THIRD ROCK CONSULTANTS

2526 Regency Road, Suite 180
Lexington, Kentucky 40503

Ph: 859-977-2000
Fax: 859-977-2001

February 15, 2008

Chuck Bowman, Buyer
Department of Administration
Purchasing Division
Building 15
2019 Washington Street, East
Charleston, WV 25305-0130

Re: *RFQ# DEP13868*

Dear Mr. Bowman:

Enclosed please find our bid submittal package in response to the above referenced RFQ. I have included the original RFQ document and the bid sheet addendum with applicable information and signatures. In addition, I have enclosed our taxonomist's resumes/certifications for your review.

Please contact me if you require additional information.

I look forward to hearing from you regarding bid selection. Thank you for the opportunity to continue providing macroinvertebrate services to your agency.

Sincerely,

Marcia L. Wooton

Marcia L. Wooton
Project Administrator

Enclosures

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

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DEP13868	1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
CHUCK BOWMAN
304-558-2157

VENDOR
*324095528 859-977-2000
THIRD ROCK CONSULTANTS LLC
~~2514~~ REGENCY ROAD #~~104~~
2526 180
LEXINGTON KY 40503

SHIP TO
ENVIRONMENTAL PROTECTION
DEPARTMENT OF
OFFICE OF WATER RESOURCES
601 57TH STREET SE
CHARLESTON, WV
25304 304-926-0499

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
01/20/2008	20			

BID OPENING DATE: ~~02/14~~/2008 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS		493-09		

WATER, WASTE WATER AND SOIL SAMPLE ANALYSIS

THE WEST VIRGINIA PURCHASING DIVISION, FOR THE AGENCY, THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, IS SOLICITING BIDS FROM QUALIFIED VENDORS TO PROVIDE ALL INSTRUMENTATION NECESSARY TO IDENTIFY BENTHIC MACROINVERTEBRATE SAMPLES FOR THE DIVISION OF WATER AND WASTE MANAGEMENT, PER THE ATTACHED SPECIFICATIONS, BID REQUIREMENTS, SCOPE OF WORK, TERMS & CONDITIONS, AND THE BID SCHEDULE.

EXHIBIT 3

LIFE OF CONTRACT: THIS CONTRACT BECOMES EFFECTIVE UPON AWARD AND EXTENDS FOR A PERIOD OF ONE (1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS WRITTEN NOTICE.

UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE IN THIS CONTRACT DOCUMENT, THE TERMS, CONDITIONS AND PRICING SET HEREIN ARE FIRM FOR THE LIFE OF THE CONTRACT.

RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR,

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE [signature] TELEPHONE 859-977-2000 DATE February 15, 2008

TITLE President FEIN 61-1379371 ✓ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
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SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30) DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE ORIGINAL CONTRACT AND SHALL BE LIMITED TO TWO (2) ONE (1) YEAR PERIODS.

CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.

OPEN MARKET CLAUSE: THE DIRECTOR OF PURCHASING MAY AUTHORIZE A SPENDING UNIT TO PURCHASE ON THE OPEN MARKET, WITHOUT THE FILING OF A REQUISITION OR COST ESTIMATE, ITEMS SPECIFIED ON THIS CONTRACT FOR IMMEDIATE DELIVERY IN EMERGENCIES DUE TO UNFORESEEN CAUSES (INCLUDING BUT NOT LIMITED TO DELAYS IN TRANSPORTATION OR AN UNANTICIPATED INCREASE IN THE VOLUME OF WORK.)

QUANTITIES: QUANTITIES LISTED IN THE REQUISITION ARE APPROXIMATIONS ONLY, BASED ON ESTIMATES SUPPLIED BY THE STATE SPENDING UNIT. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACT SHALL COVER THE QUANTITIES ACTUALLY ORDERED FOR DELIVERY DURING THE TERM OF THE CONTRACT, WHETHER MORE OR LESS THAN THE QUANTITIES SHOWN.

BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.

THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

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CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY ELECTRONIC MEDIUM SUCH AS CD-ROM.

REV. 04/11/2001

VENDOR PREFERENCE CERTIFICATE

CERTIFICATION AND APPLICATION* IS HEREBY MADE FOR PREFERENCE IN ACCORDANCE WITH WEST VIRGINIA CODE, 5A-3-37 (DOES NOT APPLY TO CONSTRUCTION CONTRACTS).

A. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:

( ) BIDDER IS AN INDIVIDUAL RESIDENT VENDOR AND HAS RESIDED CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR

( ) BIDDER IS A PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR AND HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR 80% OF THE OWNERSHIP INTEREST OF BIDDER IS HELD BY ANOTHER INDIVIDUAL, PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR WHO HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR

( ) BIDDER IS A CORPORATION NONRESIDENT VENDOR WHICH HAS AN AFFILIATE OR SUBSIDIARY WHICH EMPLOYS

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A MINIMUM OF ONE HUNDRED STATE RESIDENTS AND WHICH HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA CONTINUOUSLY FOR THE FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION.

B. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:

( ) BIDDER IS A RESIDENT VENDOR WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES WORKING ON THE PROJECT BEING BID ARE RESIDENTS OF WEST VIRGINIA WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID;
OR
( ) BIDDER IS A NONRESIDENT VENDOR EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS OR IS A NONRESIDENT VENDOR WITH AN AFFILIATE OR SUBSIDIARY WHICH MAINTAINS ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES OR BIDDERS' AFFILIATE'S OR SUBSIDIARY'S EMPLOYEES ARE RESIDENTS OF WEST VIRGINIA WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID.

BIDDER UNDERSTANDS IF THE SECRETARY OF TAX & REVENUE DETERMINES THAT A BIDDER RECEIVING PREFERENCE HAS FAILED TO CONTINUE TO MEET THE REQUIREMENTS FOR SUCH PREFERENCE, THE SECRETARY MAY ORDER THE DIRECTOR OF PURCHASING TO: (A) RESCIND THE CONTRACT OR PURCHASE ORDER ISSUED; OR (B) ASSESS A PENALTY AGAINST SUCH BIDDER IN AN AMOUNT NOT TO EXCEED 5% OF THE BID AMOUNT AND THAT SUCH PENALTY WILL BE PAID TO THE CONTRACTING

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

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State of West Virginia
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Request for Quotation

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AGENCY OR DEDUCTED FROM ANY UNPAID BALANCE ON THE CONTRACT OR PURCHASE ORDER.

BY SUBMISSION OF THIS CERTIFICATE, BIDDER AGREES TO DISCLOSE ANY REASONABLY REQUESTED INFORMATION TO THE PURCHASING DIVISION AND AUTHORIZES THE DEPARTMENT OF TAX AND REVENUE TO DISCLOSE TO THE DIRECTOR OF PURCHASING APPROPRIATE INFORMATION VERIFYING THAT BIDDER HAS PAID THE REQUIRED BUSINESS TAXES, PROVIDED THAT SUCH INFORMATION DOES NOT CONTAIN THE AMOUNTS OF TAXES PAID NOR ANY OTHER INFORMATION DEEMED BY THE TAX COMMISSIONER TO BE CONFIDENTIAL.

UNDER PENALTY OF LAW FOR FALSE SWEARING (WEST VIRGINIA CODE 61-5-3), BIDDER HEREBY CERTIFIES THAT THIS CERTIFICATE IS TRUE AND ACCURATE IN ALL RESPECTS; AND THAT IF A CONTRACT IS ISSUED TO BIDDER AND IF ANYTHING CONTAINED WITHIN THIS CERTIFICATE CHANGES DURING THE TERM OF THE CONTRACT, BIDDER WILL NOTIFY THE PURCHASING DIVISION IN WRITING IMMEDIATELY.

BIDDER: Third Rock Consultants

DATE: February 15, 2008

SIGNED: Molly Foree

Molly Foree

TITLE: President

* CHECK ANY COMBINATION OF PREFERENCE CONSIDERATION(S) IN EITHER "A" OR "B", OR BOTH "A" AND "B" WHICH YOU ARE ENTITLED TO RECEIVE. YOU MAY REQUEST UP TO THE

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State of West Virginia
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MAXIMUM 5% PREFERENCE FOR BOTH "A" AND "B".
(REV. 12/00)

NOTICE

A SIGNED BID MUST BE SUBMITTED TO:

DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
BUILDING 15
2019 WASHINGTON STREET, EAST
CHARLESTON, WV 25305-0130

THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:

SEALED BID

BUYER: CB-23

RFQ. NO.: DEP13868

BID OPENING DATE: 02/~~14~~20/2008 (Revised)

BID OPENING TIME: 1:30 PM

PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID: 859-977-2001

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE

TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

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State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

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CONTACT PERSON (PLEASE PRINT CLEARLY):
Marcia L. Wooton, Project Admistrator

****** THIS IS THE END OF RFQ DEP13868 ****** TOTAL:

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE

TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

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GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.

2. The State may accept or reject in part, or in whole, any bid.

3. All quotations are governed by the ***West Virginia Code*** and the ***Legislative Rules*** of the Purchasing Division.

4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required $125.00 registration fee.

5. All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.

6. Payment may only be made after the delivery and acceptance of goods or services.

7. Interest may be paid for late payment in accordance with the ***West Virginia Code.***

8. Vendor preference will be granted upon written request in accordance with the ***West Virginia Code.***

9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.

11. The laws of the State of West Virginia and the ***Legislative Rules*** of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.

12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.

13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this Contract may be deemed null and void, and terminated without further order.

14. **HIPAA Business Associate Addendum** - The West Viginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site **(http://www.state.wv.us/admin/purchase/vrc/hipaa.htm)** is hereby made part of the agreement. Provided that, the Agency meets the definition of a Covered Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.

2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.

3. Complete all sections of the quotation form.

4. Unit prices shall prevail in cases of discrepancy.

5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.

6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications.

SIGNED BID TO:

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

DEP13868
CONTRACT SPECIFICATIONS FOR BENTHIC MACROINVERTEBRATE SAMPLE PROCESSING AND/OR IDENTIFICATION

AREA OF WORK/BID AWARD

The Department of Environmental Protection, Division of Water and Waste Management is seeking bids for the processing and identification of benthic macroinvertebrates collected from West Virginia waters. Macroinvertebrates will be collected primarily from riffle / run habitats of flowing waters using rectangular dip nets.

Bids should be submitted by vendors in connection with the following:

- Sample pick-up and delivery
- Removal of organisms from stream debris
- Identification of the sample to the genus level and electronic submission of results
- Legal representation ($/hour)
- Quality assurance / quality control for sample processing and identification

Resumes of taxonomists and copies of NABS certificates shall be included in the bid package, or upon request prior to award.

Bid awards will be made to no more than three vendors. The program typically collects around 500 samples a year, but no minimum volume of samples is guaranteed to any one vendor.

QUALIFICATIONS

The Department of Environmental Protection's (DEP) Division of Water and Waste Management (DWWM) conducts inspections of permitted and non-permitted facilities, investigates complaints, monitors ambient quality of surface water, groundwater and sediments, performs studies, and provides water quality information to the citizens of West Virginia and other government agencies.

DWWM's Watershed Assessment Section (WAS) performs the majority of the macroinvertebrate sampling. WAS has collected an average of 500 benthic macroinvertebrate samples annually.

Legal action based upon identification results is possible. Therefore, the firm or firms selected shall have a quality control program in place and shall meet the following qualifications:

1. Must have degreed biologists on staff **that perform the actual identifications**. NABS certification for genus level EPT (eastern) and chironomidae (eastern) is required. (Identification of organisms by non-professional personnel is strictly forbidden.) Biologists must be dedicated taxonomists; that is, the majority of the work performed involves the identification of aquatic organisms.

2. Must be capable of attending and providing expert testimony in legal proceedings, upon request.

3. Completed results must be delivered to DWWM according to the following schedule:
   - Samples submitted by April 1 are due August 31;
   - Samples submitted by August 31 are due Dec. 1;
   - Samples submitted by December 31 are due Feb 28;
   - Results of smaller, site-specific projects must be available within one month of sample receipt or within some other negotiated time period.

