

Doc. 0053e/0000e

Users Manual

October 30, 1987

Procedure No. WQMA-SWS-6  
Revision No. 1

Date Issued 11/02/87  
" Effective 11/02/87

APPENDIX E:

Ohio EPA Stream/River Size Measuring  
and Sampling Location Methods

Procedure No. WQMA-SWS-6  
Revision No. 1Date Issued 11/02/87  
" Effective 11/02/87

## E-1: Methods for Calculating Drainage Areas

Three methods may be used for calculating drainage areas (square miles) which lie upstream from sampling locations. They may be used individually or combined as the need dictates. The method(s) used is dependent on three variables, 1) accessibility of drainage area information, 2) whether or not data are computerized, and 3) time constraints. Time constraints are often the most important factor, resulting in the consistent use of one method over another.

Precision of drainage area calculations in areas of 20 square miles or less is especially important when they are used as factors in various biological indices (e.g. Headwaters IBI). Calculation of larger drainage areas allows for a greater margin of error, so relative precision in such areas is not as critical. An acceptable error margin is 10% (this can be determined through a more detailed process of using a digitizer).

The first and easiest method used for calculating drainage areas is to use drainage areas listed in the Gazetteer of Ohio Streams (Ohio Dept. Nat. Res. 1960) and the Supplement to the Gazetteer of Ohio Streams (Ohio Dept. Nat. Res. 1967). Sampling locations which are located within one mile of the mouth of a listed stream or river are assigned the value which corresponds to the drainage area of that watershed. Drainage areas of sampling locations which fall between two listed streams are calculated by interpolation. This method is used most often and requires a relatively small effort.

A second method is a "hands-on" procedure in which a clear sheet of plastic marked with one square mile grids is over-laid on a USGS 7 1/2 minute topographical map. Mapped contour lines are carefully observed and watershed boundaries are outlined. Any portion of the watershed which lies within any portion of a block of the overlay is used in the calculation. For sections of a watershed which cover only a portion of a grid, the percentage of the grid which is filled is estimated. All full grids and partial grids are then added together, resulting in the total drainage area. This method is used for small streams and the headwaters portions of larger streams where the Supplement to the Gazetteer of Ohio Streams does not include the information necessary for calculating drainage areas. This method is also used in conjunction with the Supplement to the Gazetteer. Grids are used to calculate small drainage areas between sampling locations and Gazetteer reference points.

The third method, and the most complex, is that of creating a plot of the sampling locations. Data must be in a computerized information base to use this method. An electronic data file is created which contains the stream code, river mile and latitude/longitude coordinates of the sampling locations. This file is then merged with a PEMSO plotting program called PEMLST. PEMLST will produce a plot of the state of Ohio with all sampling locations labeled with an "x" and a river mile index number. When a plot has been produced, a mylar map containing the boundaries of Ohio watersheds is

Procedure No. WQMA-SWS-6Date Issued 11/02/87Revision No. 1" Effective 11/02/87

over-laid on the plot. To accomplish the alignment of sampling points within the watershed boundaries, the map of Ohio watershed boundaries is first over-laid on the map of Principle Streams of Ohio (Ohio Dept. Nat. Res. 1984). Stream courses are drawn in using a pencil. When the watershed map is over-laid on the plot of sampling locations, points should fall along the stream courses. This procedure aids in determining the drainage pattern of a stream basin. When all of these preliminary steps have been completed, a digitizer is used to outline the estimated watershed boundaries upstream from the selected sampling point. Drainage areas of watersheds are listed in two computer printouts labeled PEMS0 Watershed Characteristics. All drainage areas are listed in acres. The scale of the digitizer is set to acres to correspond to drainage areas listed in the PEMS0 Watershed Characteristics printouts. All numbers derived from the digitizer calculations must then be converted to square miles (this is done by dividing the number of acres by 640). This method is the most time consuming, but has the capability of being the most accurate for determining drainage areas. However, since all tributaries are not shown on the Principle Streams of Ohio map, precise boundary lines are not always known.

Procedure No. WQMA-SWS-6Date Issued 11/02/87Revision No. 1" Effective 11/02/87

## E-2: FINS Basin-River/Stream Codes

Basin-river/stream codes were developed for use with the Fish Information System (FINS). This is composed of a two digit prefix or basin code and a three digit river/stream code. The two digit basin code conforms to the major basin codes used with the Ohio EPA PEMS0 system (Ohio EPA 1983<sup>b</sup>). Twenty-three major basins are designated across the state.

The three digit river/stream code was developed by using the Gazetteer of Ohio Streams (Ohio DNR 1960). Each major mainstem stream or river within each of the 23 major basins is designated 001. Major tributaries of the mainstem stream or river are assigned codes 100, 200, 300, etc. Smaller streams and tributaries are given numbers in between. Thus the code for the Hocking River is 01-001 reflecting its location in major basin 01 and its prominence as the mainstem river.

FINS basin-stream/river codes are stored at Ohio EPA for each major basin according to a numerical sort for all rivers and streams listed in Ohio DNR (1960). Codes and names are assigned to streams not listed in the gazetteer and stored at Ohio EPA. Interested persons should contact Ohio EPA, Division of Water Quality Monitoring and Assessment, Surface Water Section for numerical listings and other information.