Chapter 6 - Data - What's Next?

Data Analysis, Action & Evaluation

Analysis involves looking at data and trying to explain or understand what you've found. Often, collection of data over time reveals patterns and trends that are extremely useful in data analysis. It is important to remember that the data you have collected are interrelated – habitat evaluation helps to explain macroinvertebrate presence, which depends upon chemical parameters, etc. A simple but important question is: Do my results make sense? If not, what does not fit? How can this be explained? The following are useful questions to ask during data analysis:

- How do my results compare to the state water quality standards?
- Are there any noticeable patterns?
- Do the results indicate a source of pollution in the watershed?
- Do the test results indicate important water quality issues facing the community?
- What does macroinvertebrate sampling reveal that is not reflected in chemical testing?
- Do the test results seem to correspond to land use?
- Do the CQHEI, Pollution Tolerance Index, and Water Quality Index scores agree?

Take Action

The following list is a sumary of how to take action to address a water quality issue in your river, stream, or watershed. However, don't attempt it alone - you may want to join a community-based watershed organization in your area. There are many groups that are working to locate and correct water resource problems. A list of groups in the Great Miami River Watershed is included in Appendix F of this manual.

List any problems that you discovered during sampling. You may decide that you want to help resolve a problem that you have identified. First, you must define who or what is affected by the problem. For example, fecal coliform contamination impacts the stream community and is a threat to human health.

Second, determine the possible actions that you could take. You may choose to educate others by speaking to neighbors, at school, or by writing to the newspaper. You may choose to take direct action by making lifestyle changes (e.g. start recycling), organizing a stream cleanup, or planting vegetation to stabilize stream banks. An effective way to take action with children is to write songs or theatrical productions that deal with the issue. Finally, you may take political action by speaking at a public meeting or by writing or visiting public officials.

Third, create an action plan comprised of the actions you feel will best help solve the problem. Your plan needs to be realistic and achievable with available information, have a designated time frame, and yet still be challenging and interesting to you and your group. Work locally with people in your community.

Finally, implement your plan. Divide tasks among group members and interested participants and set timelines for each step, as well as an overall deadline. Record meetings and monitor your progress. We encourage volunteers to use their data to take action at a local level.

Evaluate the River Study

Evaluation of your river study is important, as it helps to identify successes and improve future monitoring efforts. Consider whether or not you were able to meet the goals you set prior to beginning stream monitoring. Was time a major limitation? Did you take on too many sampling sites? Did you feel comfortable using the equipment, or would another training workshop be helpful? What did you learn? If you developed an action plan, was it successful?

Guide for Water Quality Ranges

Dissolved Oxygen (% Saturation)

91-110	Excellent
71-90, >110	Good
51-70	Fair
<50	Poor

E.Coli **(colonies per 100ml)**

<50 colonies	Excellent
51-200 colonies	Good
201-1000 colonies	Fair
>1000 colonies	Poor

pH (Units)

6.5-7.5	Excellent
6.0-6.4, 7.6-8.0	Good
5.5-5.9, 8.1-8.5	Fair
<5.5, >8.6	Poor

BOD (mg/L or ppm)

<2	Excellent
2.0-4.0	Good
4.1-10	Fair
>10	Poor

100-250 Good

Total Phosphate (mg/L)

<.10	Excellent
.11-.16	Good
.17-.58	Fair
.59-2.99	Poor
>3.0	Very Poor

***Nitrate Nitrogen (N) (mg/L)**

<0.3	Excellent
.4-.8	Good
.9-1.9	Fair
>2.0	Poor

* Not multiplied by 4.4

Turbidity (NTUs or ft/inches)

1-10 or >3'	Excellent
10.1-40 or 1-3'	Good
40.1-150 or 2"-1'	Fair
>150 or < 2"	Poor

Total Solids (mg/L)

<100	Excellent

Pollution Indicators Table

Watershed Land Uses	Potential Pollutants	Primary Indicators	Secondary Indicators
Agricultural	erosion/sedimentation	turbidity	benthics
		total solids	
	pesticide runoff	benthics	
	nutrient runoff	nitrates	phytoplankton
		phosphates	macrophytes
			dissolved oxygen
			BOD
	animal waste	fecal coliform	nitrates
		E. coli	phosphates
			BOD
Residential	nutrient runoff	nitrates	phytoplankton
		phosphates	macrophytes
			dissolved oxygen
			BOD
	human/pet waste	fecal coliform	nitrates
		E. coli	phosphates
			BOD
	stormwater runoff	temperature	
		total solids	
		turbidity	
Industrial	toxic discharges	benthics	
	thermal discharges	temperature	benthics
			phytoplankton
			dissolved oxygen
Mining	acid drainage	pH	benthics
	heavy metals	benthics	
	erosion/sedimentation	turbidity	benthics
		total solids	

From the Field Manual for Global Low-Cost Water Quality Monitoring by Stapp and Mitchell, 1995.

