

# **Primary Headwater Habitat Survey Plan for 2000**

## **Study Goals and Objectives**

The headwater habitat initiative is now in its second year. The goals for the continuing study in 2000 are to provide additional information and fill in data gaps regarding the nature of the 3 classes of PHWH streams, to test and refine the Headwater Habitat Evaluation Index (HHEI), and to quantify the types of PHWH which can be found throughout the state. This plan provides a brief description of each of these goals, a breakdown of work effort for each district or unit participating in the study, and a detailed study plan for the quantification of PHWH stream types.

- **PHWH Characterization**: Quarterly sampling of reference PHWH sites will continue throughout 2000. In addition, macroinvertebrate sampling was conducted during the spring in several Class C PHWH streams identified during the 1999 survey to better characterize their potential for supporting aquatic life. Some Class A PHWH sites sampled in the fall of 1999 will be re-sampled for macroinvertebrates during the summer months to provide more consistent data for comparison. As time allows, new streams will be sampled using the full assessment protocol for addition into the data base for PHWH characterization.
- **HHEI Development**: Using data gathered during 1999, a headwater habitat Evaluation Index (HHEI) was developed for use as a rapid assessment tool for PHWH streams. The index will be tested at as many sites as possible during 2000, including the sites selected for the PHWH quantification survey described below. Using the data collected this summer, the HHEI metrics will be further evaluated for validity and scoring rationale so that a final HHEI can be developed.
- **PHWH Quantification Study**: With the assistance of statisticians from the Ohio State University, a randomized sampling plan was developed to survey 200 sites statewide among 5 areas of potentially rapid urban-suburban development, designated as "potentially rapidly developing areas" or PRDAs. Although proportional sampling among the PRDAs was considered based upon the number of primary headwater streams in different geographic areas, it was decided to equally partition sampling sites among the PRDAs in order to provide better coverage statewide. Using the study plan provided later in this document, PHWH sites will be selected and evaluated during the summer of 2000. Once all of the data for these sites has been tabulated, the number of each class of PHWH will be estimated by ecoregion, by geographic area or both. Confidence limits for these estimates will then be calculated using statistical procedures. It is estimated that the 95 percent confidence interval estimates will provide an approximate margin of error of 7 percent for these estimates. Logistic regression analysis will be used to verify that there is conditional independence of stream quality after taking factors into account such as ecoregion location, the degree of development near the stream, etc.

## **Breakdown of Work Effort by District and Unit**

### **NEDO Work Effort**

4. Continue quarterly sampling at 2 class A sites (Spring Brook upper, and Spring Creek (CVNRA). spring-summer-fall = 6 samples
5. Continue quarterly sampling at 2 class B sites (Aurora-Hudson Rd. and Hudson industrial Park-disturbed). spring-summer-fall = 6 samples
6. Collect 4 samples from new Class A stream types for macroinvertebrate analysis during the summer period.
7. Sample the Streetsboro Town Square site (Class C) in spring = 1 sample.
8. Re-visit 10 previously identified Class C sites in the CVNRA to collect a spring macroinvertebrate sample.
9. Train 2-3 Lake County SWCD staff in QHEI, PHWH survey procedures, and HHEI for use in their stream assessment program (anticipated coverage = 100 sites). Conduct QA/QC evaluations at 5-10 sites to verify accuracy of the assessments. If QA/QC survey indicates that the data is acceptable, this data will be incorporated into the program.
10. Conduct three rapid assessment studies for potentially rapid development areas (PRDAs) to evaluate PHWH sites utilizing the HHEI in accordance with the attached Primary Headwater Habitat Sampling Plan for PHWH Quantification, 2000. Forty sites will be evaluate per PRDA, for a total of 120 sites.

### **SWDO Work Effort**

1. Collect qualitative macroinvertebrate samples from 2 Class A streams evaluated in 1999 (Fall samples) during July-August 2000 = 2 samples
2. Conduct rapid assessment study for one PRDA according to the attached Primary Headwater Habitat Sampling Plan for PHWH Quantification, 2000. Forty sites will be evaluate per PRDA, for a total of 40 sites.
3. Collect additional PHWH full evaluation data and HHEI data as possible.

### **SEDO Work Effort**

1. Conduct rapid assessment study for one PRDA according to the attached Primary Headwater Habitat Sampling Plan for PHWH Quantification, 2000. Forty sites will be evaluate per PRDA, for a total of 40 sites.

### **Other Districts and 401 Unit**

1. Collect additional PHWH full evaluation data and HHEI data as possible.

### **EAU Work Effort**

1. Analyze 24 qualitative macroinvertebrate samples as follows:
  - Quarterly site samples collected by NEDO (16 samples),
  - 5 Class A samples collected in SEDO for sites surveyed in July-August 1999,
  - 1 Class A sample collected in CDO (Highbanks training site) in late June 1999,
  - 2 samples collected by SWDO in 2000.
2. Analyze 6 additional macroinvertebrate samples from Class C streams in the CVNRA study area in NEDO (note: these samples have already been collected).

## Primary Headwater Habitat Sampling Plan for PHWH Quantification, 2000

### Area of Study

Five potentially rapidly developing areas (PRDAs) from the four main ecoregions of Ohio will be sampled to quantify the distribution of primary headwater habitat stream types. One PRDA will be located in each ecoregion, with the exception of the Eastern Corn Belt Plains which will have two PRDAs. The Eastern Cornbelt Plains is the largest ecoregion in the state and contains two of the main metropolitan areas of the state. Each PRDA consists of a two-county area. Within each ecoregion, counties were chosen to encompass as many sub-ecoregions as reasonably possible among rapidly developing counties.

