RAPID BIOASSESSMENT IN WADEABLE STREAMS & RIVERS BY VOLUNTEER MONITORS

PART 2: INSTRUCTIONS

Version 2
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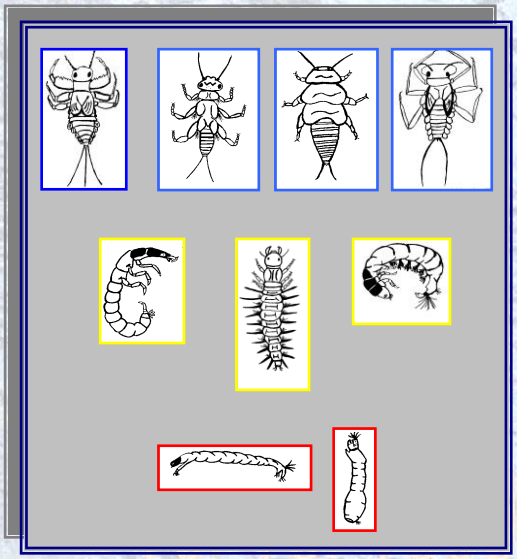

State of Connecticut
Department of Environmental Protection
Bureau of Water Protection and Land Reuse
Planning and Standards Division
Ambient Monitoring Program
Gina McCarthy, Commissioner

Rapid Bioassessment in Wadeable Streams & Rivers By Volunteer Monitors Part 2: Instructions

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February 2009

PURPOSE: The purpose of this document is to **describe in detail the process to complete Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors (RBV)**. The CT Department of Environmental Protection's Bureau of Water Protection and Land Reuse Ambient Monitoring Program (WPLR) developed the RBV program. The RBV program provides a method for which volunteer monitoring groups can submit usable surface water quality information to WPLR. Materials developed for the RBV program consist of; Part 1-*Program Description* and Part 2-*Instructions*. Additional information regarding this program can be obtained on the Internet at: www.ct.gov/dep/rbv or by contacting **Mike Beauchene, CT DEP WPLR, Planning and Standards Division, phone (860) 424-4185 or email mike.beauchene@ct.gov**

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About Rapid Bioassessment for Volunteer Monitors

RBV was developed to enable citizens to collect and submit meaningful aquatic macroinvertebrate information to the DEP's, WPLR, Ambient Monitoring Program. Data collected using this method will be used to help identify streams with pollution sensitive benthic communities. Rapid Bioassessment for volunteers is not a definitive assessment procedure, but rather a screening tool intended to identify high quality streams. Established WPLR assessment methods may be needed to determine actual community structure.

RBV TRAINING: A daylong training/data collection workshop can be held for your organization free of charge*. The workshop is structured around instructional power-point presentations in the morning and data collection in the afternoon.

The data collection process is completed on site at a riffle (fast flowing rocky bottom). Participants wade into the water, dislodge the organisms into a net by scrubbing the rocks, sort and identify the different organisms present, and preserve a representative set of organisms for verification. At the completion of the session the data is submitted to WPLR for incorporation into water quality assessments.

RBV workshops are scheduled on a first come first serve basis with priority for first time programs. Since the data collection occurs in the fall and there are a fixed number of weekend days, it is better to schedule well in advance. Every attempt will be made to accommodate each workshop request. WPLR will provide all of the necessary equipment except for waders, hip boots or other waterproof foot ware.

TO BECOME INVOLVED*:
The prerequisites to sponsor a workshop are to:

1. **Assemble a group of a least 6 adults**
2. **Reserve a meeting room centrally located to the potential monitoring stations. The room must have electricity and be capable of holding all of the participants.**
3. **Contact Mike Beauchene to schedule a workshop date by phone (860) 424-4185 or email at mike.Beauchene@ct.gov**

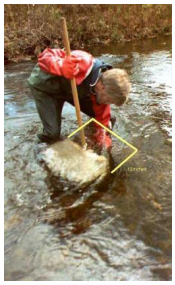
***Individuals not associated with a monitoring program can be linked with a program in their local area.**

Equipment: The equipment for the RBV protocol is listed in the table below. To facilitate participation in the program, WPLR has 20 RBV equipment kits available for loan. These kits contain the required items for implementation of the RBV protocol.

