | 2         | 27.94            | 3.8             | 31.15                     | 19                 | 91                  | 4.23                    | 56                  | 133                 |
| summer flounder  | 13                   | 4         | 19.12            | 2.6             | 21.31                     | 9                  | 205                 | 13.54                   | 154                 | 320                 |
| weakfish   | 12                   | 1         | 17.65            | 2.4             | 19.67                     | 12                 | 74                  | 4.57                    | 55                  | 104                 |
| blue crab, male  | 7                    | 2         | 10.29            | 1.4             | 11.48                     | .                  | 88                  | 8.01                    | 48                  | 121                 |
| blue crab, juvenile female                                   | 7                    | 2         | 10.29            | 1.4             | 11.48                     | .                  | 79                  | 4.09                    | 53                  | 99                  |
| bay anchovy  | 6                    | 1         | 8.82             | 1.2             | .                         | 3                  | 49                  | 8.42                    | 28                  | 76                  |
| oyster toadfish  | 2                    | 1         | 2.94             | 0.4             | 3.28                      | .                  | 115                 | 9                       | 106                 | 124                 |
| Atlantic croaker   | 1                    | 1         | 1.47             | 0.2             | 1.64                      | 1                  | 87                  | .                       | 87                  | 87                  |
| hogchoker  | 1                    | 1         | 1.47             | 0.2             | .                         | 0                  | 106                 | .                       | 106                 | 106                 |
| comb jelly spp   | .                    | 2         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| mud crab spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| grass shrimp spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 68                   |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 13. Species composition and length statistics for the Rappahannock River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
|--|----------------------------|-----------|------------------------|-----------------------|---------------------------------|--------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|
| System - Rappahannock River                                  |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Random Trawls Made - 8                                |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fixed Trawls Made - 0                                 |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fish Species - 9                                      |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Species  | Number<br>of Fish<br>(All) | Frequency | Percent<br>of<br>Catch | Catch<br>Per<br>Trawl | Adjusted<br>Percent of<br>Catch | Number<br>of Fish<br>YOY | Average<br>Length<br>(mm) | Standard<br>Error<br>(length) | Minimum<br>Length<br>(mm) | Maximum<br>Length<br>(mm) |
| white perch  | 313                        | 3         | 44.84                  | 39.13                 | 61.25                           | 307                      | 60                        | 2.55                          | 47                        | 156                       |
| bay anchovy  | 164                        | 3         | 23.5                   | 20.5                  | .                               | 164                      | 32                        | 0.69                          | 19                        | 40                        |
| blue crab, male  | 72                         | 3         | 10.32                  | 9                     | 14.09                           | .                        | 68                        | 2.74                          | 22                        | 155                       |
| blue crab, juvenile female                                   | 56                         | 4         | 8.02                   | 7                     | 10.96                           | .                        | 68                        | 2.76                          | 21                        | 132                       |
| weakfish   | 33                         | 1         | 4.73                   | 4.13                  | 6.46                            | 33                       | 84                        | 2.11                          | 60                        | 115                       |
| hogchoker  | 23                         | 4         | 3.3                    | 2.88                  | .                               | 21                       | 69                        | 1.89                          | 59                        | 96                        |
| Atlantic silverside  | 23                         | 2         | 3.3                    | 2.88                  | 4.5                             | 23                       | 53                        | 1.46                          | 38                        | 64                        |
| spot   | 8                          | 3         | 1.15                   | 1                     | 1.57                            | 8                        | 107                       | 4.32                          | 91                        | 132                       |
| Atlantic menhaden  | 2                          | 2         | 0.29                   | 0.25                  | 0.39                            | 2                        | 60                        | 31.5                          | 28                        | 91                        |
| blue crab, adult female                                      | 2                          | 2         | 0.29                   | 0.25                  | 0.39                            | .                        | 153                       | 2.02                          | 149                       | 156                       |
| northern puffer  | 1                          | 1         | 0.14                   | 0.13                  | 0.2                             | 1                        | 59                        | .                             | 59                        | 59                        |
| American eel   | 1                          | 1         | 0.14                   | 0.13                  | 0.2                             | .                        | 198                       | .                             | 198                       | 198                       |
| comb jelly spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| sea nettle   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| grass shrimp spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| isopod spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| barnacle spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| moon jelly   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| -----  |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| All Species Combined   | 698                        |           |                        |                       |                                 |                          |                           |                               |                           |                           |