*Habitat Parameters for Selected Macroinvertebrates**

pH Ranges for Selected Macroinvertebrates*

TAXA	1	2	3	4	5	6	7	8	9	10	11	12	13	14
mayfly						X	X	X						
stonefly						X	X	X						
caddisfly						X	X	X						
snails							X	X	X	X	X	X		
clams							X	X	X	X	X	X		
mussels							X	X	X	X	X	X		

* pH ranges 1-5 and 10-14 are unsuitable for most organisms.

Temperature Ranges for Selected Macroinvertebrates

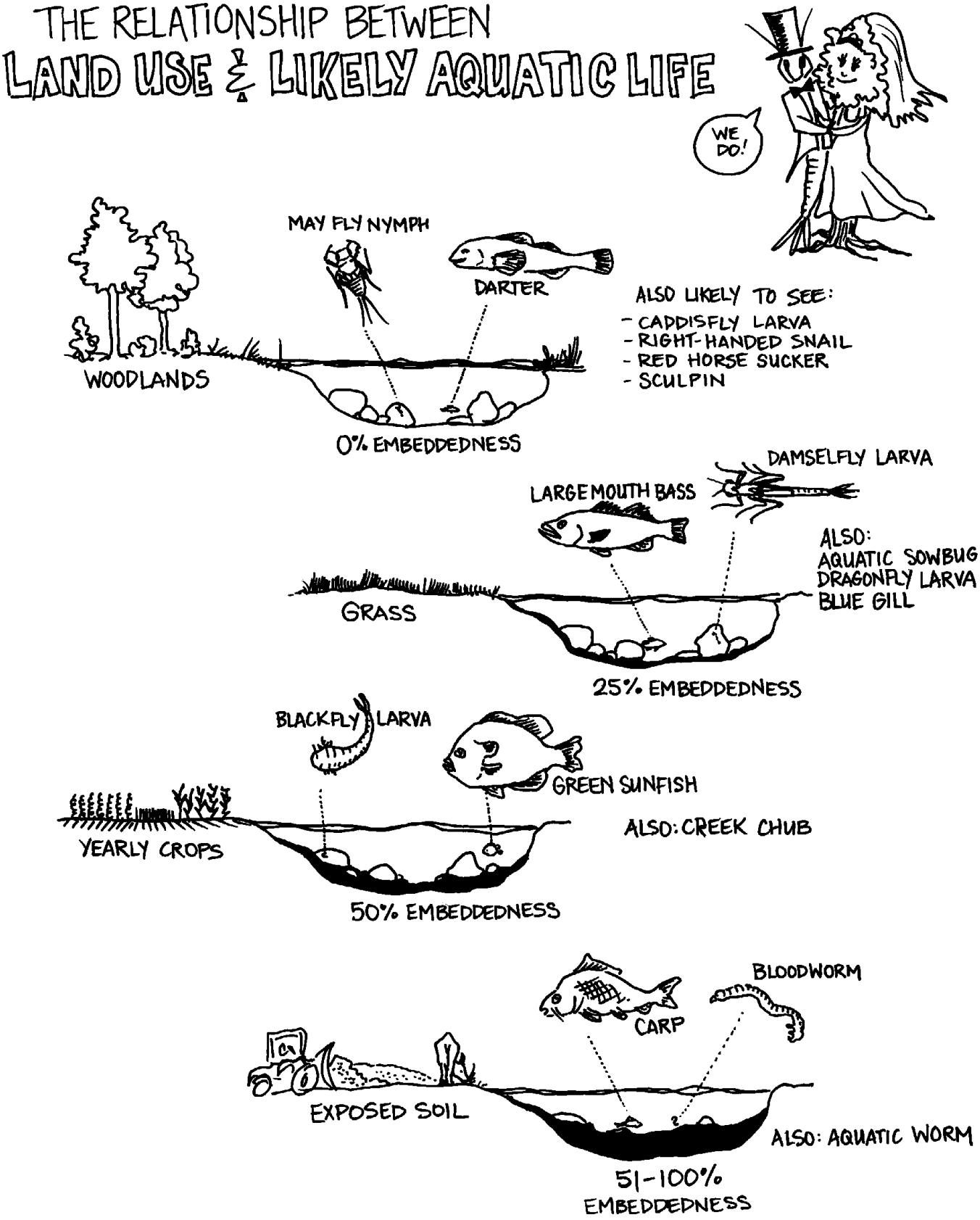
TAXA	Cold Range < 12.8°C	Middle Range 12.8 - 20°C	Warm Range >20°C
caddisfly	X	X	X
stonefly	X	X	
mayfly	X		
water pennies	X		
water beetles		X	
water striders		X	
dragonfly		X	X