REQUIRED EQUIPMENT TO BE PROVIDED BY THE DEP AS PART OF A KIT (1 KIT PER SITE SAMPLED)	
Equipment	**Rationale**
1-KICK NET	The net **MUST BE** a rectangular frame net, 18" wide x 8" high x 10" deep, with a mesh size between 500 and 1000 microns* The required net insures standardization across volunteer programs.
3-WHITE BOTTOM TRAYS	The tray is used to view and sort the contents collected during each set of kicks. The white bottom is important to provide contrast for the darker organisms.
3-PLASTIC ICE CUBE TRAYS	Provides a convenient tool to sort the organisms by type. Each well can hold all of one type of organism.
1-US # 30 SEIVE	Can be used to "clean up" the sample. If there is a lot of fine material at the site, the water in the tray may be very cloudy. This will make finding the organisms very difficult. Pour the contents of the tray into the sieve, rinse with stream water several times, place the material back into the white tray.
3+ FORCEPS/PLASTIC SPOON (S)	To remove the organisms from the tray and place into the ice cube trays/ to handle the organisms for identification.
3+ HANDS LENSES (10x power)	To magnify the organisms and assist in seeing features for identification
1-LEAK-PROOF CONTAINER 1-PER SITE	To store the voucher collection.
ISOPROPYL ALCOHOL	To preserve the voucher collection. It is inexpensive and readily available
PENCIL	To write the label for the vial. Pencil will not dissolve in the alcohol while most ballpoint pen will.
RBV FIELD ID CARDS RBV SORTING GUIDE	To help in identification of the organisms collected in the sample.
RBV DATA SHEET 1-PER SITE	To record the relative abundance of the organisms as they are reviewed.
OPTIONAL EQUIPMENT TO BE PROVIDED BY THE PARTICIPANT, NOT DEP	
WADERS & GLOVES	To keep the participant dry when in the water
TOPOGRAPHIC MAP (S) OF THE STUDY AREA	Navigation to study locations, view upstream segments.
SCRUB BRUSH	To help dislodge the organisms from the rocks.
DIGITAL CAMERA	To photo document the site and the process

Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors Abbreviated Instructions

This is an abbreviated list of instructions. Specific details for each of the steps follow later in this document.



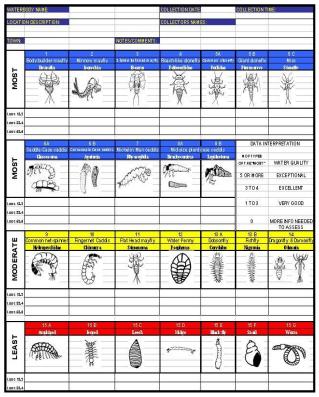
Step 1: Arrive at the site and locate the riffle. Visualize 6 places where you could collect organisms from within the riffle area.

Step 2: COLLECT THE SAMPLES

2A: Go to location 1 and collect then location 2 and collect, dump the contents of the net into a large white tray.

2B: Go to location 3 and collect then location 4 and collect, dump the contents of the net into a second large white tray.

2C: Go to location 5 and collect then location 6 and collect, dump the contents of the net into a third large white tray, pick any organisms that may be clinging with forceps and place into the tray.



Step 3: SAMPLE PROCESSING

Observe each tray, remove large debris like sticks rocks and leaves, sieve sample if necessary, remove organisms and sort into ice cube trays (place like types together).

Step 4: IDENTIFY THE ORGANISMS

Use the sorting guide and field identification cards to make a match. Fill in the abundance of each type identified on the datasheet. Record the relative abundance of each type of organism collected on the data sheet.

Step 5: MAKE THE VOUCHER/INSERT A LABEL

Place 1 of each type of organism into a vial containing isopropyl alcohol (rubbing alcohol). Place a pencil written label into the voucher container with date, stream name, location, and collector's initials.