   Submissions shall include the following for each sample: a) macroinvertebrate identifications in Excel or Access format; b) copies of bench sheets; c) all organisms identified (except reference specimens, which will be returned when the contract is complete); and d) all QA/QC associated with sorting and identifying the samples.

4. Must be able to complete large-scale macroinvertebrate processing and identification projects (e.g. projects with >200 samples per year).

SCOPE

In administering and enforcing most of the pollution control laws of the state, the importance of quality control cannot be overstated. Quality control measures must be strictly adhered to in all phases of sample collection, preservation, transportation, and analysis. The quality control and analytical processes, as they relate to the contractor's responsibility, are divided into four (4) major steps:

STEP 1 - Collection of sample from specified office.
STEP 2 - Conduct specified analysis on samples in a timely and professional manner.
STEP 3 - Establishment of continuing program to ensure the reliability of data (Quality Assurance/Quality Control).
STEP 4 - Legal Testimony

Step 1 - Collection of Samples from Specified Office

Benthic macroinvertebrate samples will be collected by DWWM personnel. Due the size of the sample containers (1 gallon jar) and the total number of samples collected annually, DWWM will not ship samples to the contractor using commercial transport such as UPS or Federal Express. Therefore, the vendor shall provide sample pick up and delivery services. DWWM will bear the cost of sample transport, however, and the vendor shall include sample transport costs as part of the bid package. Typically, there are four to five sample pick-ups per year.

DWWM will provide Chain-of-Custody forms when samples are picked-up by the vendor. The vendor shall be responsible for maintaining preservation of the sample and the internal chain of custody from the time the vendor obtains the sample until the results of macroinvertebrate identification are accepted by the Division. The vendor shall also maintain records of the results of identification for a minimum of five (5) years.

Step 2 - Conduct Specified Analysis on Samples

Sorting Benthic Macroinvertebrate Samples

Most benthic macroinvertebrate samples shall be processed in accordance with the procedures outlined in "Standard Operating Procedures for Processing Benthic Macroinvertebrate Samples" (Attachment A.). Sub-samples consisting of 200 aquatic macroinvertebrates are to be prepared for all samples collected with a net apparatus. Sub-samples shall be obtained by placing the entire sample in a sieve box divided into 100 1-inch by 1-inch grids. Any vertebrates encountered during subsampling should be retained with the sample, but not identified. Specimens should be stored in archival quality containers that will prevent loss of preservative through evaporation: glass vials with or without screw caps, polypropylene jars with screw caps, etc.

Occasionally, the entire sample will need to be sorted and identified (artificial substrate samples and special surveys). DWWM realizes that these samples may require significantly more time to process and identify than 200 organism subsamples. Vendors are asked to bid on whole-sample processing separately.

Vendor will be responsible for examining sorting efficiency for 5 % of all submitted samples for QA/QC purposes.

Identification of Benthic Macroinvertebrate Samples

Benthic macroinvertebrate samples shall be identified in accordance with procedures outlined in "Standard Operating Procedures for Identifying Macroinvertebrate Samples" (Attachment B.). Taxonomists are permitted to use identification keys other than those suggested in the operating procedures. However, all keys must be current and up-to-date. All results submitted to DWWM shall include a bibliography of publications used in identification of the specimens. Vendor will be responsible for identification only; data analysis will not be required.

All aquatic insects (including Diptera), crayfish, snails and clams are to be identified to the genus-level. ***(NOTE: samples may include a significant number of chironomid larvae, which MUST be identified to genus.)***

Aquatic invertebrates that do not require family/genus level identification are Nemertea, Oligochaeta, Nematoda, Hydroida, Turbellaria, Bryozoa, and Hirudinea. These organisms need only be identified to the taxonomic level (phylum, class, order, etc.) indicated in the previous sentence. However, it would be desirable to report lower taxonomic levels if these organisms are easily identified. Vertebrates and terrestrial organisms are not to be identified.

Vendor will be responsible for re-identification of 5 % of all submitted samples for QA/QC purposes.

Vendor will also be required to establish reference collections and retain all voucher specimens for this project. A reference collection is defined as a set of biological specimens, each representing some taxonomic level. Reference collections are to be arranged/curated based on taxonomic and/or phylogenetic order. Voucher specimens are the actual specimens identified from the samples.

Results of identifications shall be submitted on the form(s) provided by DWWM and in electronic format (Microsoft Excel or Access compatible format; WVDEP will provide a blank database for this purpose). All QA/QC associated with sorting and identification of each sample shall also be submitted with the results.

Analysis of samples is not deemed completed until the data has been submitted to and accepted by the DWWM. Should the DWWM not provide notice of acceptance within four weeks of the date results were mailed by the vendor, the firm may consider the data to be acceptable by the Division.

The vendor shall be responsible for maintaining preservation of the samples. Vendor shall return all sample jars, voucher specimens and reference collections to the DWWM in addition to the results of identification. Unused sample residues (i.e. detritus and unpicked portions) are to be properly disposed by the vendor.

Step 3 - Quality Control

The consultant shall compile genus-level reference and voucher collections to be submitted to DEP/DWWM annually or upon request.

With the exception of organisms used in the reference collection, all specimens identified in the 200 organism sub-samples are to be returned to DEP/DWWM. Slide mounted specimens should be labeled to indicate, at a minimum, DEP sample ID and lab number. All other specimens are to be stored in a singe sample vial (additional vials may be used when large organisms, (i.e., crayfish) are present).

Vendor shall evaluate sorting efficiency for 5 % of all samples. Recovery errors may not exceed 10% of the total sample. A record of all samples sorted, a list of quality control checks and documentation of any corrective action taken shall be maintained by the vendor to document the process. This information shall be provided annually or upon request.

In addition, the vendor shall re-identify a minimum of 5 % of the samples. A taxonomist other than the original identifier shall perform this check. All documentation associated with the QA/QC process, including any corrective action taken, shall be submitted to DEP/ DWWM annually or upon request.

If any significant changes in taxonomy occur during the life of this contract, the vendor shall notify DWWM and provide supporting references. This process will allow our own records to remain current.

DEP biologists and/or another contract laboratory will verify identifications for a minimum of 2.5% of the samples. Samples subjected to verification are selected randomly and will[1] encompass checks on all taxonomists. The vendor will be advised immediately if significant differences in identification are encountered. Cancellation of the contract will result if discrepancies continue.

Step 4 - Legal Testimony

The selected firm or firms may be requested by the DWWM to testify concerning the validity of

[1] "Significant" differences will include, but will not be limited to, consistent misidentification of an organism(s) during QA/QC checks.

the laboratory analysis. The firm will only be required to testify to the following areas:

1. Time of notification by the DEP/DWWM of sample shipment and by whom.
2. Condition of sample.
3. How sample was preserved by the firm.
4. Dates of analysis and by whom.
5. Chain of Custody procedures within the laboratory.
6. Methods used.
7. Results of analysis.

At no time will the firm respond to questions concerning interpretation of results. The Division shall reimburse the firm for the costs of any such testimony.

SUBCONTRACTORS

The vendors who are awarded a contract, when performing work under the terms and conditions of this contract, are solely responsible for the satisfactory completion of the work. The prime vendor shall be responsible for ensuring that any subcontractor has all the necessary permits, certifications, experience and insurance to perform the work. **All subcontractors must be approved in writing by DWWM before subcontractor initiates work.** The primary contractor shall supply resumes and/or other documents to prove sub-contractor's qualifications. DWWM will consider the prime vendor to be the sole point of contact with regard to authorized work under the contract; however, this provision does not prohibit the DWWM from directly contacting subcontractors.

CONFIDENTIALITY

The vendor agrees that any and all data, analyses, materials, reports or other information, oral or written, prepared by the vendor with respect to this requisition shall, except for information which has been publicly available, be treated as confidential and shall not be utilized, released, published, or disclosed, by the vendor at any time for any purpose whatsoever other than to provide consultation or other service to the DWWM.

Attachment A.

WVDEP/DWWM Requirements for Processing Benthic Macroinvertebrate Samples (Preparing a 200 organism sub-sample)

INTRODUCTION

Sorting macroinvertebrates from benthic survey samples (a procedure often referred to as "bug sorting") is an extremely important step in the biological research performed by the Department of Environmental Protection. The quality of the work performed by the "sorter" influences the quality of subsequent processes, such as identification and data analysis. A competent "sorter" must be able to recognize the morphological diversity of aquatic organisms, as well as the various methods these organisms may use to hide themselves from predators. The outcome of the final study may be affected, even if only a few organisms are overlooked during the sorting process.

The processes described below were derived from: Barbour, M. T. et al. "Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish", Second Ed., EPA 841-B-99-002. These protocols may be downloaded from the Internet at http://www.epa.gov/owowwtr1/monitoring/rbp/download.html.

DEFINITIONS

MACROINVERTEBRATES - Animals that are large enough to be seen with the naked eye and do not have a backbone.

BENTHIC ORGANISMS (or BENTHOS) - Living organisms that reside on the bottom of streams, rivers, or lakes. Benthos may be vertebrates, invertebrates, or plants.

REFERENCE COLLECTION – A reference collection is a set of specimens, each representing some taxonomic level and not necessarily limited to a specific project. For the purposes of DWWM's studies, a reference collection does not have to be limited to a particular watershed. Reference collections should have expert confirmation of each taxon. These collections are used to verify identifications of subsequent samples.

VOUCHER COLLECTION – The voucher collection consists of the actual specimens collected during the project. Following identification and enumeration, all specimens collected for this project should be maintained in a voucher collection. This collection will be returned to the DWWM.

EQUIPMENT

1. Sample Jar - Contains the unprocessed sample, which consists of benthic organisms and stream debris.

2. Sample vial - for storage of processed sample. This container may be a plastic/glass vial or a larger plastic bottle. Most samples will fit into a 10 ml vial, however, large organisms such as crayfish, will require larger bottles.

3. White Flat-bottom Pans - contain sample during the sorting process

4. Denatured Alcohol - preservative used in unprocessed and processed samples

5. Sieves - #30 sieves are used to separate alcohol and fine debris from the sample prior to sorting.

6. Sieve box - a homemade wooden frame with #30 mesh screening on the bottom is used to evenly distribute the sieved sample for randomly selecting the sub-sample. The internal dimensions of the box can vary (i.e., 10 in. X 10 in. or 5 in. X 20 in.); however, all boxes are marked into 100 1-inch by 1-inch grids.

7. Labels - Self-adhesive labels are used to identify the contents of the sample bottle (i.e., the sorted sample).

8. Scotch Tape - Used on label as additional adhesive.

9. Pencil - used to label sample bottle.

10. Crucible - or other small container, is used for short term, intermediate storage of the sample during the sorting process.

11. Forceps - Fine tipped forceps are used to remove the organisms from the debris.

12. Illuminated Magnifier - an optical aid to illuminate and magnify the sample during the sorting process. Alternatively, magnifying visors and a desk lamp can be used.

13. Squirt bottle - filled with alcohol, used to rinse organisms into sample bottle.

14. Plexiglas - used to cover sample partially sorted overnight to prevent evaporation.

SAFETY

Protective eyewear should be worn during sample processing to prevent contact with the residual alcohol in the specimens and debris.

PROCEDURES

1. Select the sample to be sorted. If a sample is in two jars, the contents of the jars must be combined before picking is initiated.

2. Select a small bottle that will hold the organisms after sorting is completed. Usually a 10 mL bottle is adequate for a 200-organisms sub-sample. An additional bottle may be needed if the sample contains large organisms.

3. Label the bottle:

   a. Use self-adhesive labels

   b. Using a pencil (ink will run if alcohol is spilled on the label), copy all information on the sample jar label onto the self-adhesive label. The label must include the following information:

      Stream Name
      Station Number (Random Number and/or AN-code)
      Sample ID# (Short number to link electronic results to final database)
      Sample Date
      County
      Initials of Sample Collector
      Initials of Sample Processor
      # of grids sorted
      # of organisms in final sample

   If any of this information is missing from the original sample jar label, notify the DWWM biologists so that the error can be corrected.

   c. Attach the new label on the bottle and secure with clear tape.

   d. Prepare an *internal* label for the sample using permanent ink. Internal label should contain the same information as required in 3-b above. This label will serve as a back-up if the external label is lost. (External labels may be omitted for samples stored in

transparent glass containers, as long as the internal label is clearly visible.)

