

Appendix D

The Lower Olentangy Watershed Inventory

December 2003

This page left blank.

“A Snapshot: The State of the Lower Olentangy River Watershed in 2001”

Lower Olentangy River Watershed Inventory



Photograph by George C. Anderson

December 2003

This page left blank.

**“A Snapshot:
The State of the Lower Olentangy
River Watershed in 2001”**

Lower Olentangy River Watershed Inventory

Produced by:

FLOW

Explore. Discover. Understand.

3528 N. High St. #F
Columbus, OH 43214
614-267-3386

flow2004@sbcglobal.net



This page left blank.

Table of Contents

Table of Contents	D-i
List of Appendices	D-iii
List of Tables	D-iv
List of Figures	D-vi
1. Introduction	D-1
Lower Olentangy River Watershed Inventory.....	D-1
FLOW Inventory Committee Members	D-2
2. Watershed Physiography	D-3
3. Geology of the Olentangy River Watershed	D-7
Bedrock Geology in the Watershed	D-7
Glacial Geology in the Watershed.....	D-8
Upper Geological Region (“Farmland River”).....	D-10
Middle Geological Region (“Scenic River”).....	D-12
Lower Geological Region (“Urban River”).....	D-14
4. Hydrology of the Olentangy River Watershed	D-23
The Hydrologic Cycle.....	D-23
Climatic Conditions in the Watershed.....	D-23
Stream Flow	D-24
<i>Stream Flow in the Olentangy River</i>	D-25
Effects of Deforestation and Impermeable Surface Areas.....	D-28
Effects of the Delaware Dam on Stream Flow in the River	D-28
A Generalized Daily Hydrologic Budget for the Lower Olentangy River	D-29
Future Impacts on Olentangy River Stream Flow	D-29
5. Biology of the Lower Olentangy River Watershed	D-35
Aquatic Biotas in the Lower Olentangy Sub-basin.....	D-35
<i>Fish</i>	D-36
<i>Freshwater Mussels</i>	D-38
<i>Benthic Macroinvertebrates (Aquatic Insects)</i>	D-40
Ohio EPA 1999 Biological and Water Quality Study.....	D-41
FLOW River Monitoring Results (1998-2001).....	D-41
Other Biotas Found in the Lower Olentangy Watershed.....	D-41
National Heritage Database Records for the Lower Olentangy Watershed	D-42

Table of Contents, Continued.

6.	Human Impacts on the Lower Olentangy River Watershed	D-53
	Cultural History.....	D-53
	Impacts Over Time	D-55
	Human Population in the Lower Olentangy River Watershed.....	D-58
	Current Land Use in the Lower Olentangy River Watershed.....	D-58
	The Importance of Imperviousness.....	D-60
	Human Impacts – Permitted Point Sources	D-63
	Human Impacts – Nonpoint Sources of Pollution	D-67
 7.	 Water Quality in the Lower Olentangy River Watershed	 D-76
	Definitions and the Basis for Evaluating Water Quality in Ohio	
	Surface Waters.....	D-76
	<i>Use Attainment</i>	D-76
	<i>Water Quality Standards</i>	D-77
	<i>Aquatic Life Use Designations</i>	D-78
	<i>Measures of Physical Stream Habitat</i>	D-79
	<i>Measures of Chemical Water Quality</i>	D-80
	Causes and Sources of Impairment Organized by 14-Digit Subwatershed	D-82
	Summary Results of the 1999 Ohio EPA Olentangy River Study	D-83
	<i>Mainstem of the Lower Olentangy River</i>	D-83
	<i>Olentangy Tributary Streams</i>	D-89
	Stream Habitat Quality in the Lower Olentangy River Watershed	D-90
	<i>Lower Olentangy River Mainstem</i>	D-90
	<i>Lower Olentangy River Tributaries</i>	D-92
	Biological Water Quality in the Lower Olentangy River Watershed.....	D-92
	<i>Delaware County River Mainstem</i>	D-92
	<i>Franklin County River Mainstem</i>	D-93
	<i>Lower Olentangy River Tributaries</i>	D-95
 8.	 Selected Olentangy River Tributaries	 D-103
	Horseshoe Run.....	D-103
	Delaware Run	D-104
	Unnamed Lewis Center Tributary.....	D-105
	Bartholomew Run.....	D-106
	Linworth Run	D-107
	Rush Run.....	D-108
	Bill Moose Run.....	D-109
	Kempton Run.....	D-111
	Adena Brook.....	D-112
	Turkey Run	D-114
	Glen Echo Ravine.....	D-115
	Iuka Ravine	D-116

Table of Contents, Continued.