Step 6: SUBMIT THE DATA

Submit the voucher container and datasheet to the DEP Volunteer Monitoring Coordinator. Mike Beauchene phone (860) 424-4185 or Email: mike.beauchene@ct.gov

Step #1: ARRIVE ON SITE & LOCATE THE RIFFLE

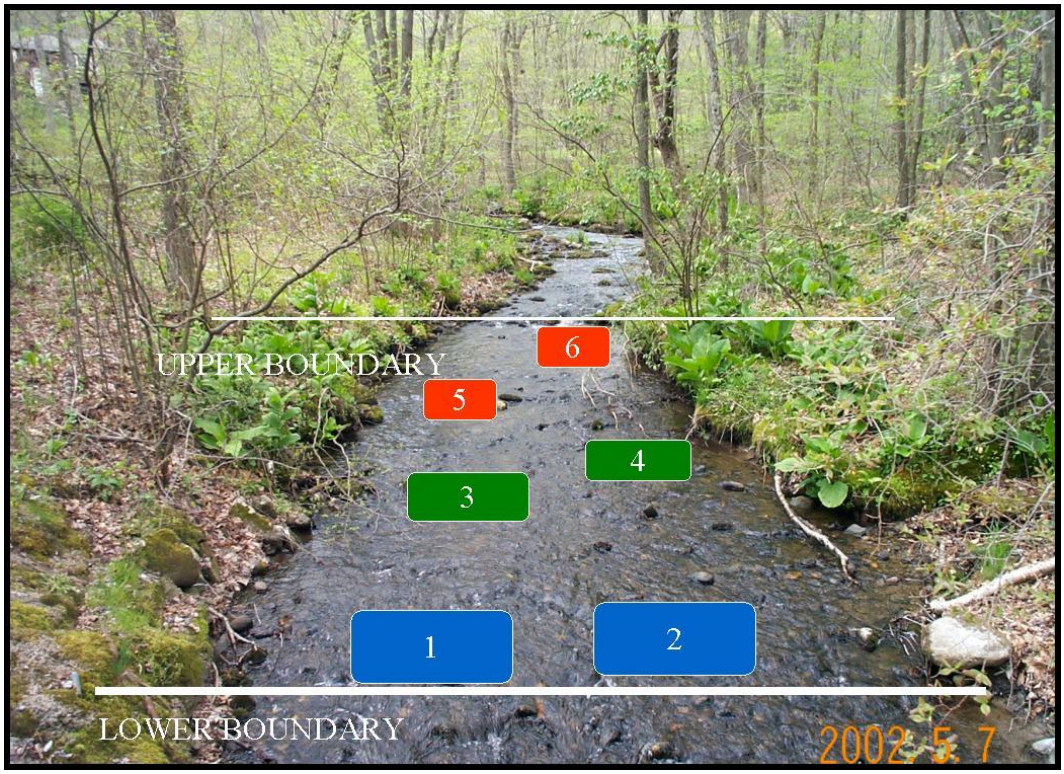
The goal of this step is to visualize and discuss where you will collect macroinvertebrates from 6 different locations within the riffle at the sampling site. To complete this task you will need to **first** travel to the sampling site, **second** locate the riffle, and **finally** visualize/discuss/locate 6 locations where you can collect a sample

-Locate the best riffle at the sample site (you may have to move slightly upstream or downstream of the access point). **A good riffle site will have water across the entire streambed during low flows and will be wadeable during normal flows. The ideal riffle habitat consists of a balanced mix of loosely embedded boulders, cobbles (melon size rocks) and gravel.**

-Define the upper and lower boundaries of the riffle to be sampled.

-Visualize/discuss where you will be able to collect organisms from 6 kick sample locations. Try to locate your 6 locations in the best possible macroinvertebrate habitat.

(Remember!! the intent of the method is to find as many different types as possible, so sample areas where if you were a macroinvertebrate, you would live).



STEP # 2 - COLLECT THE SAMPLES

The goal of this step is to collect a sample of the macroinvertebrate community from 6 different locations in the riffle. To complete this task you will need to **first** sample locations 1 and 2, **second** dump the contents of the net from these 2 locations into a white tray, **third** repeat the process at locations 3 and 4, and **finally** locations 5 and 6.

Step 2A: Collect organisms from location 1 and 2 in the riffle area.

!!!ALWAYS START DOWNSTREAM AND WORK YOUR WAY UPSTREAM.!!!!

-Walk out to collection site #1.

-Stand facing upstream and place the net firmly on the stream bottom with the net opening facing upstream.

-Reach into the stream and scrub the surface of each large rock located within **12 inches** of the net opening.

