

Michigan Trout Unlimited *River Keepers*  
*Program Volunteer Manual*



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## **Chapter 1 – *River Keepers Program Overview***

### **1.1 Scope of this Manual**

This manual contains methods and tools for volunteer monitoring of water temperature, in-stream habitat characteristics, aquatic macroinvertebrate based water quality indices, in-stream flow, and fisheries populations. Some of the methods and training techniques are specific to Michigan; in these instances chapters outside of Michigan should consult with their local agency biologists about modifying methods to meet their needs. This manual is intended for use by Trout Unlimited (TU) chapters across the country, although it was written specifically for Michigan and includes examples and methods specific to Michigan.

The methods included in this manual are standard to governmental agencies in Michigan. For most types of data the methods presented should work across the country. Methods for water temperature, in-stream flow, and in-stream habitat are standard and should work throughout the nation with little modification unless otherwise noted. However, methods for sampling macroinvertebrates and fisheries survey techniques are specific to those required by the Michigan Departments of Natural Resources and Environment (MI DNRE). Chapters outside of Michigan interested in monitoring macroinvertebrates and/or fish should contact local agencies to determine what methods are standard for stream monitoring in their area.

It is a good idea to contact local agencies and fisheries biologists early on in the planning process regardless of which variables you are monitoring. Maintaining a good relationship and open communication with agency staff is very beneficial. It will make setting up most aspects of a volunteer stream monitoring program easier. In addition, in most cases, one of the goals of stream monitoring is to provide data to state and/or federal agencies. Communication about how they would like the data collected and delivered is critical to ensuring that the data will get used in future fisheries and habitat management decisions.

### **1.2 Stream Monitoring, A New Opportunity for TU Volunteers**

One of the important identities of TU is the hands-on stream restoration that its members achieve through volunteer efforts. Through the past decades this has been a hallmark of TU, incredibly beneficial to our rivers and streams, and has provided a critical means for TU volunteers to directly contribute to our mission in a meaningful and valuable manner. In many parts of the country, this hands-on stream restoration work is still the foundation of TU work. Michigan Trout Unlimited (MITU) is fortunate to have a wealth of highly productive partners in conservation and in particular, stream restoration. Many of our watershed councils and conservation districts (and the RC&D's) possess a high level of capacity, have many fulltime technical staff, and are very productive in performing

stream restoration projects. We are fortunate for this, as performing stream restoration projects in Michigan has become administratively demanding (engineering design requirements, grant subcontracting, etc.), at least for a volunteer-based organization such as TU. Hands-on volunteer involvement is not always needed for these projects. Fortunately, volunteer stream monitoring offers TU members an ideal opportunity to contribute in a hands-on manner while capitalizing on the greatest strength of TU, its large number of members who are knowledgeable about specific trout streams. The volunteer stream monitoring program also comes at a time when governmental agencies need this type of assistance more than at any other time in history. MITU's large number of members and wide distribution across Michigan provide MITU with a unique opportunity to conduct widespread stream monitoring. Monitoring coldwater streams across the state will provide a wealth of valuable information.

Volunteer stream monitoring engages members, educates them about coldwater resources, and contributes needed information that is the foundation to achieving any component of our conservation mission. The MITU *River Keepers* stream monitoring program was created with this premise in mind. The three primary goals of the *River Keepers Program* are to collect data that will help guide future coldwater conservation and restoration efforts, to provide hands-on volunteer opportunities for Trout Unlimited members, and to provide meaningful data to the MI DNRE. This program will allow MITU to conduct conservation and restoration projects based in science. The ultimate goal of the *River Keepers Program* is to improve coldwater conservation in MI while strengthening MITU's working relationship with the MI DNRE.

Each subsequent chapter of this manual focuses on one type of monitoring: 2) temperature, 3) river habitat mapping, 4) Adopt-A-Station habitat monitoring, 5) macroinvertebrates, 6) in-stream flow, and 7) fish. Objectives and methods for monitoring each type of data can be found in subsequent chapters.

### **1.3 Recording Volunteer Time and Travel**

It is very important to know how many active volunteers are participating in *River Keepers*, how many hours each volunteer is putting in, and how far each volunteer is traveling by car. This information is very important for leveraging funds and for use as match when writing grants. Please keep track of your time and travel each time you volunteer for the *River Keepers Program*. A volunteer time and travel log can be found in Appendix 1A.



## **Chapter 3 – River Habitat Mapping**

Chapters across the country should be able to use the standard procedure for river habitat mapping. Consult with local agencies about additional variables they would like monitored and streams of interest to them.

### **3.1 Objectives**

These standard protocols for river habitat mapping are intended to be used to increase the amount of habitat data available for Michigan's coldwater streams. This document is designed to provide standard protocols for mapping river habitat that can be used by trained volunteers participating in the Michigan Trout Unlimited *River Keepers Program*.