9. Conclusions D-117

Report Card for the River MainstemD-118

What's Good about the RiverD-118

What's Not So Good about the RiverD-119

Report Card for the Olentangy River Tributary Streams.....D-120

What's Good about the Tributaries.....D-120

What's Not So Good about the TributariesD-121

Defining the ProblemsD-121

Where Do We Go from Here?D-123

10. References D-125

List of Appendices

D.1: Streamflow Hydrographs for Stretches of the Lower
Olentangy River (USGS).....D-129

D.2: Delaware Reservoir Sediment Surveys (Delaware SWCD).....D-133

D.3: Unique Places of Interest and Recreational Resources Table & Map.....D-145

D.4: Demographic Data for Franklin and Delaware Counties (MORPC).....D-147

D.5: Delaware County: List of Comprehensive PlansD-151

D.6: Ohio EPA Beneficial Use Designation Chart for the Olentangy River and
TributariesD-153

D.7: Reference List of OSU Library ResourcesD-157

List of Tables

Table 1:	Bedrock Formations in the Vicinity of the Olentangy River.....	D-22
Table 2:	Flow Characteristics of the Olentangy River Main Stem	D-31
Table 3:	Stream Flow Measurements (1978-1981)	D-32
Table 4:	Stream Flow Measurements (1996-1999)	D-33
Table 5:	Stream Flow and Maximum Sediment Load Data	D-33
Table 6:	General Hydrologic Budget for the Lower Olentangy River	D-34
Table 7:	Columbus City Parks and Recreation BioBlitz Results (2001)	D-43
Table 8:	Unique Biological Life – Aquatic.....	D-43
Table 9:	Unique Biological Life – Birds and Plants.....	D-44
Table 10:	Unique Preserves, Parkland & Special Features	D-45
Table 11:	Pollution-Intolerant Fish Species Collected from the Olentangy River	D-46
Table 12:	Comparisons of Central Ohio Streams.....	D-47
Table 13:	Abundance of Smallmouth Bass (<i>Micropterus dolomieu</i>).....	D-47
Table 14:	Distribution of Fish Species Collected at Individual Collection Sites in Delaware County.....	D-48
Table 15:	Distribution of Fish Species Collected at Individual Collection Sites in Franklin County.....	D-49
Table 16:	Living Unionid Mussels Species Recorded from the Olentangy River.....	D-50
Table 17:	Abundance of Live Specimens of Freshwater Mussel Species.....	D-51
Table 18:	Abundance of Living Specimens of Freshwater Mussel Species	D-51
Table 19:	Abundance of Living Specimens of Freshwater Mussel Species	D-52
Table 20:	Cumulative Stream Quality Results: F.L.O.W.	D-52
Table 21:	Census Data Comparison for 1990 and 2000	D-58
Table 22:	Land Uses in the Lower Olentangy Watershed.....	D-59
Table 23:	Land Uses in the Lower Olentangy Watershed Floodplain in Delaware County.....	D-59
Table 24:	Land Uses in the Lower Olentangy Watershed Floodplain in Franklin County.....	D-59
Table 25:	Percentage of Imperviousness.....	D-61
Table 26:	NPDES Permittees Ohio EPA CDO, September 12, 2000.....	D-65
Table 27:	List of Combined Storm and Sanitary Sewer Overflows (CSOs)	D-70
Table 28:	Combined Sanitary Sewer Overflows (CSOs) without Regulators.....	D-70
Table 29:	City of Columbus Sanitary Sewer Overflow Relief Points.....	D-71
Table 30:	Unsewered Areas in the Lower Olentangy Watershed – Franklin County*	D-74
Table 31:	Lowhead Dams in the Lower Olentangy Watershed.....	D-75
Table 32:	Aquatic Life Use Designations and Minimal Biological Index Scores	D-96
Table 33:	Concentrations of Heavy Metals and Organic Compounds.....	D-97
Table 34:	Biological and Water Quality Data for the Olentangy River Mainstem.....	D-98
Table 35:	Biological and Water Quality Data for the Olentangy River Mainstem.....	D-99
Table 36:	Biological and Water Quality Data for the Olentangy River Tributaries	D-100
Table 37:	Chemical Water Quality in Sampled Olentangy River Tributaries	D-101
Table 38:	Chemical Contaminants (Persistent Organics and Metals).....	D-102