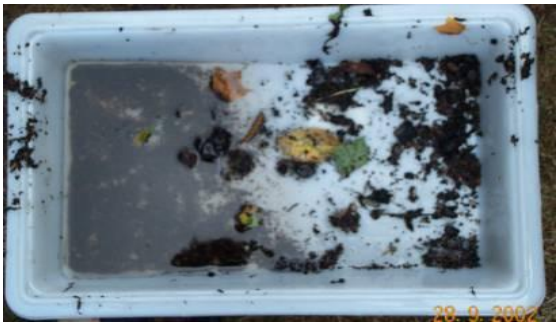
-Move each rock to the side of the net after it has been scrubbed.

-Once all of the large rocks have been scrubbed, shift so that you are standing upstream of the net opening.

-Slide your foot side to side across the net opening a couple of times to disturb the stream bottom (to a depth of 2 inches).
-Lift the net from the water.

-Locate and move to collection site #2 and repeat the same rock scrubbing process.

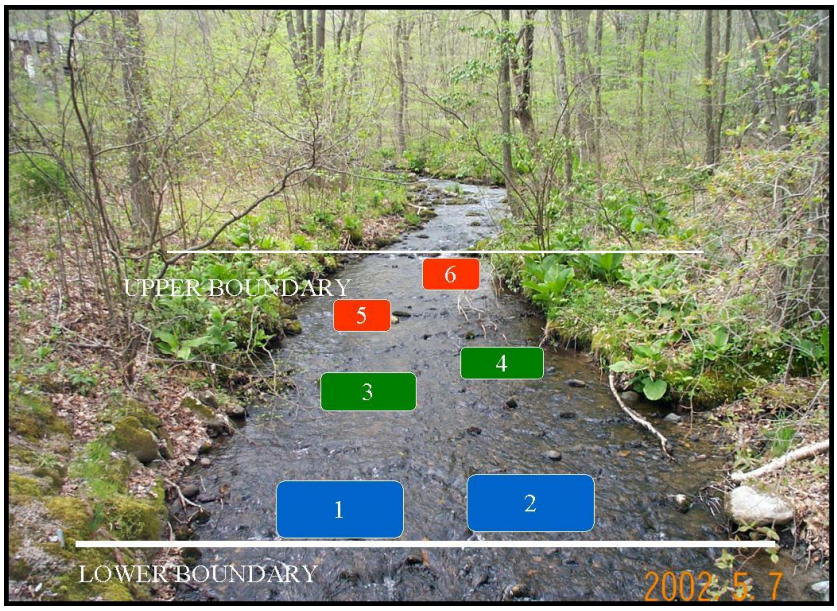
-Return to shore and dump the contents of the net into one of the 3 large white trays. Add just enough water to the tray to float the material (approximately 1/2 inch).



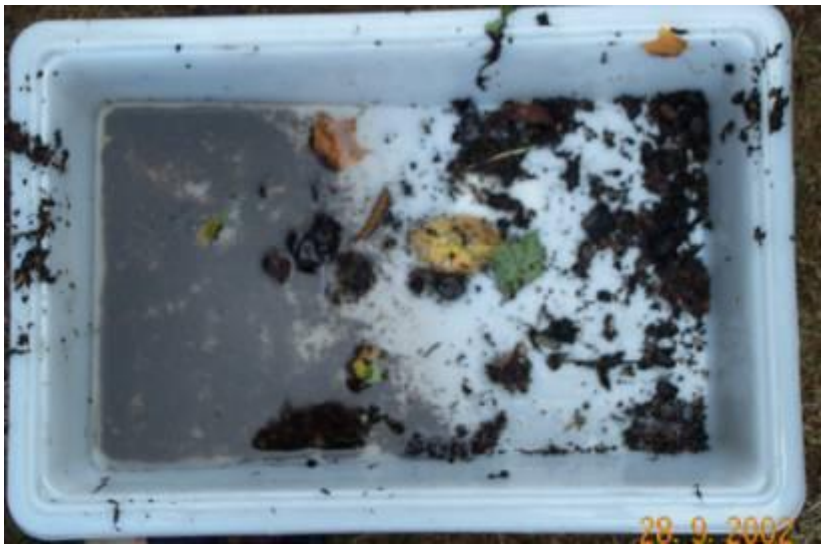
At this point you have collected organisms from 2 locations in the riffle and have placed them into one of the large white trays.

Step 2B: Collect organisms from location 3 and location 4 in the riffle area.
Repeat the process in step 2 for locations 3 & 4

Step 2C: Collect organisms from location 5 and location 6 in the riffle area.
Repeat the process in step 2 for locations 5 & 6.



