Quality Assurance / Quality Control; Developments with Virginia's Biological Monitoring Program

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Purpose of QA /QC Program

The Virginia Department of Environmental Quality's (VADEQ) biological monitoring program has been a nationally recognized and respected program since the 1980's. Virginia was involved with the review and/or the development of the original USEPA's Rapid Bioassessment Protocols (RBP) (Plafkin et al. 1989) and the revised RBP document (Barbour et al. 1999).

However, due to the economic implications of benthic macroinvertebrate impairments to stakeholders such as the regulated community, the biological monitoring program has been put under a microscope. The need to update the biomonitoring QA/QC program was recognized.

Response: QA / QC documentation = Legal defensibility

QA / QC Goals

- Training / Standardization of Methods
- Update Standard Operating Procedures (SOPs)
- Update Quality Assurance Project Plan (QAPP)
- Benthic Macroinvertebrate Taxonomic Verification
- Benthic Macroinvertebrate Taxonomic Certification

VADEQ Biologists' "Training"

- Standardization of sampling methods
- Standardization of habitat assessments

Standard Operating Procedures

- Methods for Multi-habitat Benthic Macroinvertebrate Collections
- Methods for Benthic Macroinvertebrate Collections in Cobble Substrate (single habitat)
- Methods for Habitat Assessment for Streams
- Methods for Laboratory Sorting and Subsampling of Benthic Macroinvertebrate Samples

Approved by USEPA July 2006

QAPP

Includes the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001).

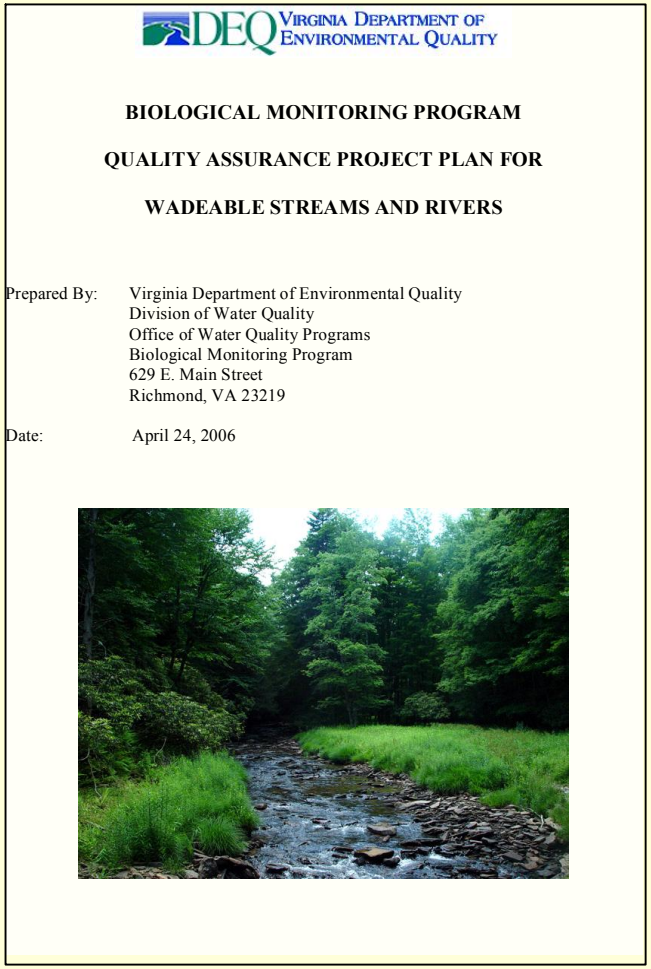
Group A: Project Management Elements

Group B: Measurement/ Data Acquisition Elements

Group C: Assessment/ Oversight Elements

Group D: Data Validation and Usability

Approved by USEPA July 2006



DEQ Virginia Department of Environmental Quality

BIOLOGICAL MONITORING PROGRAM

QUALITY ASSURANCE PROJECT PLAN FOR

WADEABLE STREAMS AND RIVERS

Prepared By: Virginia Department of Environmental Quality
Division of Water Quality
Office of Water Quality Programs
Biological Monitoring Program
629 E. Main Street
Richmond, VA 23219

Date: April 24, 2006

Taxonomic Verification

In 2005, the USEPA agreed to perform a taxonomic verification check on 5% of DEQ's benthic macroinvertebrate samples from 2004.