List of Tables, Continued.

Table 39: Fish Kills in the Lower Olentangy River Watershed, 1990-1999.....D-102
Table 40: Horseshoe Run Monitoring ResultsD-103
Table 41: Delaware Run Monitoring Results.....D-104
Table 42: Unnamed Lewis Center Tributary Monitoring ResultsD-105
Table 43: Bartholomew Run Monitoring ResultsD-106
Table 44: Linworth Run Monitoring Results.....D-107
Table 45: Rush Run Monitoring ResultsD-108
Table 46: Bill Moose Run Monitoring ResultsD-110
Table 47: Kempton Run Monitoring ResultsD-111
Table 48: Adena Brook Past Pollution Incident Reports Received by
Ohio EPA.....D-113
Table 49: Turkey Run Monitoring Results.....D-114

List of Figures

Figure 1-1:	Watershed Action Planning Process	D-2
Figure 2-1:	Scioto River Basin.....	D-4
Figure 2-2:	Olentangy River Watershed	D-5
Figure 2-3:	The Lower Olentangy Watershed	D-6
Figure 3-1:	Bedrock Geology of Central Ohio.....	D-7
Figure 3-2:	End Moraines in the Olentangy Watershed.....	D-9
Figure 3-3:	The Olentangy River in Marion County.....	D-11
Figure 3-4:	Photograph of the Delaware Dam.....	D-11
Figure 3-5:	The Olentangy River at High Banks Metro Parks	D-12
Figure 3-6:	Concretions in Ohio Shale at High Banks Metro Park	D-13
Figure 3-7:	Urban Encroachment on the Olentangy Watershed in Franklin County	D-16
Figure 3-8:	The Olentangy River in the Henderson Rd Bridge, and Whetstone Park.....	D-17
Figure 3-9:	Lowhead Dam on the Olentangy River at North Broadway	D-18
Figure 3-10:	Lowhead Dam on the Olentangy River at Dodridge Street.....	D-18
Figure 3-11:	Fifth Avenue Dam and Impounded River at OSU	D-19
Figure 3-12:	The Olentangy River below the Third Avenue Bridge	D-19
Figure 3-13:	Ravines in the Lower Olentangy Watershed	D-20
Figure 3-14:	Aerial Photograph of Bill Moose Run	D-21
Figure 4-1:	Hydrologic Cycle.....	D-23
Figure 4-2:	Aquifer Yields in the Olentangy Watershed	D-27
Figure 6-1:	The Old Piatt Mill on the Olentangy River.....	D-54
Figure 6-2:	Olentangy Park.....	D-55
Figure 6-3:	Original Vegetation (Pre-European)	D-57
Figure 6-4:	Aerial Photograph of Land Use Changes in the Watershed.....	D-62
Figure 6-5:	Permitted Wastewater Dischargers in the Lower Olentangy Watershed.....	D-66
Figure 7-1:	Ohio EPA 1999 Lower Olentangy River Sampling Site Use Attainment Map.....	D-81
Figure 7-2:	<i>E. coli</i> and Fecal Coliform Trends in the Mainstem.....	D-85
Figure 7-3:	Ammonia, Nitrate, Phosphorus, and Dissolved Oxygen in the Mainstem	D-86
Figure 7-4:	Nitrate and Phosphorus Concentrations in the Mainstem	D-87
Figure 7-5:	IBI, MIWB, and QHEI Scores Longitudinally in the Mainstem.....	D-91
Figure 7-6:	Distribution of DELTs in Fish in the Olentangy Mainstem.....	D-95
Figure 9-1:	Changes in Fish Species Abundance Downstream of the Delaware WWTP, 1989 vs. 1999 (OEPA, 2001)	D-119