4. Prepare the sample for sorting. This step is performed in a sink and should be done under a fume hood or in a well ventilated area.

   a. Under a fume hood, open sample jar and pour contents into the sieve box

   b. Rinse sample jar into sieve box and examine jar to make sure all detritus and bugs have been removed.

   c. Rinse the contents of the sieve box in tap water to remove remaining alcohol and to rinse out fine sand and sediment.

   d. Carefully rinse any large detritus (i.e. leaves) or stones, making sure that all organisms on these items are returned to the sieve. Discard the leaves and rocks after rinsing.

   e. Place the box in a few inches of water and gently swirl it until the contents are evenly distributed. ***Even distribution is extremely important in this step.*** If debris is clumped, the organisms will not be distributed evenly and the final result may be skewed. If the sample was divided into more than one jar, the jars are to be combined at this point. When the sample is evenly distributed throughout the gridded screen box, remove it from the water.

   f. Using a random number generator, select the first grid to be sorted. Using the "cookie cutter", isolate the organisms within the chosen grid and scoop the contents of the grid into a white enamel pan. Be careful not to destroy any organisms during this step. Organisms with their head inside the grid are to be included within the grid. If you can't tell which end is the head, then the organism belongs in the grid that contains the largest portion of the body.

5. Sorting

   a. Fill a crucible with 75% alcohol. A small piece of tape, rolled into a ring so the adhesive is exposed, may be attached to the bottom of the crucible to prevent tipping. If preferred, another small wide-mouth container may be substituted for the crucible.

   b. Using fine-tipped forceps and illuminated magnifier or magni-visor (sorter should use magnification of at least 2x), remove all invertebrates from the sub-sample and transfer to the alcohol filled crucible. Look for small clinging organisms that could be attached to larger organisms (e.g. midges on crayfish). Keep track of the number of organisms that have been sorted. ***If there are a significant number of invertebrates that appear to be terrestrial, include them in the sample, but do not include them in the 200-organism***

count. The taxonomist will verify whether these organisms are truly terrestrial or semi-aquatic. Do not include empty clam or snail shells, or parts of organisms that are easily disconnected from the specimen (legs, gills, etc.).

c. If leaves are present, be sure to examine both surfaces. Watch for unusual clumps of twigs, leaves, or sand, which may be protective cases for some organisms. If cases are found, both the case and the organism should be sorted. If the organism is in the case, the case and organism should be kept together. If an empty case is found, it should also be removed.

d. If there is any doubt to the identity of an object (is it a seed or a bug?), it should be sorted, but not counted. A senior biologist should be notified if a large number of questionable objects are present.

e. When all the organisms appear to have been removed from the pan, agitate the contents of the pan and look again. Often the agitation will reorient an organism that was previously overlooked.

f. Have a senior biologist inspect the pan after sorting has been completed. The biologist will point out any organisms that have been overlooked or misidentified as detritus. As the sorter becomes more proficient at his/her task, this step will be reduced in frequency.

g. If 200 or more organisms have been obtained from the initial grid chosen, sub-sampling is complete. If fewer than 180 organisms have been collected, another grid is randomly chosen and steps 4.f through 5.e are repeated until at least 180 organisms are obtained or until the entire sample has been sorted. The remainder of the sample (i.e., the non-selected grids) may be discarded.

h. Pour the contents of the crucible into the labeled vial. Use a squirt bottle containing alcohol to rinse the organisms from the crucible. Make sure that all organisms in the vial are fully submerged in the alcohol. If some remain on vial sides, use the squirt bottle to rinse them down into the alcohol.

6. Record Keeping

a. After a sample has been sorted, record the date and your initials in the sample log book. The **total number of organisms picked** and **the number of grids sorted** should also be documented for each sample. This last step is very important as these values are used to calculate an estimate of organism density and to determine sample comparability.

QUALITY ASSURANCE/QUALITY CONTROL

Sorting efficiency shall be evaluated for 5% of the samples. Recovery errors cannot exceed 10% (i.e., no more than 20 organisms can be missed by the sorter for a given sample) of the total sample (composite of remnants from each grid sorted). If the sorter does not meet this standard, the sorted sample remnants shall be re-checked until the recovery limits are attained. A record of all samples sorted, a list of quality control (QC) checks and documentation of any corrective action taken shall be maintained by the vendor to document the process. DWWM reserves the right to review QA/QC documentation upon request.

Attachment B.

WVDEP/DWWM Requirements for the Identification of Macroinvertebrates

Consultant will be required to provide identification services only. No data analysis will be required. At the completion of the projects (or portions of the project) the consultant will submit the completed "WVDEP/ WAS BENTHIC MACROINVERTEBRATE LAB SHEET", voucher specimens, and identification results in Microsoft Excel or Access format. (The voucher specimens are essentially all specimens in the 200 organism sub-sample that have not been included in the reference collection.) Vendor may retain reference specimens until the project has been completed.

Aquatic insects (***including all Diptera***), crayfish, snails and clams in the 200-organism subsample are to be identified to the genus level as specified in the project contract. Aquatic invertebrates that do not require genus level identification are Nemertea, Oligochaeta, Nematoda, Hydroida, Turbellaria, Bryozoa, and Hirudinea. These organisms need only be identified to the taxonomic level (phylum, class, order, etc.) indicated in the previous sentence. However, it would be desirable to report lower taxonomic levels if these organisms are easily identified. Vertebrates and terrestrial organisms are not to be identified. If these organisms are included in the sample, they shall be retained with the sample and returned to DWWM.

MATERIALS AND SUPPLIES

1. Dissecting Microscope - for examination of gross features.

2. Compound Microscope - for examining minute features. Phase-contrast microscopes are preferable.

3. Fine-tipped forceps - for manipulating specimens.

4. Fine-tipped probes - for manipulating specimens.

5. Petri dishes – or other container to hold specimens during identification.

6. Alcohol - 75% ethanol or isopropanol is used to preserve the samples.

7. Wash Bottle - used for alcohol storage.

8. Microscope Slides and glass cover slips - for examination of small specimens (e.g. midges) and/or body parts under a compound microscope. Slides and cover slips should be clean.

9. Benthic Macroinvertebrate Lab Sheet - standard for recording results of identification and enumeration (Figure 1).

10. Mounting Medium – CMC-10 mounting medium is used to prepare permanent mounts of microscopic specimens.

Figure 1. An Example of the DWWM Macroinvertebrate Identification Lab Sheet.

WVDEP-WAS BENTHIC MACROINVERTEBRATE LAB SHEET

Stream Name: _____ AN-Code: WV_____ R#: _____

Sample ID: _____ Collection Date (mm/dd/yy): _____ County, State: _____

Sorted by: _____ Number of Grids Picked: _____ Number of Organisms Picked: _____

ID By: _____ Collected By: _____ # Organisms ID'd _____

Taxon ID/Taxon	Count	Taxon ID/Taxon	Count	Taxon ID/Taxon	Count
Annelida		Plecoptera		Diptera (Chronomidae)	
Amphipoda					
Isopoda					
				Diptera (other)	
Decapoda		Trichoptera			
Ephemeroptera					
		Megaloptera			
				Mollusca	
Odonata					
		Coleoptera			
				Other Taxa	

10.

11. Taxonomic Keys –

The primary taxonomic keys are listed below. The contractor may use other taxonomic keys for lower level identification; however, these references must be current and up-to-date. The contractor shall provide a list of references used in the identification of all specimens.

General Keys:

Brigham, A. R., W. U. Brigham, and A. Gnilka (eds.). 1982. Aquatic Insects and Oligochaetes of North and South Carolina. Midwest Aquatic Enterprises, Mahomet, Illinois.

Merrit, R. W. and K. W. Cummins, eds. 1996. An Introduction to the Aquatic Insects of North America, Third Edition. Kendall and Hunt Publishing Company, Debuque, Iowa.

Peckarsky, B. L., P. R. Fraissinet, M. A. Penton, and D. J. Conklin, Jr. 1990. Freshwater Macroinvertebrates of Northeastern North America. Cornell University Press.

Pennack, R. W. 1978. Fresh-water invertebrates of the United States. John Wiley and Sons, New York

Pennak, R. W. 1989. 3rd Edition. Fresh-water Invertebrates of the United States – Protozoa to Mollusca. John Wiley and Sons, Inc., New York, New York. 628 pp.

Thorp, J.H and A.P.Covich, Eds. 2001. Ecology and Classification of North American Freshwater Invertebrates. Second Edition. Academic Press.

Annelida:

Brinkhurst, R. O. 1986. Guide to the freshwater aquatic microdile oligochaetes of North America. Canadian Spec. Publ. Fish. Aquat. Sci. 84: 259 pp.

Klemm, D. J. (ed.). 1985. A guide to the freshwater Annelida (Polychaeta, naidid and tubificid Oligochaeta, and Hirudinea) of North America. Kendall/Hunt Publishing Co., Dubuque, Iowa.

Crustacea:

Hobbs, H. H., Jr. 1972. Biota of freshwater ecosystems, identification manual no. 9. Crayfishes (Astacidae) of North and Middle America. EPA-WPCRS No. 18050, ELD05/72. Supt. Doc. No. 5501-0399, U. S. Environ. Prot. Agency, Washington, D.C. 173 pp.

Holsinger, J. R. 1972. Biota of freshwater ecosystems, identification manual. Freshwater amphipod crustaceans (Gammaridae) of North America. WPCRS No. 18050, ELD04/72. Supt. Doc. No. 5501-0369, U. S. Environ. Prot. Agency, Washington, D.C. 89 pp.

Taylor, C. A., and G. A. Schuster. 2004. The Crayfishes of Kentucky. Illinois Natural History Survey Special Publication No. 28. viii + 219pp.

Williams, W. D. 1972. Biota of freshwater ecosystems, identification manual no. 7. Freshwater isopods (Asellidae) of North America. WPCRS No. 18050, ELD05/72. Supt. Doc. No. 5501-0390, U. S. Environ. Prot. Agency, Washington, D.C. 45 pp.

Coleoptera:

Brown, H. P. 1972. Aquatic dryopoid beetles (Coleoptera) of the United States. U. S. Government Printing Office.

Epler, J. H. 1996. Identification manual for the water beetles of Florida (Coleoptera: Dryopidae, Dytiscidae, Elmidae, Gyrinidae, Haliplidae, Hydraenidae, Hydrophilidae, Noteridae, Psephenidae, Ptilodactylidae, Scirtidae). Florida Dept. Env. Prot., Tallahassee, Florida.

Diptera:

Adler, P. H. and K. C. Kim. 1986. The black flies of Pennsylvania (Simuliidae, Diptera). Bionomics, taxonomy, and distribution. The Pennsylvania State Univ., Agric. Exp. Stat. Bull. 856, 85 pp.

Bode, R. W. 1983. Larvae of North American *Eukiefferiella* and *Tvetenia* (Diptera: Chironomidae). Bull. New York State Museum 452:1-40.

Epler, J. H. 1995. (Revised Edition). Identification manual for the larval Chironomidae (Diptera) of Florida. Florida Dept. Env. Prot., Tallahassee, FL 302 pp.

Epler, J. H. 2001. Identification Manual for the Larval Chironomidae (Diptera) of North and South Carolina. Available on-line: http://www.esb.enr.state.nc.us/BAUwww/Chiron_manual/intro.pdf

Gelhaus, J. K.. 2002 Manual for the Identification of Aquatic Crane Fly Larvue for Southeastern United States. Unpublished.

McAlpine, J.F. (Ed.). 1989. Manual of Nearctic Diptera. Vols. 1-3. Research Branch Agriculture Canada. Monograph No. 32.