<u>PRDA NAME</u>	<u>COUNTIES INVOLVED</u>	<u>RESPONSIBLE OFFICE</u>
Eastern Cornbelt Plains I	Delaware & Union	NEDO
Eastern Cornbelt Plains II	Butler & Warren	SWDO
Erie/Ontario Drift & Lake Plain	Geauga & Medina	NEDO
Huron/Erie Lake Plains	Fulton & Wood	NEDO
Western Allegheny Plateau	Athens & Hocking	SEDO

### SAMPLING PLAN

A total of 200 sites will be surveyed statewide for this aspect of the study. The sites will be divided evenly among the PRDAs for a sub-sample size of 40 sites per PRDA. Sites will be selected randomly utilizing NRCS soil surveys for the 2 counties involved. The selection of sites will be conducted as follows:

#### **0. preparation for one PRDA sub-sample**

- A. Identify one of the counties as A, the other as B. Determine area of each county (given in general info at beginning of each soil survey book). Compute  $a = \text{county A area} \div \text{total area of counties A \& B}$  for use in Step 1 below.
2. For Step 2 below, each soil survey book has a map showing whole county as divided into map pages; for each county determine the number of map pages from the county "Index to Map Sheets" map near the front of the document (designated as "q" in procedure below).
3. For Step 3, create or obtain a Mylar or other transparent overlay with an interior grid 26 cm x 38 cm and with grid spacing of 2 cm. Place the origin in the lower lefthand corner of the grid with sequential numbering in the x and y direction (1,2,3,4,..., etc.). The resulting grid should be 13 units in the vertical direction and 19 units in the horizontal direction.

#### **1. Randomly select which county the next sample member in the PRDA will be drawn from:**

Use random number function on calculator or computer to randomly select a number between 0.0 & 1.0; if random number is between 0.0 & a, next sample member will come from county A, otherwise B.

#### **2. Randomly select a map page from the chosen county:**

Use random number function on calculator or computer to randomly select a number between 0 & 1, multiply result by (q-1), add 1 to the result, and round to the nearest whole number to select the map sheet where the sample site will be located.

**3. Randomly select a stream on the map page:**

1. Overlay the selected map page with the Mylar overlay. Determine the total grids included on the map sheet in the vertical direction (y) and the horizontal direction (x) (note: this will vary depending somewhat depending upon the aerial photograph size in the soil survey reports, the edges of counties may have only partial photos on a map sheet).
2. Use random number function on calculator or computer to randomly select a number between 0 & 1, multiply result by y and call answer y'.
3. Use random number function on calculator or computer to randomly select another number between 0 & 1, multiply result by x and call answer x'.
4. Measure from lower left corner of chosen map page, x' units to right, y' units up; then chose the nearest accessible headwater stream as next sample member. If the point selected is outside of the county limits, or is off of the aerial photo, discard this location and repeat the procedure to select another stream (this will most often happen at the county boundaries where partial photos are often used on the map sheets).

Repeat steps 1-3 until a total of 50 sites are selected for that PRDA's sub-sample. The 10 extra sites can be used as replacement sites should field conditions at a particular site prevent access for sampling.

**Analysis**

Field data collection at each site will consist of the completion of both sides of the Primary Headwater Habitat Evaluation Index (HHEI) field sheet according to the procedures in the HHEI User's Manual (Ohio EPA, 2000). In addition, a minimum of 15 minutes of kick net and qualitative sampling will be conducted in streams where suitable habitat exists for aquatic organisms in order to document the presence of aquatic life. In situations where suitable habitat does not exist (i.e. dry stream bed), no biological sampling is required. Vertebrate and macroinvertebrate taxa collected will be summarized using the qualitative analysis summary sheets found in the Primary Headwater Habitat Evaluation Form (Item K of Appendix 1 of the Primary Headwater Habitat Assessment Manual, Ohio EPA, 1999). Voucher specimens should be preserved for all salamander species collected during the site visit using the procedures described in the assessment manual. Preservation of voucher specimens for fish and macroinvertebrate taxa collected during the site visit is optional if needed to confirm field identifications.

In addition to the information required by the HHEI form, field readings for temperature, pH, dissolved oxygen, and conductivity will also be taken in accordance with standard Ohio EPA procedures. In addition, an evaluation of the degree of recent (i.e. less than 20 years old) suburban/urban development within the vicinity of the stream (1-3 mile radius) will be made. For purposes of this evaluation, "suburban/urban development" means large lot and subdivision type residential development, commercial development, golf courses, and other non-agricultural land uses. Land uses such as agriculture, woodlot, and parks will not be considered in this category. Categories for characterization of the degree of development are as follows:

None:	no suburban/urban development noted
Slight:	less than 5 percent suburban/urban development noted
Moderate:	5 - 20 percent suburban/urban development noted
High:	21-50 percent suburban/urban development noted
Extreme:	greater than 50 percent suburban/urban development noted

The attached sheet should be used to record the additional information not included on the HHEI form.

**Rapid Assessment Study Supplemental Data Sheet**  
(Attach to HHEI form)

PRDA Name: \_\_\_\_\_

Site Number: \_\_\_\_\_

County: \_\_\_\_\_

Date: \_\_\_\_\_

Field Water Chemistry:                      Temperature (EC) \_\_\_\_\_                      pH \_\_\_\_\_

Dissolved Oxygen (mg/l) \_\_\_\_\_

Conductivity (Fmhos/cm) \_\_\_\_\_

Development Pressure (check one):

    None (all use agriculture, woodlot, park, etc.)                      \_\_\_\_\_

    Slight (<5% suburban/urban development)                      \_\_\_\_\_

    Moderate (5- <20% suburban/urban development)                      \_\_\_\_\_

    High (20-50% suburban/urban development)                      \_\_\_\_\_

    Extreme (>50% suburban/urban development)                      \_\_\_\_\_