The river habitat mapping procedure is designed to address several objectives:

- Provide comprehensive habitat data for entire streams.
- Provide the best information possible to prioritize conservation, protection, and restoration of coldwater streams.
- Provide consistent methods for evaluating and quantifying in-stream habitat.

### **3.2 Training**

All river habitat mapping program leaders must have received training from a Michigan Trout Unlimited staff member or fellow program leader. Leaders are then qualified to train volunteers to map river habitat. Leaders from chapters wishing to begin a river habitat mapping project are encouraged to do "side-by-side" habitat mapping with a program leader from a chapter actively participating in river habitat mapping.

### **3.3 Equipment**

It is recommended that several river habitat mapping "kits" be put together. These "kits" can then be passed around among volunteers which eliminates much of the hassle of sharing equipment. It is recommended kits be housed in backpacks or bags. Kits should include:

- A fiberglass or nylon tape measure (100-300 feet)
- A laser range finder
- A foldable ruler or yard stick for measuring depth
- A clipboard with a compartment
- Pencils
- Data sheets
- Laminated instruction sheets
- A handheld GPS unit (if available)
- A digital camera
- A canoe or drift boat (only necessary for streams where wading is not possible, and of course is not in the "kit" bag)

### 3.4 Preparation

#### a. Choosing a River

Several factors contribute to determining if a river is a good candidate for river habitat mapping. New habitat mapping programs should plan to start with a river that will be relatively easy to map, is of interest to the chapter, and is a priority for conservation partners (MI DNRE, RC&D's, etc.). An easily mapped river will have easy access throughout, will be wadeable or very easy to float, and will have a large number of interested volunteers. It is recommended that more difficult rivers not be tackled until volunteers have gained experience in river habitat mapping. Chapters should consult with local fisheries biologists and other interest groups when choosing a river. MITU staff can also help with river selection.

#### b. Dividing a River into Sections

Rivers will be mapped in sections. These sections can vary in length depending on the size of the river. As a rule, it is probably a good idea to try not to create sections that will take more than 2-3 hours to map. Small sections of the river that frequently switch bedform (run, riffle, pool) will take much longer to map than large, monotonous sections of river. Keep this in mind when dividing a river.

It is also a good idea to try to create sections that begin and end at easy access points. This makes it easier for people to get in and out of the river and helps make it easy to find a given section. Rivers should be divided into sections by the project manager and additional volunteers before mapping begins, MITU staff can help with this task. Be specific when giving volunteers section assignments.

### 3.5 River Habitat Mapping

**This information is included in a condensed instruction sheet in appendix 3A**

#### a. Key Terms

##### Bedform Delineation

- **Run** – Moderate current, unbroken water.
- **Riffle** – Swift current, turbulent broken water.
- **Pool** – Slow or no current, unbroken water. Relatively deep.
- **Rapid** – Swift current, very turbulent, broken water. Large boulders or bedrock often breaking the surface.
- **Waterfall** – The majority of the stream flowing over a ledge or cliff.

##### Substrate Classification

- **Clay** – Very fine sticky texture. Easily forms ribbon when rolled in hand.
- **Silt** – Very fine texture. Smooth, silky feel when handled.
- **Sand** – Crumbles readily when handled. Single sand grains are apparent.
- **Gravel** – Rocks 1/16 to 2 ½ inches in diameter.

- **Cobble** – Rocks 2 ½ to 10 inches in diameter.
- **Boulder** – Rocks greater than 10 inches in diameter.
- **Bedrock** – Solid rock surface, not the tops of boulders.

#### b. Getting Started

When the river has been divided into sections, each section should be assigned to a crew. Each crew should have about 3-5 volunteers.

Make sure you know where your start and end points are! Begin by filling in the information at the top of the data sheet (river, date, crew, starting point, and surveying direction) Appendix 3B.

Habitat mapping should be done in mid to late summer through early fall, during average to low flow. Avoid mapping immediately following heavy rain. High water will make it hard to distinguish bedform, categorize substrate, and will not give an accurate percent of deep water. After rain events, wait until flow is back to normal.

#### c. Measuring Unit Area

A unit of the river is defined as a section of river that is made up of one consistent bedform type (i.e. each run, riffle, and pool are separate units). The first step in mapping a stretch of river is to determine the **bedform type** (run, riffle, pool, rapid, waterfall) at the starting point. Record the bedform type on the data sheet and measure the stream width at the starting point. If you are working in a downstream direction you will measure the **top width** of unit 1 and indicate the bedform type on the data sheet. You then will measure the **length** of the unit and the **bottom width**. You will also need to record a GPS coordinate at the top and bottom of each unit.

One person should remain at the beginning of the unit so you can use the range finder to measure unit length. If you are having a hard time getting the range finder to focus on an object try having a person holding up a clipboard stand at the end of the unit.