Pechuman, L. L., D. W. Webb, and H. J. Teskey. 1983. The Diptera, or true flies, of Illinois. I. Tabanidae. Illinois Nat. Hist. Surv. Bull. 33(1):1-122.

Simpson, K. W., R. W. Bode, and P. Albu. 1982. Keys for the genus *Cricotopus* adapted from "Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae)' by M. Hirvenoja. Bull. 450, New York St. Mus., Albany, New York.

Webb, D. W. 1977. The Nearctic Athericidae. J. Kansas Entomol. Soc. 50: 473-495.

Ephemeroptera:

Bednarik, A. F. and W. P. McCafferty. 1979. Biosystematic revision of the genus *Stenonema* (Ephemeroptera: Heptageniidae). Can. Bull. Fish. Aquat. Sci. 21:1-73.

Berner, L. and M. L. Pescador. 1988. 2nd Ed. The mayflies of Florida. Univ. Florida Press, Gainesville, Florida. 352 pp.

Burks, B. D. 1953. The mayflies, or Ephemeroptera, of Illinois. Illinois Nat. Hist. Surv. (Urbana). Bull. 26, Part1:1-211.

Edmunds, G. F., Jr., S. L. Jensen, and L. Berner. 1976. Mayflies of North and Central America. University of Minnesota Press.

Lugo-Ortiz, C. R. and W. P. McCafferty. 1998. A new North American genus of Baetidae (Ephemeroptera) and key to *Baetis* complex genera. Entomol. News 109:345-353.

Lugo-Ortiz, C. R., W. P. McCafferty, and R. D. Waltz. 1999. Definition and reorganization of the genus Pseudocloeon (Ephemeroptera: Baetidae) with new species descriptions and combinations. Trans. American 1Entomol. Soc. 125:1-37.

McCafferty, W. P. 1975. The burrowing mayflies (Ephemeroptera: Ephemeridae) of the United States. Trans. Amer. Entomol. Soc. 101:447-504.

McCafferty, W. P. and R. D. Waltz. 1995. *Labiobaetis* (Ephemeroptera: Baetidae): new status, new North American species, and related new genus. Entomol. News 106(1):19-28.

McCafferty, W. P., M. L. Wigle, and R. D. Waltz. 1994. Systematics and biology of *Acentrella turbida* (McDunnough) (Ephemeroptera: Baetidae). Pan-Pacific Entomol. 70(4):301-308.

Morihara, D. K. and W. P. McCafferty. 1979. The *Baetis* larvae of North America (Ephemeroptera: Baetidae). Trans. Amer. Entomol. Soc. 105(2):139-221.

Pescador, M. L. and L. Berner. 1981. The mayfly Baetiscidae (Ephemeroptera). Part 2. Biosystematics of the genus *Baetisca*. Trans. Amer. Entomol. Soc. 107:163-228.

Provonsha, A. V. 1990. A revision of the genus *Caenis* in North America (Ephemeroptera: Caenidae). Trans. Amer. Entomol. Soc. 116(4):801-884.

Tarter, D. C. and R. F. Kirchner. 1978. A new species of *Baetisca* from West Virginia (Ephemeroptera: Baetiscidae). Entomol. News 89(9-10):209-213.

Mollusca:

Branson, B. A. 1987. Keys to the aquatic gastropoda known from Kentucky. Trans. Kentucky Acad. Sci. 48(1-2):11-19.

Burch, J. B. 1972. Biota of freshwater ecosystems, identification manual no. 3. Freshwater sphaeriacean clams (Mollusca: Pelecypoda) of North America. WPCRS No. 18050, ELD03/72. Supt. Doc. No. 5501-0367, U. S. Environ. Prot. Agency, Washington, D.C. 31 pp.

Burch, J. B. 1982. Freshwater Snails (Mollusca: Gastropoda) of North America. United States Environmental Protection Agency. EPA-600/3-82-026.

Parmalee, P.W. and A.E. Bogan. 1998. The Freshwater Mussels of Tennessee. University Tennessee Press. Knoxville, Tennessee. 328 pp.

Odonata:

Needham, J. G. and M. J. Westfall, Jr., and M.L. May. 2000. Dragonflies of North America. Scientific publishers, Gainesville, Florida. xvi and 940 pp.

Westfall, M. J. and M. L. May. 1996. Damselflies of North America. Scientific Publishers, Inc., Gainesville, Florida. 650 pp.

Plecoptera:

Frison, T. H. 1935. The stoneflies, or Plecoptera, of Illinois. Illinois Nat. Surv. Bull. 20: 280-471.

Stewart, K. W. and B. P. Stark. 2002. Nymphs of North American stonefly genera (Plecoptera)..Second Edition. The Caddis Press. Columbus, Ohio. xii + 510 pp

Trichoptera:

Chapin, J. W. 1978. Systematics of nearctic *Micrasema* (Trichoptera: Brachycentridae). Ph.D. Dissertation, Clemson University, Clemson, South Carolina, 136 pp.

Flint, O. S. 1962. Larvae of the Genus *Rhyacophila* in eastern North America (Trichoptera: Rhyacophilidae). Proc. U.S. National Mus. (Washington, D.C.) 113:465-493.

Flint, O. S. 1984. The genus *Brachycentrus* in North America, with a proposed phylogeny of the genera of Brachycentridae (Trichoptera). Smith. Contrib. Zool. No. 398.

Floyd, M. A. 1995. Larvae of the caddisfly genus *Oecetis* in North America. Bull. Ohio Biol. Surv., New Series, Vol. 10, No. 2, viii + 85 pp.

Glover, J. B. 1996. Larvae of the caddisfly genera *Triaenodes* and *Ylodes* (Trichoptera: Leptoceridae) in North America. Bull. Ohio Biol. Surv., New Series, Vol. 11, No. 2, vii + 89 pp.

Prather, A.L. and J.C. Morse. 2001. Eastern Nearctic *Rhyacophila* species, with revision of the *Rhyacophila invaria* group *Trichoptera: Rhyacophilidae*. Trans American Entomol. Soc. 127:85-166.

Ross, H. H. 1944. The caddisflies, or Trichoptera, of Illinois. Illinois Nat. Hist. Surv. (Urbana). Bull. 23, Art. 1:1-326.

Schefter, P. W. and G. B. Wiggins. 1986. A systematic study of the Nearctic larvae of the *Hydropsyche morosa* Group (Trichoptera: Hydropsychidae). Royal Ontario Mus., Toronto, Canada. 94 pp.

Schuster, G. A. and D. A. Etnier. 1978. A manual for the identification of the larvae of the caddisfly genera *Hydropsyche* Pictet and *Symphitopsyche* Ulmer in eastern and central North America (Trichoptera: Hydropsychidae). EPA-600/4-78-060.

Wiggins, G. B. 1996. Larvae of the North American caddisfly genera (Trichoptera), 2nd Edition. Univ. Toronto Press, Canada. 457 pp.

Procedures for mounting Chironomidae (and other small specimens)

The procedures that follow are summarized from Epler's *Identification Manual for the Larval Chironomidae (Diptera) of North and South Carolina.*

1. Label a clean glass slide. Label should include, at a minimum, the stream name, stream code, collection data and sample ID number.

2. Place 2-5 drops of CMC-10 mounting medium on the slide.

3. Place the specimens in the mounting medium, ventral side up, head pointing down ("south"). Tease out larger bubbles.

4. Gently lower coverslip over the mounting medium at an angle.

5. Use the cover slip to reposition larvae, if desired. Then gently press down the copver slip over the head capsules with pencil eraser to spread the mouthparts and over the anal end to spread the hind pro-legs.

6. Lay the slide on a flat surface and allow it to cure for 2-3 hours. If air bubble form, fill them in with fresh medium and allow to cure 1-2 more hours. Then ring the slide with more medium or clear fingernail polish.

Quality Assurance / Quality Control

A minimum of 5 percent of the samples are re-identified by a taxonomist other than the original identifier. Errors are brought to the attention of the original taxonomist and subsequent identifications are subject to scrutiny until errors are resolved. DWWM may request results of the QA/QC activities.

Revised - See Attached (Addendum) 1/29

DEP13868 BID SHEET

Item No.	Quantity	Description	Unit Price	Amount
A	500	Per sample un-sorted, identified to genus level: 200 organism subsample	$	$
B	50	Per sample pre-sorted, identified to genus level (necessary for quality assurance checks; 200 organism 200 organism subsample	$	$
C	500	Per sample un-sorted, identified to genus level; entire sample.	$	$
D	50	Per sample pre-sorted, identified to genus level (necessary for quality control assurance checks); entire sample	$	$
E	4	Per each "sample pick-up/delivery" not "per sample" (assume 100 samples per pickup)	$	$
F	20 hr	Cost/hour for professional staff repersentation of data in legal/administrative setting	$	$
G	10	Whole Sample (not 200 organism sub sample)	$	$

TOTAL = $

Contractor: _____

Signature: _____

Date: _____

Quantities listed on the bid schedule are for bid evaluation purposes only and are not a guarantee of quantities to be ordered over the life of the contract. Actual quantities ordered may be more or less than those stated on this schedule.

RFQ No. DEP13868

STATE OF WEST VIRGINIA
Purchasing Division

030

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate

DEFINITIONS:
"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

LICENSING: Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

CONFIDENTIALITY: The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendors should visit **www.state.wv.us/admin/purchase/privacy** for the Notice of Agency Confidentiality Policies.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), it is hereby certified that the vendor acknowledges the information in this said affidavit and are in compliance with the requirements as stated.

Vendor's Name: Third Rock Consultants LLC

Authorized Signature: _____ Date: February 15, 2008

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
DEP13868	1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
CHUCK BOWMAN
304-558-2157

VENDOR
*324095528 859-977-2000
THIRD ROCK CONSULTANTS LLC
~~2514~~ 2526 REGENCY ROAD #~~104~~ 180
LEXINGTON KY 40503

SHIP TO
ENVIRONMENTAL PROTECTION
DEPARTMENT OF
OFFICE OF WATER RESOURCES
601 57TH STREET SE
CHARLESTON, WV
25304 304-926-0499

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
02/08/2008				

BID OPENING DATE: 02/20/2008 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
	********** ADDENDUM NO. 1 ********** ADDENDUM ISSUED FOR THE BENTHIC MICROINVERTABRATE SAMPLE CONTRACT TO DISTRIBUTE THE AGENCY REVISED BID SCHEDULE. PLEASE USE THE ATTACHED WHEN SUBMITTING QUOTATION. BID DATE AND OPENING TIME ARE EXTENDED TO 02/20/2008 AT 1:30 PM. ********** NO OTHER CHANGES **********					
0001	1	LS		493-09		
	WATER, WASTE WATER AND SOIL SAMPLE ANALYSIS					

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE [signature] TELEPHONE 859-977-2000 DATE February 15, 2008

TITLE President FEIN 61-1379371 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.

2. The State may accept or reject in part, or in whole, any bid.

3. All quotations are governed by the ***West Virginia Code*** and the ***Legislative Rules*** of the Purchasing Division.

4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required $125.00 registration fee.

5. All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.

6. Payment may only be made after the delivery and acceptance of goods or services.

7. Interest may be paid for late payment in accordance with the ***West Virginia Code.***

8. Vendor preference will be granted upon written request in accordance with the ***West Virginia Code.***

9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.

11. The laws of the State of West Virginia and the ***Legislative Rules*** of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.

12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.

13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this Contract may be deemed null and void, and terminated without further order.

14. **HIPAA Business Associate Addendum -** The West Viginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (**http://www.state.wv.us/admin/purchase/vrc/hipaa.htm**) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Covered Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.

2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.

3. Complete all sections of the quotation form.

4. Unit prices shall prevail in cases of discrepancy.

5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.

6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications.