AT THIS POINT (STEP #2) THE COLLECTING IS COMPLETED. YOU SHOULD HAVE 3 WHITE TRAYS EACH CONTAINING THE MATERIAL GATHERED FROM 2 LOCATIONS IN THE RIFFLE AREA.



STEP # 3: SAMPLE PROCESSING

The goal of this step is to remove as many different types of organisms as possible from each of the 3 trays. To complete this task you will need to **first** remove large debris like sticks rocks and leaves, **second** sieve sample if necessary, **third** observe the tray to see what has been collected, and **finally** remove the organisms and place them into ice cube trays (place like types together).

-Fill the ice cube tray wells with water.

-Observe the tray for 2-5 minutes while carefully inspecting and removing large debris (leaves, gravel, sticks).

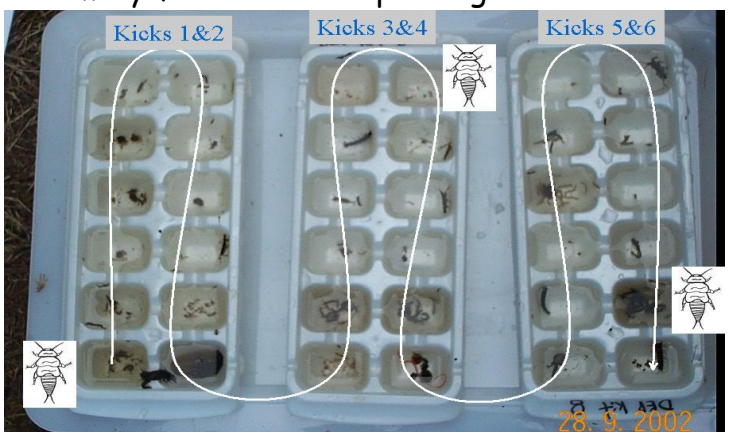
-As you remove each organism, place it into an ice cube tray well with others that are identical.

NOTE: The sieve can be used to "clean up" the sample. If there is a lot of fine material at the site, the water in the tray may be very cloudy. This will make finding the organisms very difficult. Pour the contents of the tray into the sieve, rinse with stream water several times, place the material back into the white tray.

AT THIS POINT (STEP #3) THE PROCESSING IS COMPLETED. YOU SHOULD HAVE 3 ICE CUBE TRAYS EACH CONTAINING THE ORGANISMS REMOVED FROM 1 OF THE 3 WHITE TRAYS.

Step 4: IDENTIFY THE ORGANISMS

The goal of this step is to identify which organisms are present at the site and complete the data sheet. To complete this task you will need to **first** assemble the identification materials (flow chart and field identification cards and data sheet), **second** assemble all of the ice cube trays together, **third** identify an organism, **fourth** record on the data sheet for locs 1 and 2 whether the abundance in this ice cube tray is either FEW, SOME, or MANY as compared to all of the other types in the same tray, and **finally** review the second and third ice cube trays to see if there are any identical organisms. If so record few, some or many for the corresponding collection locations on the data sheet.