1. Introduction

Lower Olentangy River Watershed Inventory

The Friends of the Lower Olentangy Watershed (FLOW) is a non-profit, grassroots, citizens' organization dedicated to protecting and promoting the beneficial use of the Olentangy River and its resources. FLOW formed in August 1997. Our mission is to increase public awareness of the extensive environmental, recreational, historical, and cultural resources of the Lower Olentangy River Watershed and to promote responsible policies and uses of the river. To date, FLOW has over 100 dues-paying members. Our ultimate goal is to implement a **watershed action plan**, involving all affected parties that work to decrease non-point source pollution and increase the recreational value of the river. The largest role we play in the community is education. We also work to provide a forum for diverse interests to discuss issues concerning the river and its watershed.

The Lower Olentangy River **Watershed Inventory** is a compilation of the characteristics of the Lower Olentangy River and its tributary streams as well as the features of the surrounding landscape that affect the quality of these critical water resources. These characteristics and features include: topography and physiography (Section 2); geology, soils, and riparian habitats (Section 3); hydrologic factors such as precipitation and stream flow (Section 4); the biological diversity and resources, both aquatic and terrestrial, which have been documented from the river and its watershed (Section 5); and human influences such as population, land use, and human modification of these natural areas (Section 6). This inventory also includes a summary of the results from the Ohio Environmental Protection Agency's 1999 water quality monitoring of the mainstem of the Olentangy River and select tributary streams (Section 7, 8) and conclusions of this inventory (Section 9).