SIGNED BID TO:

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

REVISED PER ADDENDUM NO. 1

DEP13868 BID SHEET

Item No.	Quantity	Description	Unit Price	Amount
A	500	Per sample un-sorted, identified to genus level: 200 organism subsample	$150	$75,000
B	50	Per sample pre-sorted, identified to genus level (necessary for quality assurance checks; 200 organism 200 organism subsample	$100	$5,000
C	20	Per sample un-sorted, identified to genus level; entire sample.	$350	$7,000
D	20	Per sample pre-sorted, identified to genus level (necessary for quality control assurance checks); entire sample	$300	$6,000
E	4	Per each "sample pick-up/delivery" not "per sample" (assume 100 samples per pickup)	NC	—
F	20 hr	Cost/hour for professional staff representation of data in legal/administrative setting	$80	$1,600

TOTAL = $94,600.00

Contractor: Third Rock Consultants, LLC

Signature: [signature] President

Molly Foree

Date: February 15, 2008

Quantities listed on the bid schedule are for bid evaluation purposes only and are not a guarantee of quantities to be ordered over the life of the contract. Actual quantities ordered may be more or less than those stated on this schedule.

Aquatic Biology

Fish

Chelsey has surveyed for fishes in streams, rivers, and lakes throughout Kentucky and Tennessee using several sampling techniques including backpack electroshocking, boat mounted electroshocking, and seining. He also participated in surveying the fish communities of Pools 9 and 10 of the Kentucky River and their respective tributaries. Chelsey has conducted blackside dace (*Phoxinus cumberlandensis*) surveys in numerous streams in southeastern Kentucky for coalmine permits and utility crossings. On one such survey at Davis Branch, Chelsey located and identified the federally threatened blackside dace.

Macroinvertebrates

Chelsey is responsible for identification, sorting, and collection of macroinvertebrates. He routinely identifies aquatic members of the phyla Arthropoda, Mollusca, and Annelida to genus/species. He has performed macroinvertebrate identification for numerous clients including the Environmental Protection Agency, West Virginia Department for Environmental Protection, Lexington Fayette County Urban Government, Kentucky Division of Water, Tennessee Department of Environmental Quality, US Army Corps of Engineers Louisville District, Louisville Metropolitan Sewer District, and the Ohio River Valley Water Sanitation Commission. Chelsey is also responsible for statistical analyses of these macroinvertebrates, including the modified Hilsenhoff Biotic Index.

Mussels

Chelsey has experience designing and conducting mussel surveys. In 2007 he developed survey plans for three large-scale (SCUBA) mussel surveys, two on the Green River and one on the Cumberland River. The surveys resulted in the discovery of one endangered species, the fanshell (*Cyprogenia stegaria*), on the Green River. He has recently designed the mussel survey plan for a raw water intake structure to be located on the South Fork Rockcastle River in Jackson County, Kentucky.

Chelsey's survey experience ranges from simple view bucket and "hand grubbing" in the upper reaches of river systems to working with surface air supplied divers in the lower reaches of primary water systems. In 2006, Chelsey played a key role in the identification of over 40,000 mussels in a relocation project on the Tennessee River.

Chelsey also has recent experience in mussel identification through two workshops and through coursework while completing his masters degree. Chelsey completed the semester-long course, Freshwater Invertebrates, under the direction of Dr. Guenter Schuster, professor at Eastern Kentucky University. In the course, he gained extensive knowledge in the identification of mussels and crayfish. Chelsey also attended a 1-day workshop, Freshwater Mussel Identification, also under the direction of Dr. Schuster. In the workshop, he learned to identify federally threatened and endangered mussel species using examples from the mollusk division of Eastern Kentucky University's museum collection. Chelsey recently revisited the collection and under the direction of Ed Hartowicz received additional identification training.

Terrestrial Biology

Mammals (Bats and Small Mammals)

Chelsey's project experience includes conducting numerous biological assessments (mist-netting for Federal and Kentucky listed bat species across Kentucky) and conducting bat mist-netting at more than 15 sites in the Allegheny National Forest. Chelsey has frequently captured and identified the federally endangered gray bat (*Myotis grisescens*). Chelsey is also very experienced using acoustical sampling methods for the detection of bat activity.

He has worked extensively with Les Meade, prefaced by a 2-day workshop on bats of the Eastern United States that involved handling preserved specimens (from the Morehead State University collection) of the genus Myotis. The expansive collection included numerous stuffed Indiana and gray bat specimens, as well as representatives of all other bats known to occur in Kentucky. Chelsey is also responsible for the set-up of mist-nets for the numerous sites he has surveyed and has extensive training in radio telemetry and Anabat II techniques.

Herps

While conducting a project at the Cumberland Gap National Historical Park, Chelsey surveyed for reptiles and amphibians at randomly located cover boards and pitfall traps. He further conducted qualitative searches of potential habitat within the Park.

Birds

Chelsey has over three years experience in the migration patterns/behaviors of neo-tropical warblers. He has experience in measuring, (e.g. weight, wing cord, tarsus length), bleeding and banding captured birds, and using ptilochronology to evaluate nutritional conditions of avian populations.

While conducting research for his Master's thesis at Eastern Kentucky University, Chelsey monitored the reproductive success of 10 breeding pairs of loggerhead shrikes. Upon completion of the breeding season, vegetative characteristics of the nest sites and territories were quantified and compared to randomly selected potentially suitable, yet uninhabited sites, to gain a better understanding of why this species is limited in its distribution.

While at Auburn University, he served as a field technician for a study to detect the spread of West Nile Virus and Equine encephalitis, as well as the migration patterns/behaviors of neotropical warblers. Specifically, he assisted at a banding station. Using a mist-net array of approximately 15 nets, Chelsey identified numerous avian species, recorded and tracked population demographics through banding, and bled both wild and sentinel birds to monitor West Nile virus and encephalitis.

Watershed Assessment

Statistical Analysis

While writing his thesis, Chelsey utilized SAS (Science Analysis Software) software to analyze his data. Statistical Analyses included multivariate analysis of variance (MANOVA), stepwise discriminant analysis, and cross-validation technique.

Prior Professional Experience

After earning his bachelors degree, Chelsey continued his education in the post-baccalaureate program at the University of Kentucky, where he gained further experience in GIS, hydrogeology, and population and community ecology. At the University of Kentucky, Chelsey served as a research Assistant for a study on the addition of a detrital mixture to squash and cucumber fields in an attempt to increase lycosid numbers and therefore increase the natural predation on cucumber and squash beetles.

Technical Presentations/Publications

- Olson, W.C. 2007. Rare Little Brown Birds of Kentucky. Third Rock Continuing Education.
- Olson, W.C. 2006. Avian Collisions and the Migratory Bird Act. Third Rock Continuing Education.
- Olson, W.C. 2005. Loggerhead Shrike (Lanius ludovicianus) Distribution, Reproductive Success, and Hunting Behavior. Third Rock Continuing Education and Masters Seminar.
- Olson, W.C. 2003. Waterfowl and the Prairie Pothole Region. Third Rock Continuing Education.

Les Meade
Environmental Scientist

THIRD ROCK CONSULTANTS

Years Experience - 13

Education

- M.S. Biology, Morehead State University, 2000
- B.S. Biology, Morehead State University, 1995

Professional Registrations & Licenses

- Open Water Scuba Diver, PADI, 2002

Professional Memberships & Associations

- Kentucky Academy of Science
- Kentucky Wildlife Society
- Kentucky Bat Working Group

Specialized Training

- Anabat Training, Kentucky Department of Fish and Wildlife Resources-United States Fish and Wildlife Service, 2007
- Current Wetland Issues in Tennessee, Tennessee Department of Transportation, 2007
- Wetland Delineation Certification, Wetland Training Institute, 2006
- Wetland Flora, Institute of Botanical Training, LLC, 2006
- Freshwater Mollusks Seminar, Kentucky Department of Fish and Wildlife Resources, 2006
- Annual Meeting, Kentucky Academy of Science, 2006
- Ohio Department of Transportation - Office of Environmental Services Ecological Services, Ecological Training, 2005
- Indiana Bat and Coal Mining: A Technical Interactive Forum, Bat Conservation International, Illinois Coal Association, Kentucky Coal Association, 2004
- Land Snail Identification, Natural Bridge State Park, Dan Dourson, Instructor, 2004
- Mid-Atlantic Water Pollution Biology Workshop, Mid-Atlantic EPA, 2003
- Secrets of Successful Technical Writing, Rockhurst University Continuing Education Center, 2002
- Introduction to Aquatic Macroinvertebrate Identification/Taxonomy, Dr. Michael Floyd, Instructor, 2002
- Bat Echolocation Symposium and Tutorial, Bat Conservation International, 2002
- Grasses, Sedges, and Rushes Identification, Ron Jones, Instructor, 2002
- Freshwater Mussel Identification, Guenter Schuster, Instructor, 2002
- Asteraceae Identification, Eastern Kentucky University, Ron Jones, Instructor, 2002
- Bat Conservation and Forest Management, Bat Conservation International, East Kentucky Power Cooperative, Daniel Boone National Forest, and Kentucky Department of Fish and Wildlife Resources, 2002
- Symposium on the Biology and Management of the Indiana Bat, Bat Conservation International, University of Kentucky, Southeastern Bat Diversity Network, US Forest Service, US Fish and Wildlife Service, and Northeastern Bat Working Group, 2001
- Land Snail Identification, Dan Dourson, Instructor, 2001

Professional Experience/Areas of Expertise

Les Meade is a biologist for Third Rock. He has years of experience surveying for reptiles, amphibians, and small mammals, making him an integral part of Third Rock's ecosystems team. He has traveled through the eastern United States (WV, VA, PA, GA, TN, OH, IN and KY) surveying for the federally endangered Indiana bat (Myotis sodalis), gray bat (M. grisescens), and Virginia big-eared bat (*Corynorhinus townsendii virginianus*). His main passion is studying reptiles and amphibians. His photographs have appeared on the United States Geological Survey Amphibian Species and Identification Guide, a brochure for West Virginia

Department of Natural Resources entitled "Salamanders of West Virginia" and in a recently published book, "Kentucky Snakes, Their Identification, Variation, and Distribution." Les is also a PADI certified open water diver and part of Third Rock's dive team. He has participated in mussel surveys in the Licking, Kentucky, Red, Tennessee, Salt, and Green Rivers in Kentucky.

Aquatic Biology

Fish

Les is an integral part of Third Rock's biological team. He routinely conducts aquatic surveys for fish. For example, he has conducted fish surveys for the federally threatened Blackside dace (*Phoxinus cumberlandensis*) in Cumberland Gap National Historical Park, Acorn Fork, and Laurel Fork. Les has been part of several fish surveys on pools of the Kentucky River. He has employed several different sampling techniques including backpack electroshocking, boat mounted electroshocking, seining, and gill netting.

Macroinvertebrates

One of Les's many responsibilities at Third Rock includes macroinvertebrate sampling. He has participated in sampling for the Lexington Fayette Urban County Government, Louisville MSD, and sampling in Acorn Fork, among others. Les has sorted and identified macroinvertebrate samples from Kentucky, West Virginia, Ohio, Indiana, and Mississippi to genus and/or species level.

Mussels

As part of Third Rock's dive team, Les has conducted mussel surveys in the Kentucky River, Licking River, Red River, Cumberland River, Ohio River, Green River, Salt River, Tennessee River, Little Sandy River, and Tygart's Creek. A survey of the Licking River near Falmouth resulted in 345 individuals of 21 different species, including several federally endangered eastern fanshell mussels (*Cyprogenia stegaria*). On the Tennessee River, Les helped identify over 40,000 mussels of 28 species that were then relocated downstream into suitable habitat. Les also has recent experience in mussel identification through two workshops.

Les also has specific mussel identification training. He attended a 1-day workshop, Freshwater Mussel Identification, under the direction of Dr. Guenter Schuster, professor at Eastern Kentucky University. In this workshop, Les learned to identify federally threatened and endangered mussel species using examples from the mollusk division of Eastern Kentucky University's museum collection. Les also recently revisited the collection and under the direction of Ed Hartowicz, Third Rock's senior biologist, received additional identification training.

Terrestrial Biology

Mammals (Bats and Small Mammals)

Les has specific knowledge and experience with the endangered Indiana bat, *Myotis sodalis*; gray bat, *Myotis grisescens*; and Virginia big-eared bat, *Corynorhinus townsendii virginianus* having captured and identified numerous individuals of each species. He has traveled to numerous states including West Virginia, Virginia, Pennsylvania, Georgia, Tennessee, Ohio, Indiana, and Kentucky surveying for these and other species.