StationID	Final ID	VADEQ	EPA	ABSdiff	Agreements	Comments
4ABTM006.74	Capniidae	35	36	1	35	1 w/o head
4ABTM006.74	Chironomidae	8	8	0	8	1 w/o head
4ABTM006.74	Chloroperlidae	2	0	2	0	these were actually perlodids
4ABTM006.74	Elmidae	2	1	1	1	
4ABTM006.74	Ephemerellidae	5	5	0	5	
4ABTM006.74	Gomphidae	1	1	0	1	
4ABTM006.74	Heptageniidae	4	5	1	4	1 partial body
4ABTM006.74	Hydropsychidae	1	1	0	1	
4ABTM006.74	Leptophlebiidae	1	1	0	1	
4ABTM006.74	Limnephilidae	3	3	0	3	1 with thorax only counted
4ABTM006.74	Lumbriculidae	1	1	0	1	
4ABTM006.74	Peltoperlidae	1	1	0	1	
4ABTM006.74	Perlodidae	0	2	2	0	
4ABTM006.74	Simuliidae	11	11	0	11	
4ABTM006.74	Tabanidae	1	1	0	1	
4ABTM006.74	Taeniopterygidae	36	39	3	36	1 w/o abdomen
4ABTM006.74	Tipulidae	0	1	1	0	
		112	117	11	109	

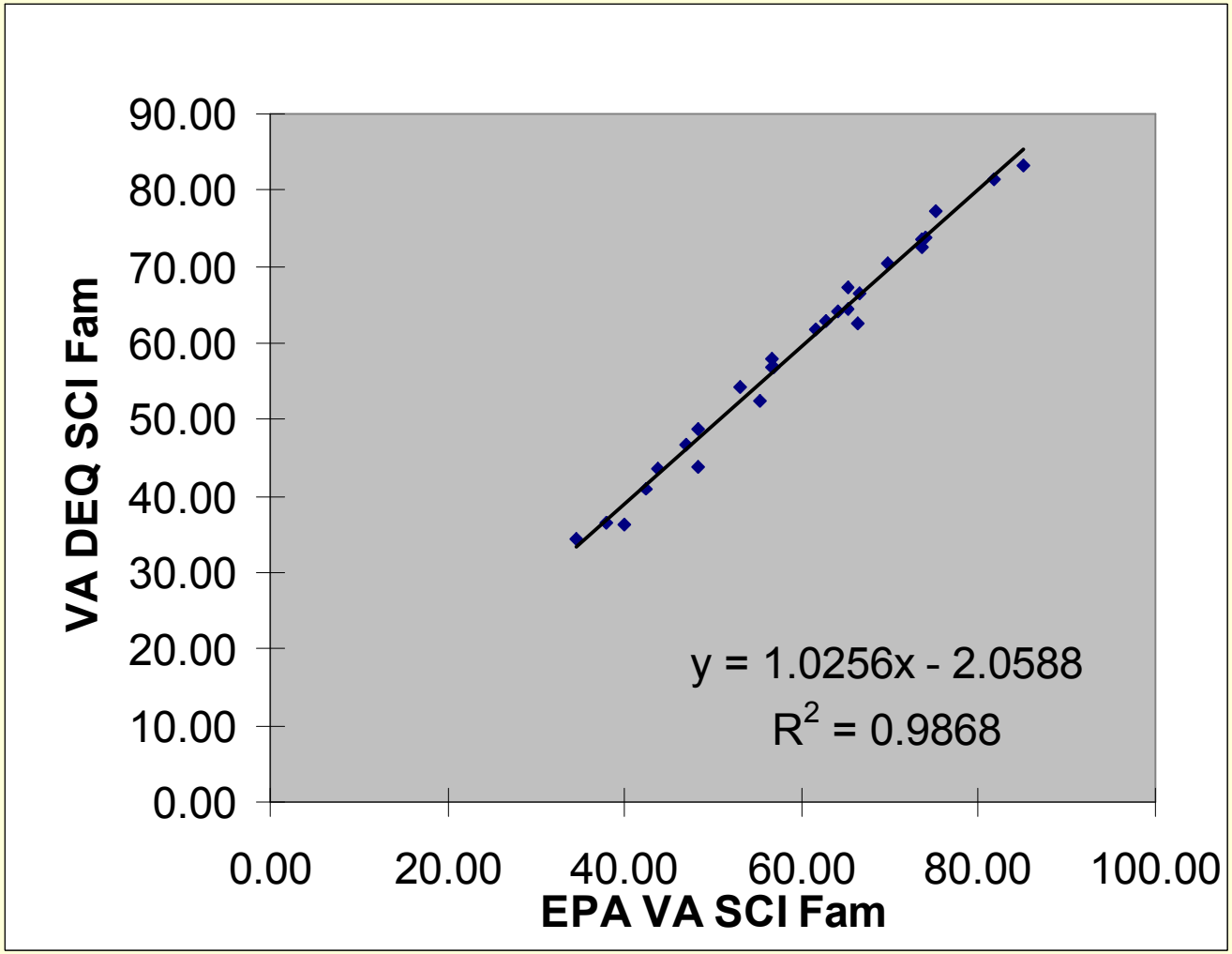
The Measurement Quality Objective (MQO) for DEQ's biological samples is a % taxonomic disagreement (PTD) < 10.0