Table 14. Species composition and length statistics for the Piankatank River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
|--|----------------------------|-----------|------------------------|-----------------------|---------------------------------|--------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|
| System - Piankatank River                                    |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Random Trawls Made - 6                                |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fixed Trawls Made - 0                                 |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fish Species - 10                                     |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Species  | Number<br>of Fish<br>(All) | Frequency | Percent<br>of<br>Catch | Catch<br>Per<br>Trawl | Adjusted<br>Percent of<br>Catch | Number<br>of Fish<br>YOY | Average<br>Length<br>(mm) | Standard<br>Error<br>(length) | Minimum<br>Length<br>(mm) | Maximum<br>Length<br>(mm) |
| striped bass   | 72                         | 1         | 28.46                  | 12                    | 43.37                           | 72                       | 69                        | 1.27                          | 59                        | 91                        |
| bay anchovy  | 64                         | 2         | 25.3                   | 10.67                 | .                               | 62                       | 33                        | 1.64                          | 22                        | 78                        |
| blue crab, male  | 29                         | 1         | 11.46                  | 4.83                  | 17.47                           | .                        | 93                        | 2.96                          | 55                        | 150                       |
| spot   | 24                         | 3         | 9.49                   | 4                     | 14.46                           | 24                       | 110                       | 2.63                          | 78                        | 133                       |
| hogchoker  | 23                         | 2         | 9.09                   | 3.83                  | .                               | 18                       | 78                        | 2.65                          | 60                        | 120                       |
| blue crab, juvenile female                                   | 18                         | 3         | 7.11                   | 3                     | 10.84                           | .                        | 84                        | 3.8                           | 57                        | 131                       |
| Atlantic silverside  | 10                         | 1         | 3.95                   | 1.67                  | 6.02                            | 10                       | 59                        | 2.18                          | 49                        | 69                        |
| summer flounder  | 8                          | 3         | 3.16                   | 1.33                  | 4.82                            | 7                        | 183                       | 18.58                         | 150                       | 310                       |
| naked goby   | 2                          | 1         | 0.79                   | 0.33                  | 1.2                             | .                        | 28                        | 3                             | 25                        | 31                        |
| weakfish   | 1                          | 1         | 0.4                    | 0.17                  | 0.6                             | 1                        | 98                        | .                             | 98                        | 98                        |
| white catfish  | 1                          | 1         | 0.4                    | 0.17                  | 0.6                             | 0                        | 240                       | .                             | 240                       | 240                       |
| skilletfish  | 1                          | 1         | 0.4                    | 0.17                  | 0.6                             | .                        | 29                        | .                             | 29                        | 29                        |
| mud crab spp   | .                          | 3         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| comb jelly spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| barnacle spp   | .                          | 2         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| sand shrimp  | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| grass shrimp spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| worm spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| sea nettle   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| -----  |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| All Species Combined   | 253                        |           |                        |                       |                                 |                          |                           |                               |                           |                           |

Table 15. Species composition and length statistics for the Potomac River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
|--|----------------------------|-----------|------------------------|-----------------------|---------------------------------|--------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|
| System - Potomac River                                       |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Random Trawls Made - 4                                |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fixed Trawls Made - 0                                 |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| No. of Fish Species - 11                                     |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| Species  | Number<br>of Fish<br>(All) | Frequency | Percent<br>of<br>Catch | Catch<br>Per<br>Trawl | Adjusted<br>Percent of<br>Catch | Number<br>of Fish<br>YOY | Average<br>Length<br>(mm) | Standard<br>Error<br>(length) | Minimum<br>Length<br>(mm) | Maximum<br>Length<br>(mm) |
| white perch  | 845                        | 4         | 85.35                  | 211.25                | 94.2                            | 356                      | 103                       | 3.14                          | 23                        | 221                       |
| bay anchovy  | 86                         | 4         | 8.69                   | 21.5                  | .                               | 86                       | 35                        | 0.55                          | 23                        | 45                        |
| striped bass   | 18                         | 2         | 1.82                   | 4.5                   | 2.01                            | 18                       | 62                        | 1.65                          | 55                        | 82                        |
| Atlantic menhaden  | 9                          | 2         | 0.91                   | 2.25                  | 1                               | 9                        | 43                        | 1.47                          | 36                        | 49                        |
| hogchoker  | 7                          | 3         | 0.71                   | 1.75                  | .                               | 2                        | 76                        | 5.73                          | 49                        | 92                        |
| Atlantic silverside  | 5                          | 2         | 0.51                   | 1.25                  | 0.56                            | 5                        | 57                        | 2.48                          | 50                        | 63                        |
| blue crab, juvenile female                                   | 5                          | 2         | 0.51                   | 1.25                  | 0.56                            | .                        | 87                        | 5.81                          | 65                        | 107                       |
| blue crab, male  | 4                          | 3         | 0.4                    | 1                     | 0.45                            | .                        | 88                        | 8.81                          | 63                        | 123                       |
| spot   | 3                          | 2         | 0.3                    | 0.75                  | 0.33                            | 3                        | 117                       | 11.59                         | 103                       | 140                       |
| brown bullhead   | 3                          | 2         | 0.3                    | 0.75                  | 0.33                            | .                        | 155                       | 18.68                         | 135                       | 192                       |
| weakfish   | 2                          | 1         | 0.2                    | 0.5                   | 0.22                            | 2                        | 82                        | 14.5                          | 67                        | 96                        |
| inland silverside  | 2                          | 1         | 0.2                    | 0.5                   | 0.22                            | .                        | 74                        | 0.5                           | 73                        | 74                        |
| Atlantic croaker   | 1                          | 1         | 0.1                    | 0.25                  | 0.11                            | 0                        | 285                       | .                             | 285                       | 285                       |
| mud crab spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| isopod spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| comb jelly spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| worm spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| barnacle spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| Amphipod spp   | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| bent mussel  | .                          | 1         | .                      | .                     | .                               | .                        | .                         | .                             | .                         | .                         |
| -----  |                            |           |                        |                       |                                 |                          |                           |                               |                           |                           |
| All Species Combined   | 990                        |           |                        |                       |                                 |                          |                           |                               |                           |                           |