In Kentucky, he has mist-netted for bats at over 100 locations, including more than 30 sites within the Daniel Boone National Forest. He has mist-netted in over 25 counties at more than 40 locations throughout Kentucky under Third Rock's statewide environmental services contract with the Kentucky Transportation Cabinet. He also led Third Rock's team of biologists as they mist-netted at over 25 sites in the Allegheny National Forest, mist-netted at 56 sites in the Wayne National Forest and at 40 sites in the Hoosier National Forest. At

Hoosier National Forest, Third Rock staff found the first maternity colony for Indiana bats. They also documented the first Eastern pipistrelle maternity site under a bridge for the state of Indiana.

Les has experience in the collection and identification of small mammals using various methods including cover boards, snap, and pitfall traps across Kentucky. Les participated in extensive terrestrial surveys at the Kentucky Ridge Wildlife Management Area and as part of the survey effort for an EIS for the proposed I-66 Corridor in Pike County, Kentucky and Mingo County, West Virginia. He surveyed for small mammals using live traps and pitfall traps and conducted qualitative searches of potential habitat.

Herps

Les also has experience in the collection and identification of amphibians and reptiles across the southeastern United States, including extensive work in Kentucky, Tennessee, Georgia, South Carolina, and West Virginia. He has traveled throughout these areas studying and photographing amphibians and reptiles in their native habitats. Recently, he conducted herpetological surveys and prepared reports for Cumberland Gap National Historical Park, Obed Wild and Scenic River, and the Kentucky Ridge Wildlife Management Area. Because of his extensive knowledge, Les has provided informational updates for the distributional records of amphibians and reptiles included in a new amphibian and reptile book of Kentucky.

Les is a contributing photographer to the USGS Amphibian Identification Guide for the North American Reporting Center for Amphibian Malformations. He also provided a salamander photograph to the West Virginia Department of Natural Resources for a new brochure entitled Salamanders of West Virginia. In addition, several of his photographs were published in a recent book "Kentucky Snakes, Their Identification, Variation, and Distribution."

Prior Professional Experience

Prior to being employed by Third Rock, Les worked for BHE Environmental, Inc. in 1999 through 2000 and for Turner Technology, Inc. in 1998 through 1999 where he conducted numerous bat surveys and surveyed for other small mammals, reptiles, amphibians, and plants.

Prior to joining Third Rock, Les also mist-netted for bats at 20 Daniel Boone National Forest Service ponds in the Morehead, Kentucky District to collect data on Northern bat, *Myotis septentrionalis; m*ist-netted annually for bats at Murder Branch Cave in Menifee County, Kentucky, and assisted with hibernaculum count of the Indiana bat at Carter Caves State Park.

Technical Presentations/Publications

- Meade, L.S., 2008. Identifying Common Kentucky Herbaceous Wetland Plants. Third Rock Continuing Education.
- Meade, L.S., 2007. Kentucky's Small Mammals - Identification, Distribution, and Trapping. Third Rock Continuing Education.
- Meade, L.S., 2006. State Listed Amphibians and Reptiles of Kentucky. Third Rock Continuing Education.
- Meade, L.S. 2005. State and Federal Collection Permits for Threatened and Endangered Species. Third Rock Continuing Education.
- Meade, L.S. 2005. Herpetofauna Suvey of Obed Wild and Scenic River. Presented to National Parks Service.
- Meade, L.S. 2005. Indiana, Gray, and Virginia Big-Eared Bats. Third Rock Continuing Education.
- Meade, L.S. 2004. Critter Crossings: Reducing Roadkill. Third Rock Continuing Education.
- Meade, L.S. 2003. Amphibian Colonization and Use of Ponds Created for Trial Mitigation of Wetland Loss. Third Rock Continuing Education.

- Meade, L.S. 2003. Herpetofauna Survey of Cumberland Gap National Historic Park. Third Rock Continuing Education. Also Presented to the National Park Service.
- Meade, L.S. 2003. Flora and Fauna of Kentucky Clifflines. Third Rock Continuing Education.
- Meade, L.E., Meade, L.S., Macgregor, J.L., and Sewell, P.L. 2001. Fall Surveys of Microchiropteran Bats at Murder Branch Cave, Daniel Boone National Forest, Menifee County, Kentucky. Annual Meeting of KAS, Murfreesboro, TN.
- Meade, L.S. 2000. Kentucky Salamanders of the Genus Desmognathus: Their Identification, Distribution, and Morphometric Variation.

Tony Miller
Environmental Scientist

THIRD ROCK CONSULTANTS

Years Experience - 11

Education

- M.S. Zoology, North Dakota State University, 2001
- B.A. Biology, Murray State University, 1997

Professional Registrations & Licenses

- Open Water SCUBA Diver, PADI, 2002
- Nitrox SCUBA Certification, PADI, 2007

Professional Memberships & Associations

- Kentucky Academy of Science
- Kentucky Wildlife Society
- American Fisheries Society, Kentucky Chapter
- North American Benthological Society
- Society of Wetland Scientists
- American Statistical Association

Specialized Training

- Wetland Delineation, Kentucky Transportation Cabinet-Wetland Training Institute, 2007
- Wetland Flora, Institute of Botanical Training, 2007
- Soil Erosion and Sediment Control, American Consulting Engineers Council, Kentucky Society of Professional Engineers, 2007
- Watershed-Based Planning Workshop, Kentucky Waterways Alliance, 2006
- Freshwater Mollusks Seminar, Kentucky Department of Fish and Wildlife Resources, 2006
- Annual Technical Conference and Exhibition, Kentucky Rural Waterways Association, 2006
- Natural Solutions to Stormwater Management Workshop, Jefferson County Soil and Water Conservation District, 2006
- Annual Meeting, Southeastern Water Pollution Biologists' Association, 2006
- Annual Meeting, Kentucky Academy of Science, 2006
- Southeastern Water Pollution Biologists Association Conference, Olive Branch, Mississippi, 2005
- Southeast Regional Watershed Conference, Kentucky Waterways Alliance, Bowling Green, Kentucky, 2005
- American Statistical Association Annual Meeting and Workshops, Minneapolis, Minnesota, 2005
- Ecological Training, Ohio Department of Transportation, 2005
- Kentucky Water Resources Symposium, Kentucky Water Resources Research Institute, 2005
- 15th Annual Tennessee Water Resources Symposium, American Water Resources Association, Tennessee Section, 2005
- Annual North American Benthological Society (NABS) Meeting, NABS, 2005
- Indiana Bat and Coal Mining: A Technical Interactive Forum, Bat Conservation International, Illinois Coal Association, Kentucky Coal Association, 2004
- Exploring Watershed Utilities and the Soil and Water Assessment Tool (SWAT), Texas A&M University, 2004
- Identifying Trees in Winter, Bernheim Forest, 2004
- Mid-Atlantic Water Pollution Biology Workshop, Mid-Atlantic EPA, 2003
- Bat Identification and Telemetry, Les Meade and Mark Gumbert, 2003
- Secrets of Successful Technical Writing, Rockhurst University Continuing Education Center, 2003
- Function of Intermittent Stream Systems Technical Information Workshop, North American Benthological Society, 2003
- Aquatic Beetle Taxonomy and Identification, Duke Power, 2002
- Grasses, Sedges, and Rushes Identification, Ron Jones, 2002

- Asteraceae Identification, Eastern Kentucky University, Ron Jones, 2002

Professional Experience/Areas of Expertise

Tony Miller has a dual role of project administrator and biologist with a primary focus on watershed remediation. Tony is currently studying the interaction of macroinvertebrate communities and the effects of their physio-chemical environment to determine remediation actions that are most effective. Tony plays a key role as a liaison to watershed groups around Kentucky involved in watershed improvement projects. Tony is also intimately involved with the ongoing microbial source tracking projects at Third Rock to assist with these watershed remediation studies.

Tony's background is in the ecological assessment of streams, rivers, lakes, and wetlands. As a result, he has experience in the identification of macroinvertebrates, fish, zooplankton, and freshwater mussels combined with the ability to determine the environmental factors that influence their presence and abundance. Tony is also one of Third Rock's primary macroinvertebrate taxonomists providing identification of samples to lowest feasible resolution. Tony's background in aquatic biology also makes him an invaluable member of our Dive Team; currently, he is a PADI SCUBA open water diver certified in NITROX diving; he has participated on several large freshwater mussel survey and relocation projects. Tony also has experience with terrestrial endangered species surveys for a variety of bats and plants. Additionally, because his background allows him to bridge the gap between aquatic and terrestrial ecosystems, Tony is involved with wetland delineation and design. With the abundance of data resulting from these types of surveys, Tony coordinates Third Rock's data analysis services that allow us to illustrate trends in complex environmental situations. He is adept at ecological statistical analysis using SAS, SYSTAT, Excel, CANOCO and PC-ORD. Currently, Tony is combining all of his experience with aquatic and terrestrial environments to coordinate watershed remediation projects for Third Rock with the Kentucky Division of Water.

Aquatic Biology

Fish

Tony has conducted fish surveys on a variety of aquatic habitats. For example, he has conducted surveys for the Minnesota Department of Natural Resources on large prairie wetlands in Minnesota, for the Cumberland Gap Historic National Park on the streams containing the federally threatened blackside dace (*Phoxinus cumberlandensis*), and for the U.S. Corps of Engineers, Louisville District, on pools 9 and 10 of the Kentucky River. Tony has employed several different sampling techniques including backpack electroshocking, boat mounted electroshocking, seining, and gill netting.

Macroinvertebrates

Tony has conducted macroinvertebrate surveys on essentially all types of aquatic habitat. As an undergraduate, Tony gained a range of experience with aquatic macroinvertebrate sampling in streams and large reservoirs as a technician at a field biology station (Hancock Biological Station). During graduate school, Tony gained experience sampling invertebrates from ephemeral pools to determine the effects of adjacent logging. Since joining Third Rock, he has sampled hundreds of streams of all sizes for various projects. During these numerous outings, Tony has gained experience using a variety of sampling techniques ranging from activity traps and Hester Dendy samplers to d-framed nets, and surber samplers.

During his time at Third Rock, Tony has extensively sampled and identified macroinvertebrates for numerous clients including West Virginia Department of Environmental Protection, Mississippi Department of Environmental Quality, Louisville Metropolitan Sewer District, Tennessee Department of Environment and Conservation, USACE, and Lexington Fayette Urban County Government. Tony is capable of and has

experience in identifying all macroinvertebrates to lowest feasible taxonomic resolution including Chironomidae.

Mussels

Tony has conducted mussel surveys on a variety of aquatic habitats from intermittent streams to large rivers. Tony is well versed in sampling techniques ranging from view buckets to SCUBA assisted tactile searches. Tony has gained vast experience in mussel identification on the job under the tutelage of Ed Hartowicz and by reviewing Third Rocks large relic shell collection. Tony has also had the opportunity to observe many of the Southeast's federally endangered mussels at the Kentucky Department of Fish and Wildlife Resource's mussel propagation laboratory.

In the summer of 2005, Tony assisted in the initial stages of the extensive mussel relocation project associated with the US 60 highway bridge construction over the Tennessee River in Livingston County, KY. Using SCUBA, Tony was involved with moving hundreds of mussels from the staging area of the project. Additionally, Tony helped establish the relocation site for the 40,000 mussels moved from the project area.

In the past, as part of Third Rock's dive team, Tony has conducted mussel surveys using SCUBA on the Green River for Kentucky Department of Transportation projects, the Licking River (to help fulfill requirements for a WWTP permit), the Kentucky River (USACE), the Cumberland River (a bridge crossing survey for TDEC), as well as numerous small stream surveys throughout the state for a variety of clients. These projects resulted in the collection and identification of hundreds of live mussels of varying species.