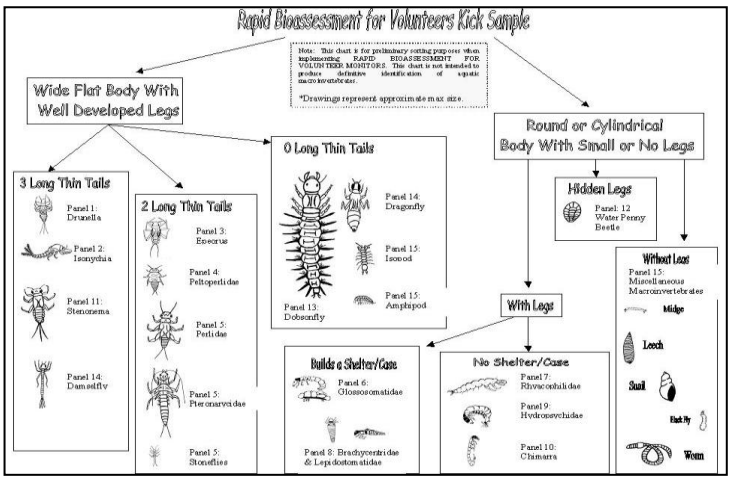


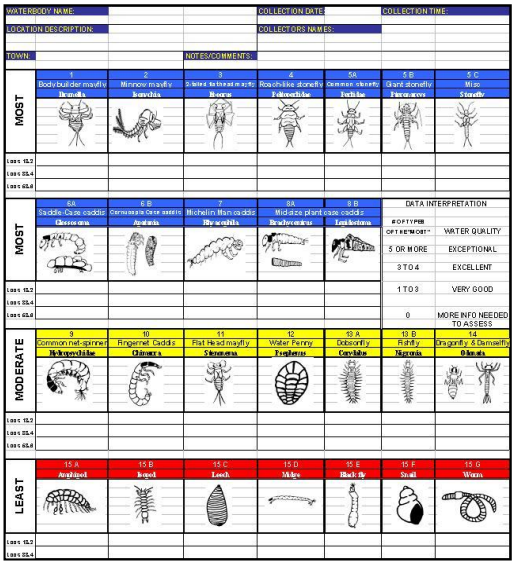
-Begin the identification process by selecting 1 ice cube well from the tray containing organisms from locs 1-2.

-Follow the descriptions in the sorting guide to get to one box. Based on the box, find the corresponding field identification cards for each of the organisms in that box.

-Review the key structures and key behaviors on each identification card to determine if you have a match.

-If nothing matches, either try the chart taking a different path, or simply place the organism into the voucher collection.





-If you have a match record FEW, SOME, or MANY on the datasheet for locs 1-2. Scan the remaining ice cube trays for locs 3-4 and record FEW, SOME, MANY, if the same organism is present. Repeat for locs 5-6.

-Continue identification until all of the organisms have been completed.

LAYOUT OF THE FIELD IDENTIFICATION CARDS

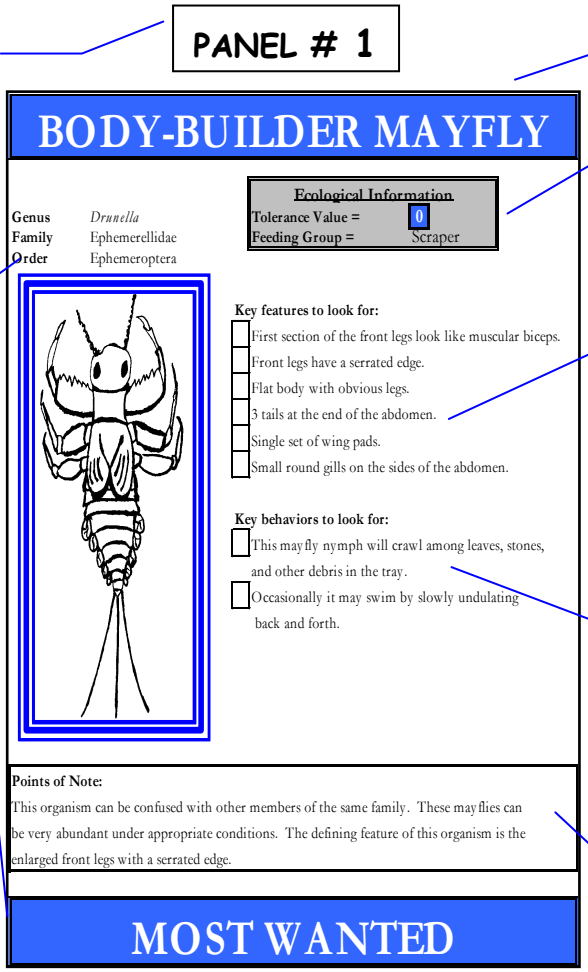
PANEL NUMBER IS UNIQUE TO THE ORGANISM ON THE CARD. IT IS CONSISTANT ACROSS ALL RBV MATERIALS, INCLUDING THE SORTING GUIDE AND DATASHEET.

SCIENTIFIC NAMES

THE RBV CATEGORY THIS ORGANISMS IS IN

THE COLOR ALSO CORRESPONDS TO 1 OF THE 3 CATEGORIES

BLUE = MOST WANTED
YELLOW = MODERATELY WANTED
RED= LEAST WANTED



COMMON NAME

ECOLOGICAL INFORMATION

DESCRIBED BELOW

COMPARE THESE FEATURES TO THE ORGANISM, IF YOU HAVE A MATCH, THEN RECORD ON THE DATASHEET.