Table 16. Species composition and length statistics for Pocomoke Sound sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - Pocomoke Sound                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 6                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 8                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| bay anchovy  | 443                  | 3         | 86.02            | 73.83           | .                         | 371                | 47                  | 0.78                    | 29                  | 67                  |
| weakfish   | 18                   | 3         | 3.5              | 3               | 25.71                     | 14                 | 103                 | 10                      | 31                  | 157                 |
| spot   | 17                   | 6         | 3.3              | 2.83            | 24.29                     | 17                 | 129                 | 1.1                     | 122                 | 137                 |
| blue crab, male  | 12                   | 3         | 2.33             | 2               | 17.14                     | .                  | 93                  | 4.81                    | 62                  | 130                 |
| blue crab, adult female                                      | 9                    | 3         | 1.75             | 1.5             | 12.86                     | .                  | 147                 | 1.94                    | 133                 | 158                 |
| blue crab, juvenile female                                   | 8                    | 3         | 1.55             | 1.33            | 11.43                     | .                  | 85                  | 3.99                    | 66                  | 110                 |
| hogchoker  | 2                    | 2         | 0.39             | 0.33            | .                         | 0                  | 116                 | 24                      | 92                  | 140                 |
| harvestfish  | 2                    | 1         | 0.39             | 0.33            | 2.86                      | 2                  | 58                  | 3.5                     | 54                  | 61                  |
| northern searobin  | 2                    | 1         | 0.39             | 0.33            | 2.86                      | 2                  | 149                 | 1.5                     | 147                 | 150                 |
| striped searobin   | 1                    | 1         | 0.19             | 0.17            | 1.43                      | .                  | 122                 | .                       | 122                 | 122                 |
| striped anchovy  | 1                    | 1         | 0.19             | 0.17            | 1.43                      | 1                  | 70                  | .                       | 70                  | 70                  |
| comb jelly spp   | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| sea nettle   | .                    | 3         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 515                  |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 17. Species composition and length statistics for Great Wicomico River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - Great Wicomico River                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 2                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 4                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| bay anchovy  | 57                   | 1         | 89.06            | 28.5            | .                         | 48                 | 39                  | 2.46                    | 23                  | 75                  |
| summer flounder  | 2                    | 1         | 3.13             | 1               | 28.57                     | 1                  | 277                 | 78.5                    | 198                 | 355                 |
| spot   | 2                    | 1         | 3.13             | 1               | 28.57                     | 2                  | 118                 | 8                       | 110                 | 126                 |
| northern puffer  | 1                    | 1         | 1.56             | 0.5             | 14.29                     | 1                  | 78                  | .                       | 78                  | 78                  |
| blue crab, male  | 1                    | 1         | 1.56             | 0.5             | 14.29                     | .                  | 116                 | 0                       | 116                 | 116                 |
| blue crab, juvenile female                                   | 1                    | 1         | 1.56             | 0.5             | 14.29                     | .                  | 106                 | 0                       | 106                 | 106                 |
| comb jelly spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| barnacle spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 64                   |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 18. Species composition and length statistics for Back Bay sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - Back Bay  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 10                               |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 10                                     |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| spot   | 312                  | 8         | 62.78            | 31.2            | 70.59                     | 312                | 66                  | 0.74                    | 51                  | 116                 |
| white perch  | 107                  | 6         | 21.53            | 10.7            | 24.21                     | 106                | 49                  | 0.99                    | 31                  | 77                  |
| bay anchovy  | 54                   | 4         | 10.87            | 5.4             | .                         | 53                 | 37                  | 0.51                    | 28                  | 45                  |
| Atlantic croaker   | 15                   | 7         | 3.02             | 1.5             | 3.39                      | 15                 | 124                 | 2.95                    | 99                  | 150                 |
| blue crab, male  | 2                    | 2         | 0.4              | 0.2             | 0.45                      | .                  | 159                 | 9.81                    | 142                 | 176                 |
| bluegill   | 2                    | 1         | 0.4              | 0.2             | 0.45                      | .                  | 26                  | 4                       | 22                  | 30                  |
| Atlantic menhaden  | 1                    | 1         | 0.2              | 0.1             | 0.23                      | 1                  | 34                  | .                       | 34                  | 34                  |
| white catfish  | 1                    | 1         | 0.2              | 0.1             | 0.23                      | 1                  | 40                  | .                       | 40                  | 40                  |
| common carp  | 1                    | 1         | 0.2              | 0.1             | 0.23                      | .                  | 76                  | .                       | 76                  | 76                  |
| naked goby   | 1                    | 1         | 0.2              | 0.1             | 0.23                      | .                  | 36                  | .                       | 36                  | 36                  |
| hogchoker  | 1                    | 1         | 0.2              | 0.1             | .                         | 1                  | 67                  | .                       | 67                  | 67                  |
| grass shrimp spp   | .                    | 4         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| wedge rangia clam  | .                    | 4         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| Amphipod spp   | .                    | 1         | .                | .               | .                         | .                  | .                   | .                       | .                   | .                   |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 497                  |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 19. Species composition and length statistics for North Landing River sites during the NCA 2003 sampling period. Second tows are not included.