Minimum Dissolved Oxygen Levels for Selected Macroinvertebrates

TAXA	High Range 8-10 ppm	Medium Range 4-8 ppm	Low Range 0-4 ppm
stonefly	X		
water penny	X		
caddisfly	X	X	
some mayflies	X	X	
dragonfly		X	
true bugs		X	
damselfly		X	
mosquito			X
midges			X
pouch snail			X
rat-tailed maggot			X

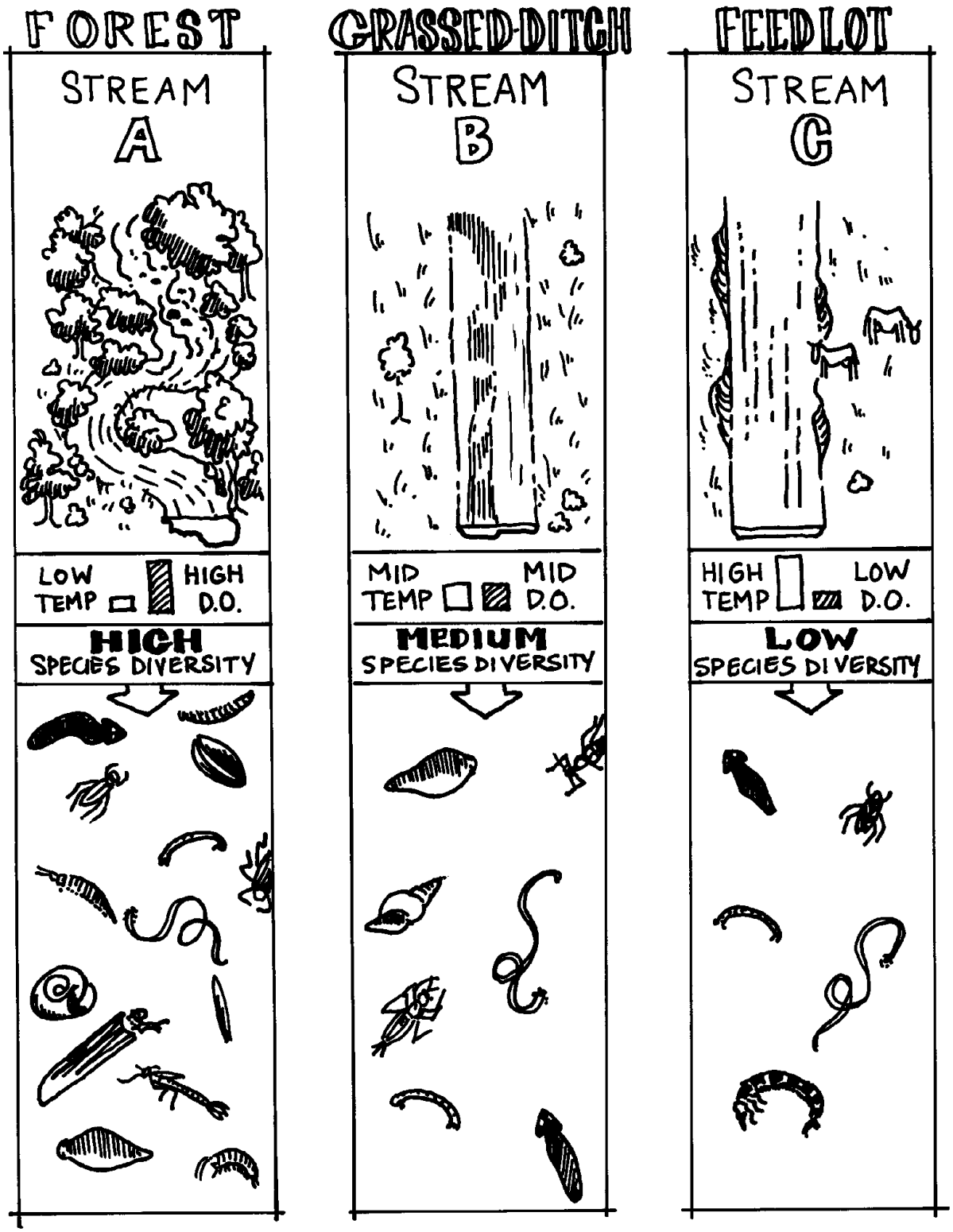
* The values provided are preferred ranges for most species of these groups of organisms.

From GLOBE Manual 1997.