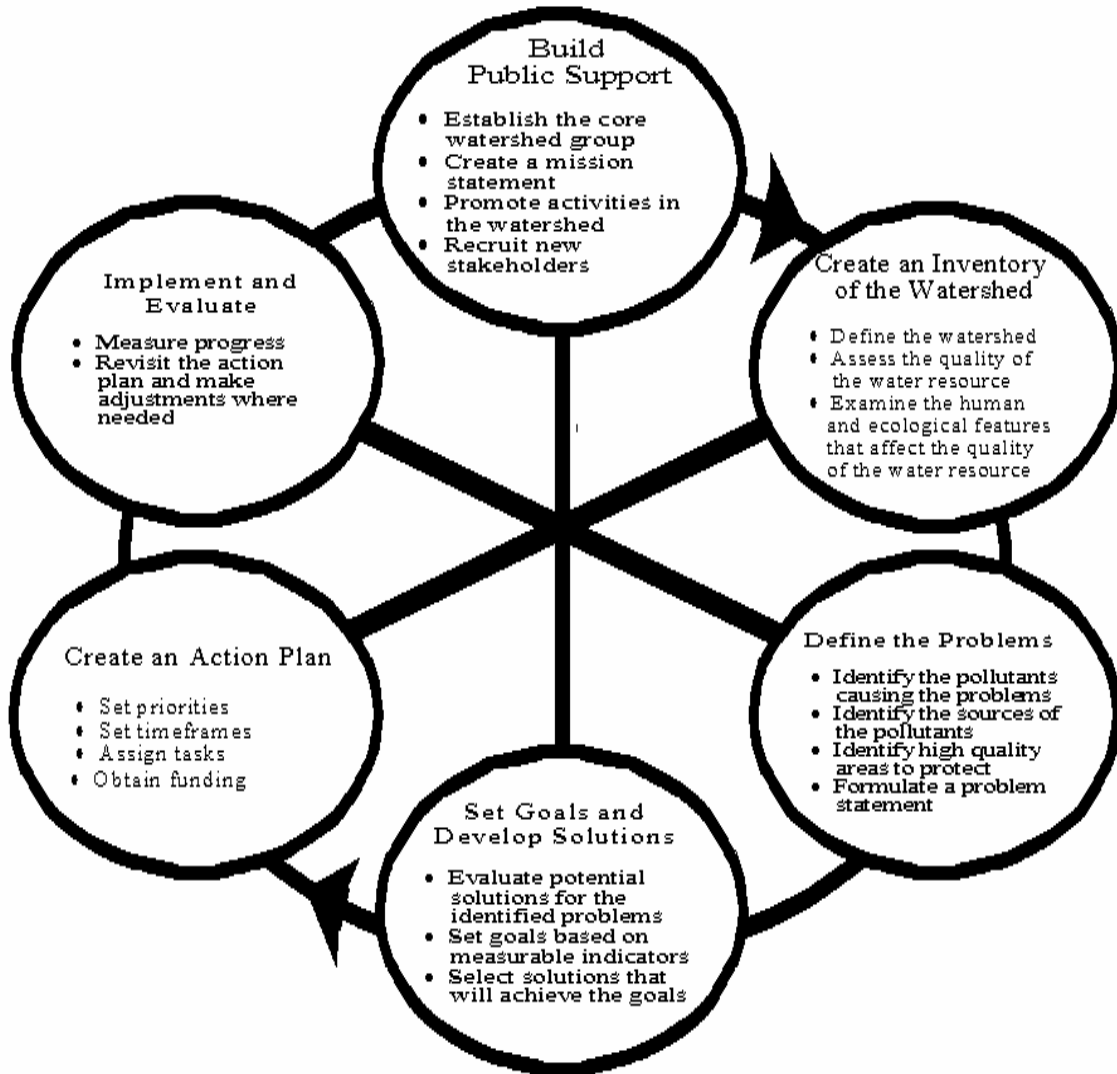
The information found in this inventory report will be used to evaluate potential sources of water quality and biological habitat degradation and to identify actions needed to address these impacted areas as well as areas of high water and biological quality that may need additional protection. This will be accomplished by the creation of a group of stakeholders and the formulation of a **watershed action plan** for the Lower Olentangy River Watershed. This plan will help guide FLOW and other decision-making entities along the river and its tributaries to make policies and procedures that will facilitate the goals and strategies laid out by the action plan (Figure 1-1, Watershed Action Plan process, Ohio EPA, 1997).

We would like to thank the FLOW Inventory Committee for collecting and compiling the information in this report and editing the many drafts. We would especially like to thank Dr. Robert C. Frey and Erin Miller, the main authors of the report, David White who prepared many of the maps and line drawings and formatted the document; George C. Anderson for his beautiful photographs of the river and Promedia of Ohio for providing a discount on CD duplication services. Photos copyrighted by George C. Anderson, all rights reserved.

This publication was funded through a grant from the Ohio Environmental Protection Agency and the USEPA, under the provisions of Section 319(h) of the Clean Water Act.

FLOW Inventory Committee Members

Dr. Robert C. Frey (Chair), Erin Miller (Watershed Coordinator), George C. Anderson, Wes Beery, Jeremy Carroll, Amanda Lanning Davey (FLOW Chair), Keith Dimoff, Dan Fink, Jennifer Fish, Julie Jackson, Katie Martin-Renner, Vince Mazeika, Janna McKee, Edward Quickert, Doreen Uhas-Sauer, Jerry Wager, and David White.



Watershed groups often start at the top of the wheel by building public support and then move clockwise. A group is likely to travel around the wheel several times, with each cycle building upon the information and experience gained previously. The "spokes" connecting each step to the center illustrate that the process does not always proceed in one direction, and that the steps are interrelated. Information gained at one step may lead the group to move to another step in the process. For example, information gained during the inventory step may lead the group back to seeking new stakeholders.

Figure 1-1: Watershed Action Planning Process (Ohio EPA, 1997).