| Month - All - Pooled, 2003                                   |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
|--|----------------------|-----------|------------------|-----------------|---------------------------|--------------------|---------------------|-------------------------|---------------------|---------------------|
| System - North Landing River                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Random Trawls Made - 2                                |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fixed Trawls Made - 0                                 |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| No. of Fish Species - 3                                      |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| Species  | Number of Fish (All) | Frequency | Percent of Catch | Catch Per Trawl | Adjusted Percent of Catch | Number of Fish YOY | Average Length (mm) | Standard Error (length) | Minimum Length (mm) | Maximum Length (mm) |
| brown bullhead   | 18                   | 1         | 85.71            | 9               | 85.71                     | .                  | 77                  | 9.72                    | 43                  | 237                 |
| white catfish  | 2                    | 1         | 9.52             | 1               | 9.52                      | 1                  | 102                 | 43                      | 59                  | 145                 |
| white perch  | 1                    | 1         | 4.76             | 0.5             | 4.76                      | 0                  | 123                 | .                       | 123                 | 123                 |
| -----  |                      |           |                  |                 |                           |                    |                     |                         |                     |                     |
| All Species Combined   | 21                   |           |                  |                 |                           |                    |                     |                         |                     |                     |

Table 20. Summary of tissue chemistry and pathology samples collected and their associated length statistics for the 2003 NCA sampling period.

| Common Name             | Species Code | Length Information (mm) |       |      |      |     |
|-------------------------|--------------|-------------------------|-------|------|------|-----|
|                         |              | Mean                    | S.E.  | Min. | Max. | N   |
| <b>Tissue Chemistry</b> |              |                         |       |      |      |     |
| Atlantic croaker        | 0005         | 205.2                   | 12.66 | 99   | 367  | 42  |
| hogchoker               | 0151         | 86.7                    | 2.53  | 37   | 182  | 142 |
| spot                    | 0033         | 116.4                   | 1.93  | 59   | 235  | 198 |
| summer flounder         | 0003         | 200.8                   | 9.59  | 126  | 386  | 44  |
| white perch             | 0032         | 134.6                   | 4.86  | 50   | 221  | 71  |
| Total                   |              |                         |       |      |      | 497 |

|                   |      |     |  |     |     |   |
|-------------------|------|-----|--|-----|-----|---|
| <b>Pathology</b>  |      |     |  |     |     |   |
| spot              | 0033 | 103 |  | 103 | 103 | 1 |
| Atlantic menhaden | 0037 | 91  |  | 91  | 91  | 1 |
| Total             |      |     |  |     |     | 2 |