Sample Number	No. of agreements	Total No. of Org. in larger Count (N)	PTD
BLACKWATER	103	113	**8.85**
BULL BRANCH	101	101	**0.00**
1BBVR002.75	115	119	**3.36**
2-BRX000.66	127	129	**1.55**
2-IVC010.20	118	118	**0.00**
2-MCM018.92a	107	110	**2.73**
2-MCM018.92b	103	106	**2.83**
2-JKS006.67	115	119	**3.36**
4ABTM006.74	109	117	**6.84**
6BEAS000.07	91	99	**8.08**
6AMCR017.12	96	101	**4.95**
6CSTC000.87	95	96	**1.04**
1BCDR015.40	131	139	**5.76**
1BLEW009.19	116	119	**2.52**
4-ALYT003.77	105	120	**12.50**
4-ASRV022.99	110	128	**14.06**
4AXUP000.06	168	177	**5.08**
5AXET000.28	108	124	**12.90**
2XVX000.62	102	105	**2.86**
5ASRN0001.24	92	100	**8.00**
5AWKS001.00	92	103	**10.68**
7-XDM000.50	101	110	**8.18**
1ANOG000.91	104	107	**2.80**
3-HAZ042.43	91	92	**1.09**
3-ROE004.04	94	98	**4.08**
8-PCT007.71	91	101	**9.90**
		Average PTD=	**5.54**

* EPA recognized that most disagreements were due to enumeration errors. VADEQ biologists were unaware that the 2004 samples were going to be checked and specimens may have been removed from the samples for voucher collections or damaged specimens may have been discarded after identification.

Even where there were QA failures (i.e., % taxonomic disagreement > 10.0) the VSCI did not change appreciably.

Residuals
0.54
0.97
-1.00
-0.41
0.61
0.48
0.85
0.78
1.72
2.39
-0.06
-0.31
0.32
2.09
0.13
-2.23
-0.46
-2.79
-3.37
1.25
0.79
0.35
1.99
-3.77
-1.89
-0.12
1.17



EPA has agreed to perform verification on 10% of VADEQ's 2006 benthic macroinvertebrate samples

Taxonomic Certification Workshop

A three day taxonomic identification workshop was conducted by Virginia Commonwealth University in March of 2006. DEQ biologists received comprehensive training in the identification of all families of insects, crustaceans, annelids, mollusks, and other minor groups of organisms that they are likely to encounter during bioassessments of Virginia's streams and rivers.

A certification exam was given at the end of the workshop:

All biologists obtained certification by scoring over 94%.

Current QA / QC status of DEQ's Biological Monitoring Program

- ✓ **EPA approved QAPP**
- ✓ **EPA approved SOPs**
- ✓ **Taxonomic verification program**
- ✓ **Biologists have taxonomic identification certification**

Future:

Will need to incorporate VSCI into QAPP

Questions?