THE RELATIONSHIP BETWEEN
LAND USE & LIKELY AQUATIC LIFE
WE DO!
MAY FLY NYMPH
DARTER
ALSO LIKELY TO SEE:
- CADDISFLY LARVA
- RIGHT-HANDED SNAIL
- RED HORSE SUCKER
- SCULPIN
WOODLANDS
0% EMBEDDEDNESS
DAMSELFLY LARVA
LARGEMOUTH BASS
ALSO:
AQUATIC SOWBUG
DRAGONFLY LARVA
BLUE GILL
GRASS
25% EMBEDDEDNESS
BLACKFLY LARVA
GREEN SUNFISH
ALSO: CREEK CHUB
YEARLY CROPS
50% EMBEDDEDNESS
BLOODWORM
CARP
EXPOSED SOIL
ALSO: AQUATIC WORM
51-100%
EMBEDDEDNESS

Representative Streams

Habitat & Species Diversity



Volunteer & Organization Registration

The Registration page is a form that only needs to be completed once, or if there are changes or updates. Each volunteer participating in the Miami Valley Stream Team program must register themselves and their stream sites before data will be accepted into the database.

1. Certified Monitor's Name: The name of the volunteer who has attended a Miami Valley Stream Team training session and was present during data collection.
2. Organization Name: The name of the organization, agency, corporation, school, class, troop, or group performing the volunteer monitoring activities. PLEASE do not abbreviate the name.
3. Contact Information (Address, City, State, Zip, Phone, Fax, E-mail): Please also provide your phone, fax, and e-mail (if applicable), so that we may contact you with timely information if necessary.

4. Training Workshops Attended: Only certified trained monitors may enter data in the statewide Internet database. Exceptions may be made on an individual basis for attendance at other training workshops (e.g., GREEN).

5. Year: Year training was attended

6. Location: List closest town and site (e.g., town park, state park, school, 4-H building)

7. Instructor: Name of training instructor

Organization Registration

Organization registration helps track overall participation by groups.

1. Organization Name and Contact Information: Same as above.
2. Homepage URL

Volunteer Stream Monitor Registration

Certified Monitor's Name _____

Organization Name _____

Address _____

City _____ State _____ Zip _____

Phone ( ) _____ Fax ( ) _____ E-mail _____

Training Workshops Attended

Year _____ Location _____ Instructor _____

Year _____ Location _____ Instructor _____

Year _____ Location _____ Instructor _____

Organization Registration

Organization Name _____

Name of Primary Contact(s)_____

Address _____

City _____ State _____ Zip _____

Phone ( )_____ Fax ( )_____ Homepage URL _____

Stream Site Registration

Stream/River Name _____ Site ID_____

Nearest City/Town _____ County _____ State _____

Description of Location_____

Watershed Name _____ Watershed #_____

Latitude (North) _____ Longitude (West)_____

Source of Latitude / Longitude Data_____

Stream Site Registration

1. Stream/River Name: The official name of the stream that is being monitored. The official name can be found by using a U.S. Geological Survey topographic map. In the case of unnamed streams, indicate the next named stream into which the unnamed stream drains (e.g. tributary to Mad River).

2. Nearest City/Town: The nearest community to your sampling site.

3. County and State: The county and state in which your sampling site is located.

4. Description of Location: Brief explanation of your site location in relation to nearby roads, bridges, dams, other landmarks or other waterways.

5. Watershed Name and Number: The name and 8-Digit Hydrologic Unit Code (HUC) of the watershed where your sampling site is located.

6. Latitude and Longitude: Please provide geographic data in degrees, minutes, and seconds.

7. Source of Latitude and Longitude Data:

GPS: One of the most accurate methods for determining site location is a Global Positioning System (GPS) receiver. This device picks up signals from satellites orbiting the Earth and instantly displays the latitude and longitude (and altitude, if desired) of your location. To work properly, a GPS receiver must be able to "see" the sky in order to locate the satellites. A cliff, or even a dense forest can interfere with your ability to get a good read-out. Hand-held models are available at some outdoor stores, and the prices are getting lower as the technology improves.

Internet Site: Many sites on the Internet allow you to pinpoint your latitude and longitude using computer generated maps. A few of these internet sites are listed below.

- TopoZone - **http://www.topozone.com**
- Map Blast - **http://www.mapblast.com**
- U.S. Census Bureau - **http://www.census.gov/cgi-bin/gazetteer**
- USGS Geographic Names Info. System - **http://mapping.usgs.gov/www/gnis**

Topographic Map: You can approximate your site location using a topographic map. Information on obtaining a topographic map is provided in Appendix A.

Weather

Before you enter data into the website, you are required to enter the weather conditions during the time of sampling, and 48 hours prior to sampling. Please submit the worst weather conditions during this time period as they may significantly impact water quality.

Record-keeping Form

(If you have more than one site, copy this recordkeeping form. Use a separate form for each site.)

YEAR:

Date of	Date(s) of	Data Entry	Completed by
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
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