#### d. Substrate and In-stream Habitat

As you walk the length of each unit take note of the substrate, aquatic vegetation, woody debris, and depth. At the end of each unit all members of your group should come together to discuss bottom substrate composition, percent aquatic vegetation, and percent woody debris. You will also be asked to determine what percentage of the unit is greater than 2.5 feet deep and the value of the maximum depth within the section. When estimating percentages visualize the streambed from above and estimate what percent of the streambed is occupied by each substrate type, woody debris, aquatic vegetation, and deep water. Talk about differing opinions and come to a consensus within the group.

At the end of each unit you should also make notes of any additional pieces of information the groups feels would be useful (i.e. eroding banks, substrate embeddedness, status of the riparian corridor, culverts, drains, irrigation, etc.). Move onto the next unit when all of the necessary information has been filled in.

In the event that there is more than one bedform present in a unit (i.e. run and pool), classify the unit using the dominant bedform type. This may mean that you divide the section down further so you have a run in the area where run is dominant and a pool in the area where pool is dominant. However, for data analysis it is important to choose a dominant bedform type for the whole width of the stream.

Move on to the next bedform unit and keep mapping until you reach the end of your section.

### **Data Sheets – Appendix 3B**

Mail completed data sheets to Michigan Trout Unlimited for analysis.  
P.O. Box 442  
Dewitt, MI 48820

OR

Scan and email completed data sheets to Kristin Thomas [kthomas@michigantu.org](mailto:kthomas@michigantu.org)

### **3.6 Data Analysis**

Data will be analyzed and put into a database by MITU staff. MITU will quantify the area and percentage of the river represented by each bedform type and substrate. The area and percentage of aquatic vegetation, woody debris, and deep water will also be calculated. These findings will be reported to the chapter, the area DNRE biologist, and any other interested parties.

## Appendix 3A – Habitat Mapping Guidelines

### Guidelines and Tips

1. Make sure you know where your start and end points are.
2. Fill in site description information and survey direction
3. Begin mapping
  - a. Identify the **bedform** (run, riffle, pool etc.) in your starting unit
  - b. Measure the **top width** of the unit
  - c. One person should remain at the start
  - d. One or two additional people should walk downstream to the end of the unit you are measuring
  - e. Use either a tape measure or laser range finder to measure the **length and bottom width** of that bedform unit
    - i. If you are having a hard time finding something for the range finder to focus on try having a person at the bottom of unit hold up a clipboard
  - f. As you walk to the bottom of the unit make sure to take note of the **substrate, aquatic vegetation, woody debris and depth** within the unit
    - i. When all of the group members have walked through the unit discuss the substrate composition, percent aquatic vegetation, percent woody debris, and the percent of water over 2.5 feet.
    - ii. Find the approximate location of the **deepest water in the unit** and measure the depth
  - g. Record GPS coordinates at the top and bottom of each bedform unit
  - h. Take photographs of each bedform unit
  - i. Finally, make note of **any additional useful pieces of information** such as:
    - i. Eroding banks
    - ii. Substrate embeddedness
    - iii. Status of the riparian corridor
    - iv. Culverts
    - v. Drains
    - vi. Etc.
  - j. When you have filled in all the necessary information for the first unit move on to the next.
4. If you are in a place in the stream where there are both a run and a pool or a run and a riffle present **classify the river based on the dominant bedform type**. This may mean that you divide the section down further to have pool habitat in the area where pool is dominant and run habitat in the area where run is dominant. However, it is important for data analysis that sections do not overlap.

**Appendix 3B - Datasheet**

**MITU Habitat Mapping Datasheet**

page \_\_\_\_ of \_\_\_\_

River name: \_\_\_\_\_ County: \_\_\_\_\_ Date: \_\_\_\_\_ Crew: \_\_\_\_\_

Reach Name/Description: \_\_\_\_\_

Starting Point Location: - Distance from Landmark: \_\_\_\_\_ Landmark: \_\_\_\_\_

- GPS Coordinates: EPE \_\_\_\_\_ Surveying Direction: Upstream or Downstream (circle one)

Bedform Types: 1=RIFFLE 2=RUN 3=POOL 4=RAPID 5=WATERFALL

Substrate Sizes: Clay, Silt, Sand, Gravel (1/16"-2 1/2" ), Cobble(2 1/2"-10"), Boulders

Bedform Type**	Length unit__	Top width unit__	Bottom width unit__	GPS bottom	GPS top	Max Depth	% Depth > 2.5 ft	% Woody Debris	% Aquatic veg.	% Substrate Composition						Other
										Clay	Silt	Sand	Gravel	Cobble	Boulder	
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\* Examples of information to be included in other: eroding banks, riparian corridor characteristics, culverts, drains, etc.

\*\* Pool (about 1.5 times deeper than average depth; low stream velocity); riffle (disturbed, rolling surface); run (smooth flowing section of stream); rapid (very disturbed surface, high velocity, whitewater); waterfall (the majority of the stream flowing over a ledge)