COMPARE THESE BEHAVIORS TO THE ORGANISM, IF YOU HAVE A MATCH, THEN RECORD ON THE DATASHEET.

ADDITIONAL INFORMATION ABOUT THE ORGANISM

ECOLOGICAL INFORMATION:

***Tolerance values** are a relative scale from 0 (least tolerant) to 10 (most tolerant) these values were developed to summarize overall pollution tolerance of the benthic arthropod community with a single value. The values are used in the Hilsenhoff Biotic Index (HBI) developed as a means of detecting organic pollution in communities inhabiting rock or gravel riffles. Although it may be applicable for other types of pollutants, use of the HBI in detecting non-organic pollution effects has not been thoroughly evaluated. This scale forms the base for the RBV protocol. A stream segment supporting a diverse community of organisms with low tolerance values indicates little organic enrichment and high water quality (EPA-600-4-90-030 Macroinvertebrate Field and Laboratory Techniques).

****Feeding Group:** Most aquatic insects are grouped into 1 of 5 general categories based on the type of food utilized and the feeding mechanism. Predators are secondary consumers generally feeding on other aquatic macroinvertebrates. Shredders use cutting mouthparts to feed on coarse organic matter like leaves. Scrapers use file-like mouthparts to feed primarily on microscopic algae. Collector-filterers and collector-gatherers both utilize fine organic material as the primary food but differ in feeding mechanism. Filterers allow the stream flow to carry the food to them while the gatherers actively search. Feeding groups can reflect the food base of the riffle and provide insight into the nature of potential disturbance factors. Proportion of feeding groups is important because predominance of a particular type may indicate an unbalanced community responding to an overabundance of a particular food type. The predominant feeding strategy reflects the type of impact detected. In general shredders and scrapers are dominant in high quality stream while collector-filterers and gatherers dominate in disturbed systems.

STEP 5: MAKE THE VOUCHER COLLECTION

The goal of this step is to make the voucher collection for the site. <u>This is the most important step of the entire Procedure. The most valuable data are the actual organisms.</u> To complete this task you will need to **first** fill a leak proof container with at least 90% strength isopropyl alcohol (rubbing alcohol), **second** assemble all of the ice cube trays together, **third** place 1-2 of each different type of organism into the container, and **finally** place a label written in pencil into the container.

THE FINAL LIST OF ORGANISMS FROM THE SITE WILL BE BASED ON THOSE PRESENT IN THE VOUCHER--NOT WHAT HAS BEEN WRITTEN ON THE DATASHEET.

-Fill a leak proof container with at least 90% strength isopropyl alcohol.

-Place 1 organism of each different type that you found at the site into the container. Include any that you were not able to identify, those you may think but are not sure if it is the same as something else, and any not listed on the datasheet.

-Place a label, <u>written in pencil,</u> into the container. The label should contain the stream name, collection date, time, site location, town, state, and collector. An example is below

Farmington River
9/20/99 10:00 am
100 meters upstream of Route 181
Pleasant Valley, CT
Mike Beauchene, Coll.

IF YOU ARE IN DOUBT ABOUT WHETHER OR NOT TO INCLUDE AN ORGANISM….PUT IT IN!!!

IT IS BETTER TO HAVE REPLICATION THAN NOT TO INCLUDE A TYPE THAT WAS PRESENT!!

Step 6: SUBMIT YOUR DATA

The goal of this step is to submit your data to DEP for use in water quality assessments. To complete this task you will need to **first** locate your voucher collection and completed data sheet and **second** arrange to deliver the samples.

Samples should be submitted in person, NOT MAILED* to the CT DEP Bureau of Water Protections and Land Reuse Volunteer Monitoring Coordinator:**

Mike Beauchene
CT DEP
WPLR
Planning and Standards Division
79 Elm Street
Hartford, CT 06106

Phone (860) 424-4185

Fax (860) 424-4055

Email: mike.beauchene@ct.gov

***the alcohol used to preserve the specimens in the voucher collection is considered to be a flammable liquid and subject to shipping restrictions.**

Thank you for participation in the RBV program. Please be sure to obtain a copy of the annual summary report from either the Internet at: www.ct.gov/dep/rbv or by contacting Mike directly. The annual report is usually completed and available between February and March.