Tony also has experience in mussel identification through workshop training. Tony attended a half-day workshop under the direction of Ed Hartowicz, using the mollusk division of Eastern Kentucky University's museum collection. In this workshop, Tony learned to identify federally threatened and endangered mussel species using example specimens.

Terrestrial Biology

Mammals (Bats and Small Mammals)

Tony has conducted mist-net sampling for state and federally listed bat species at multiple sites in Kentucky, Indiana, and Ohio. Tony has had extensive training in radio telemetry and Anabat II techniques. Tony is very experienced using acoustical sampling methods for the detection of bat activity. He has mist-netted and handled nine different species of bats, including the federally endangered Indiana bat and gray bat. During summer 2004, while mist-netting with Les Meade at 40 sites in Hoosier National Forest in Southern Indiana, Tony assisted Les Meade in the capture and identification of a total of five male Indiana bats (*Myotis sodalis*), one post-lactating female Indiana bat, and a male gray bat (*Myotis grisescens*). On three different occasions, Tony captured and identified gray bats while conducting biological assessments in Bell County, Kentucky (July 2002) and in Nelson County, Kentucky (August 2004). During the summer of 2005, Tony captured and identified over twenty gray bats during a biological survey for the widening of I-65 in Warren County. He has also captured and identified numerous northern bats (*M. septentrionalis*), small-footed bats (*M. leibii*), and little brown bats (*M. lucifugus*) while performing surveys within Kentucky.

In addition to an abundance of field experience, Tony has studied species identification with Les Meade during a 2-day workshop on bats of the Eastern United States. The workshop involved handling preserved specimens of most of the bats from the eastern United States including several stuffed Indiana bat specimens (from the Morehead State University collection). Tony is an integral part of our bat survey team.

Plants

Tony has spent a considerable amount of time learning the characteristics of several federally endangered plants known to occur in Kentucky. Tony has conducted surveys for running buffalo clover in Boone County and for Short's goldenrod in Warren County for projects associated with the Kentucky Transportation Cabinet.

Environmental Permitting

Wetlands

Immediately prior to and during graduate school, Tony gained a wealth of experience with seasonal wetlands. Tony studied the overall processes of these systems to determine their role in the landscape pertaining to biological and hydrological processes. At Third Rock, Tony has used this valued experience to assess the success of re-established wetlands. Tony uses his knowledge to rank the success of wetlands by determining the degree of hydrology establishment and plant survival. He has become highly competent in the identification of aquatic vascular plants during college and during numerous wetland delineations with fellow employee Ed Hartowicz. Individually, Tony has conducted more than a dozen wetland determination/delineations for the USDA NRCS, and for projects associated with the Tennessee Department of Transportation

Watershed Assessment

Water Quality Monitoring

Since joining the Third Rock in 2002, Tony has become an integral part of Third Rock's biology team particularly in the aquatic area. Tony conducts aquatic biological assessments consisting of biological and physiochemical sampling techniques on streams, rivers, and lakes. The physiochemical sampling includes field habitat analyses, field water quality testing using various water quality meters, and field collection of surface water samples. The biological investigations consist of both qualitative and quantitative sampling for algae, macroinvertebrates, mussels, and fish.

Statistical Analysis

Tony has recently devoted a considerable amount of time using advanced statistics to review aquatic impairment at the watershed scale. This approach of remediating impairment in streams, rivers, and lakes is seen as the most beneficial way to bring about significant changes in water quality on the landscape. To facilitate this approach, Tony models ecological processes using a suite of multivariate statistical approaches. Additionally, he models the fate of watershed parameters using software packages such as BASINS (Better Assessment Science Integrating Point and Nonpoint Sources) and SWAT (Soil and Water Assessment Tool). Using these combined techniques, Tony is able to build a comprehensive picture of environmental problems in watersheds. This holistic methodology helps pinpoint areas of impairment in watersheds, which leads to efficient means of remediation as pertaining to stressors on populations, communities, and ecosystems. This system of analysis is commonly used in the development of TMDLs (Total Maximum Daily Loads) of specifically identified pollutants in stream reaches. Tony is currently assisting in the development of a TMDL for two tributaries of the Dix River with the Kentucky Division of Water.

Recently, Tony was been able to able to differentiate the sources of macroinvertebrate community impairment in a West Virginia stream below a thermal discharge of a power generating facility using a multivariate approach. Using a multivariate statistical analysis called variance partitioning, past mining practices were determined to be as much or more of a detriment to the macro population than the thermal discharge. These results had a direct effect on permitting in the watershed.

Prior Professional Experience

Tony has several working experiences that relate directly to the work he does at Third Rock. During graduate school (January 1999 to December 2000) Tony became involved with ecological analyses with his own research project assessing the impacts of logging on seasonal forest wetlands. During this time, Tony became intricately involved with multivariate ordination and other advanced statistical techniques. Tony was also responsible for analyzing twenty years of aquatic data from a prime waterfowl lake in northern Minnesota to discover processes influencing trophic shifts in productivity.

In the summer of 1999, Tony worked as a crew leader on a Minnesota Department of Natural Resources project pertaining to seasonal forest wetlands. Tony was in charge of sampling seasonal wetlands for invertebrates and identifying resulting samples, as well as assessing wetland physical characteristics and titrating water samples for alkalinity.

From August 1996 to April 1997 Tony worked as a laboratory technician at Hancock Biological Station in Murray, Kentucky. Responsibilities included identifying zooplankton samples, processing water samples for chlorophyll-a, and monitoring for radioactive leaks using gas chromatograph. Tony was also involved as a technician in several studies including stream hyporheic zones, benthic oligochaete bioturbation rates, and seasonal zooplankton fluctuations.

Technical Presentations/Publications

- Miller, A.T. 2007. Nutrient Water Trading in the Upper Laurel River Watershed. Kentucky Division of Water.
- Miller, A.T. 2007. Natural Solutions for Stormwater Management. Third Rock Continuing Education.
- Miller, A.T. 2006. Dissolved Oxygen in Streams and Rivers. Third Rock Continuing Education.
- Miller, A.T. 2005. Innovative Approach to Identifying Pollutants Sources in Corbin Reservoir Watershed. Kentucky – Tennessee Water Environment Association Watershed Conference and 2005 Annual TN Water Resources Association Meeting.
- Miller, A.T., M.A. Hanson, B. Palik, M.G. Butler. 2005 (Publication Pending). Identifying Sources of Invertebrate Community Variation within Seasonal Forest Wetlands – A Multivariate Approach.
- Miller, A.T. 2005. Hydric Soils Development and Identification: Implications for Wetland Determination. Third Rock Continuing Education.
- Miller, A.T. 2004. Tracing Origins and Migration of Wildlife Using Stable Isotopes: A Review. Third Rock Continuing Education.
- Miller, A.T. 2004. Dissolved Organic Carbon and Nutrients as Regulators of Lake Ecosystems: Resurrection of a More Integrated Paradigm. Third Rock Continuing Education.
- Miller, A.T. 2003. Statistical Tools For Watershed Remediation: Seeing The Forest And The Trees. Kentucky Waterways Alliance Annual Meeting, Frankfort, KY and Virginia Water Research Symposium, Blacksburg, VA.
- Miller, A.T. 2003. Multivariate Analysis for Common Ecological Applications. Kentucky Water Resources Symposium, Kentucky State University, Frankfort, KY.
- Miller, A.T. 2003. Statistical Tools for Assessing Watershed Remediation: Simplifying Statistical Complexity. Virginia Water Resources Symposium, Virginia Tech, Blacksburg, VA.
- Miller, A.T. 2003. USEPA Water Quality Trading Policy. Third Rock Continuing Education.
- Miller, A.T., M.A. Hanson, and M.G.Butler. 2002. Impacts of Forestry on Inhabitants of Northern Ephemeral Wetlands. The Environmental Protection Agency Conference.

- Miller, A.T., M.A. Hanson, and M.G. Butler. 2001. Seasonal Forested Wetlands: Factors Influencing Aquatic Invertebrate Communities. North American Benthological Society Conference, Lacrosse, WI.
- Miller, A.T., M.A. Hanson, and M.G. Butler. 2000. Influence of Hydroperiod and Environmental Variables on Aquatic Invertebrates in Seasonal Forested Wetlands. The 62nd Annual Midwest Fish and Wildlife Conference, Minneapolis, MN.
- Miller, A.T. 2000. Aquatic Invertebrates of the Red River. The 2nd Annual Aquatic Resources Fair, Fargo, ND.

Bert Remley
Environmental Scientist

THIRD ROCK CONSULTANTS

Years Experience - 17

Education

- M.S. Biology, Morehead State University, 1997
- B.A. Anthropology, University of Kentucky, 1991

Professional Registrations & Licenses

- Taxonomic Certification for Eastern EPT Taxa (GP 2), North American Benthological Society, 2005
- Taxonomic Certification for Eastern Chironomidae (GP 3), North American Benthological Society, 2005
- Macroinvertebrate Assessment - Invertebrate Community Index (ICI), Ohio EPA, 2005-2008.
- Aquatic Insect Collection Protocols for Stream Mitigation and Restoration in North Carolina, 2001
- Open Water Scuba Diver, SCUBA Schools International, 1998

Professional Memberships & Associations

- Kentucky Academy of Science
- North American Benthological Society
- Freshwater Mollusks Conservation Society
- American Fisheries Society - Kentucky Chapter
- Carolina Area Benthologists

Specialized Training

- Level 1 of Rosgen Training. Dave Rosgen, 2007
  - Applied Fluvial Geomorphology
- Developing a Biological Assessment, United States Fish and Wildlife Service, 2007
- Freshwater Mollusk Meeting, Kentucky Department of Fish and Wildlife Resources, 2007
- A Soil Erosion and Sediment Control, American Consulting Engineers in Conjunction with the Kentucky Society of Professional Engineers, 2007
- North American Benthological Society (NABS) Annual Meeting, NABS, 2006
- Advanced Midge Identification, Association of Mid-Atlantic Biologists, 2006
- Stream Restoration in the Southeast: Accomplishments and Opportunities, North Carolina Stream Restoration Institute, 2006
- Floodplains, Riparian Zones, and Buffer Strips: Key Components to Aquatic Life Use Attainment and Self-Sustaining Stream Systems, Soil and Water Conservation Society, 2006
- Freshwater Mollusks Seminar, Kentucky Department of Fish and Wildlife Resources, 2006
- Eastern and Western Kentucky Headwater Stream Functional Assessment Protocol, Louisville District, United States Army Corps of Engineers, 2006
- Annual Meeting, Kentucky Academy of Science, 2006
- Ecological Training, Ohio Department of Transportation, 2005
- North American Benthological Society Meeting, NABS, 2005
- Canaan Valley Institute, Association of Mid-Atlantic Aquatic Biologists Workshops, 2005
- Taxonomy and Identification of Darters, Association of Mid-Atlantic Aquatic Biologists Workshop, 2005
- Macroinvertebrate Assessment - Invertebrate Community Index, Ohio Environmental Protection Agency, 2005-2003
- Indiana Bat and Coal Mining: A Technical Interactive Forum, Bat Conservation International, Illinois Coal Association, Kentucky Coal Association, 2004
- Identifying Trees in Winter, Bernheim Forest, 2004
- Land Snail Identification, Natural Bridge State Park, Dan Dourson, Instructor, 2004

- Laboratory QA/QC for Benthic Macroinvertebrate Sample Processing and Taxonomic Identifications, Mid-Atlantic Water Pollution Biology Workshop, Mid-Atlantic Environmental Protection Agency, 2003
- Aquatic Beetle Taxonomy and Identification, Duke Power, John Epler, Instructor, 2002
- Asteraceae Identification, Eastern Kentucky University, Ron Jones, Instructor, 2002
- Land Snail Identification, Dan Dourson, 2001
- Taxonomy and Systematics of the Freshwater Mollusks of North America, North American Benthological Society, 2001
- Aquatic Insect Collection Protocols for Stream Mitigation and Restoration, North Carolina Department of Environment and Natural Resources, 2001
- Oligochaetes Identification, Carolina Benthological Workshop, 2001
- Crayfish, Carolina Benthological Workshop, 2001
- Biology and Identification of Southeastern Mayflies, Stoneflies, and Caddisflies, Clemson University, 2000

Professional Experience/Areas of Expertise

Bert Remley is Third Rock's senior aquatic macroinvertebrate taxonomist and is the Quality Control/Quality Assurance Officer for Third Rock's aquatic biology laboratory. In addition to macroinvertebrate taxonomy, Bert also conducts stream sampling for aquatic macroinvertebrates, fish, plankton, and freshwater mussels. He is experienced in the identification and ecology of aquatic macroinvertebrates and fish of the region, conducting surveys in Kentucky, Ohio, Indiana, Illinois, Tennessee, West Virginia, Virginia, South Carolina, and North Carolina. Bert has also conducted hundreds of biological assessment for threatened and endangered species in Kentucky and Tennessee including numerous bat and mussel species. As a PADI certified open water diver and part of Third Rock's dive team, he has led several large mussel survey projects for Third Rock.

Aquatic Biology

Fish

Bert has surveyed streams, rivers, and lakes for fish in Kentucky, Virginia, Tennessee, Ohio, and Illinois. He has employed several different sampling techniques including backpack electroshocking, boat mounted electroshocking, seining, and gill netting. Bert participated in surveying the fish communities of Pools 9 and 10 of the Kentucky River and their respective tributaries. Recently Bert was lead biologist of a fish inventory of Cumberland Gap National Historical Park. All streams within the park that contained fish were surveyed, including Davis Branch, which contains the federally threatened blackside dace (*Phoxinus cumberlandensis*). In addition to this survey, Bert has conducted blackside dace surveys in several streams in southeastern Kentucky for coalmine permits and utility crossings. Bert has also surveyed for and collected the federally endangered relict darter (*Etheostoma chienense*) within the Bayou du Chien watershed. He has conducted numerous fish surveys in streams throughout the state for KPDES permits and biological assessments.

Macroinvertebrates

Bert has collected hundreds of samples from the southeast and midwest employing several different sampling protocols. He has recently been certified by the North American Benthological Society to be able to identify eastern midges (Chironomidae), mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to genus level. He is also certified by the Ohio EPA to collect, identify, and calculate macroinvertebrate community metrics in Ohio. Similarly, he is certified to collect benthic macroinvertebrates for 401 certification projects in North Carolina. Bert has collected macroinvertebrate samples for the United States Army Corps of Engineers

(USACE) Louisville District, Louisville Metropolitan Sewer District, and Lexington Fayette Urban County Government.

Bert is the QA/QC officer for Third Rock's macroinvertebrate lab. He is responsible for calculating macroinvertebrate bioassessment indices, assisting taxonomist with their identifications, managing samples within the laboratory, reviewing and reporting data. Bert has personally identified over 2,000 samples from 10 different states within the southeast, midwest, and pacific northwest. Recent clients Bert has performed macroinvertebrate identifications for include the West Virginia Department for Environmental Protection (WVDEP), USACE Louisville District, Mississippi Department of Environmental Quality (MSDEQ), ORSANCO (Ohio), Louisville Metropolitan Sewer District (MSD), Tennessee Department of Environment and Conservation, United States Environmental Protection Agency, and numerous private clients across the United States.

Mussels

Bert has employed view bucket, snorkeling, and tactile search techniques to survey mussels in shallow streams. Bert has conducted endangered mussel surveys for biological assessments in numerous streams in central and southeastern Kentucky. He has conducted mussel surveys in the Cumberland, Tennessee, Kentucky, and Licking River drainages.

In 2005, Bert participated in a mussel survey on the Licking River that resulted in the discovery of several individuals of the federally endangered fanshell mussel (*Cyprogenia stegaria*). A total of 345 individulas comprising 21 different species were identified during this survey.

Bert is a certified open water SCUBA diver who has participated in several of Third Rock's mussel diving projects. He has surveyed for mussels on Pools 2, 9, and 10 on the Kentucky River using SCUBA. These projects resulted in 374 live mussels incorporating 17 different species being identified. No species were federally threatened or endangered.

In the summer of 2005, Bert assisted in the initial stages of the extensive mussel relocation project associated with the US 60 highway bridge construction over the Tennessee River in Livingston County, KY. Using SCUBA, Bert was involved with moving hundreds of mussels from the staging area of the project. Additionally, Bert helped establish the relocation site for the 40,000 mussels moved from the project area.

Bert also has recent experience in mussel identification through two workshops. Bert attended a 1-day workshop, Freshwater Mussel Identification, under the direction of Dr. Guenter Schuster, professor at Eastern Kentucky University. In this workshop, Bert learned to identify federally threatened and endangered mussel species using examples from the mollusk division of Eastern Kentucky University's museum collection. Bert also revisited the collection and under the direction of Ed Hartowicz received additional identification training.

Terrestrial Biology

Mammals (Bats and Small Mammals)

Bert has conducted over 45 terrestrial surveys including mist-netting at more than 50 sites in Kentucky, Indiana, and Ohio for state and federally endangered bat species; Bert has set-up mist-nets and all appropriate equipment for these sites. He has mist-netted and handled nine different species of bats, including the federally endangered Indiana bat. Bert is also very experienced using acoustical sampling methods for the detection of bat activity. During the summer of 2004, while mist-netting with Les Meade at 40 sites in Hoosier National Forest in Southern Indiana, Bert assisted Les in the capture and identification of a total of five male Indiana bats (*Myotis sodalis*), one post-lactating female Indiana bat (*Myotis sodalis*), and a male gray bat (*Myotis grisescens*). He has also captured on several different occasions the federally endangered gray bat (*Myotis grisescens*) while performing biological

assessment in Bell, Cumberland, Mercer, and Nelson Counties in Kentucky.

He has worked extensively with Les Meade, prefaced by a 2-day workshop on bats of the Eastern United States that involved handling preserved specimens of all the above bats as well as numerous stuffed Indiana bat specimens (from the Morehead State University collection). Bert has been responsible for set-up of multiple mist-net sites and has had extensive training in radio telemetry and Anabat II techniques. Bert is an integral part of our bat survey team.

Bert has assisted with small mammal surveys in the Kentucky Ridge Wildlife Management Area (WMA) on Pine Mountain, surveying small mammals at randomly located cover boards and pitfall traps. He also conducted qualitative searches of potential habitat within the WMA. He was an integral part of Third Rock's mammal survey along more than 100 miles of the proposed I-66 corridor in Pike County, Kentucky and Mingo County, West Virginia. In 1993 Bert worked for the KDFWR on the white-tail deer (*Odocoileus virginianus*) relocation program. Bert was responsible for trapping, and relocationg white-tail deer from various state parks and military bases to Pike County, Kentucky.

Herps

Bert has assisted with herpetological surveys on Kentucky Ridge Wildlife Management Area (WMA) on Pine Mountain. He surveyed reptiles and amphibians at randomly located cover boards and pitfall traps. He also conducted qualitative searches of potential habitat within the WMA.

Birds

Bert spent the summer of 1994 assisting graduate students with their field work at Archbold Biological Station in Lake Placid, Florida. Bert assisited with monitoring nest sites, capturing and banding various passerine birds including the federally threatened Florida scrub jay (*Aphelocoma coerulescens*). In fall 1992 Bert worked for the Kentucky Department of Fish and Wildlife Resources (KDFWR) on the ruffed grouse (*Bonasa umbellus*) relocation program. Bert trapped grouse in the Daniel Boone National Forest, then took various measurements and relocated them to Nelson County, Kentucky.

Plants

Bert has conducted numerous surveys for federally endangered plant species including running buffalo clover (*Trifolium stoloniferum*) and Virginia spiraea (*Spiraea viginiana*).

Watershed Assessment

Water Quality Monitoring

Bert's thesis in graduate school dealt with the effects of lake fertilization on water quality and fish production. His thesis involved weekly collections of water samples and physiochemical data. He performed all laboratory analysis of the water samples, identification of zooplankton and phytoplankton samples, and analyzed the data. Bert has performed bi-annual water quality sampling and evaluation on reservoirs and streams for Lexington Fayette Urban County Government since 1998. Additionally, Bert collected vast numbers of water chemistry samples and physiochemical data from Pools 9 and 10 of the Kentucky River and their tributaries. He also routinely collets water quality samples for KYTC and coal mining projects. Bert is responsible for maintenance and calibration of Third Rock's water quality instruments.

Prior Professional Experience

From August 1992 to May 1993, Bert worked as a Wildlife Aide for the Kentucky Department of Fish and Wildlife Resources. He assisted the Upland Game Coordinator with the Ruffed Grouse restoration project and was also a member of the mobile deer trapping crew. During the summer of 1994, Bert served as a

research assistant for doctoral students at Archbold Biological Station Lake Placid, Florida. From August 1998 until March 2000 Bert worked as a biologist within the biomonitoring division of Envirodata Group, LLC. He conducted acute and chronic toxicity tests using both freshwater and marine vertebrate and invertebrate species. He performed microscopic identifications of phytoplankton, zebra mussel veligers, and unidentified particulate samples. Bert conducted macroinvertebrate sample processing.

Technical Presentations/Publications

- Remley, A.W. 2007. Biological Response to Stream Restoration. Third Rock Continuing Education.
- Remley, A.W. 2006. Exotic Species of Kentucky. Third Rock Continuing Education.
- Remley, A.W. 2005. Macroinvertebrate Protocols of Kentucky, Tennessee, and Ohio. Third Rock Continuing Education.
- Remley, A.W. 2004. Endangered Mussels of Kentucky. Third Rock Continuing Education.
- Remley, A.W. 2003. Clean Water Act Section 316(b). Third Rock Continuing Education.
- Remley, A.W. 2003. Blackside Dace. Third Rock Continuing Education.
- Remley, A.W. 2004. Propogation and Reintroduction of Freshwater Mussels. Third Rock Continuing Education.
- Floyd, M.A. and A.W. Remley. 2002. Water Quality Assessment of Fayette County, Kentucky, Streams Using Fish and Macroinvertebrates. Carolinas Area Benthological Workshop, Clemson, SC.
- Floyd, M.A. and A.W. Remley. 2001. Biological Assessment of Streams Along the I-66 Transamerican Corridor in Pike County, Kentucky and Mingo County, West Virginia. Mid-Atlantic Water Pollution Biology Workshop, Cacapon, WV.
- Floyd, M.A. and A.W. Remley. 2001. Biological Assessment of Streams Along the I-66 Transamerican Corridor in Pike County, Kentucky and Mingo County, West Virginia. Carolinas Area Benthological Workshop, Clemson, SC.
- Reeder, B.C., G.L. Buynak, A.W. Remley, and T.W. Spier. 2001. Effects of Nitrogen and Phosphorus Fertilization on Primary Productivity: A Case Study of Grayson Lake, Kentucky. Proceedings of the Southeastern Association of Fish and Wildlife Agencies.
- Remley, A.W. 1997. Effects of Fertilization on Water Quality in Grayson Lake, Kentucky. Master's Thesis: Morehead State University.
- Remley, A.W. and B.C. Reeder. 1996. Effects of Fertilization on Water Quality in Grayson Lake, Kentucky. 12th Annual Scientific Symposium, Ohio River Basin Consortium for Research and Education, Oxford, OH.

TAXONOMIC CERTIFICATION

June 2005 - June 2010

This certificate is awarded to

BERT REMLEY

in recognition of the successful completion of the
Taxonomic Certification Exam for
Eastern Group 2 (Ephemeroptera, Plecoptera, Trichoptera)

NORTH AMERICAN BENTHOLOGICAL SOCIETY

S B Kepler
Signature

June 30th 2005
Date

ACADIA UNIVERSITY

TAXONOMIC CERTIFICATION

June 2005 - June 2010

This certificate is awarded to

BERT REMLEY

in recognition of the successful completion of the
Taxonomic Certification Exam for
Eastern Group 3 (Chironomidae)

NORTH AMERICAN BENTHOLOGICAL SOCIETY

Signature

Jun 28 '05
Date

ACADIA UNIVERSITY