III. Critical Resources

Summary

The critical resource areas in the Upper Tuscarawas Watershed include state resource waters, headwaters, ground water resources and biologically significant wetlands. This report examines existing conditions of critical resource areas within the Portage Lakes drainage area Subwatershed portion of the Upper Tuscarawas Watershed, which were mapped for protection and preservation efforts as part of the development of an Action Plan to be directed by the Portage Lakes Task Force.

After review of the 1997 State of Ohio Water Quality Standards, Chapter 3745-1 of the Ohio Administrative Code, NEFCO determined that there are no streams designated as "state resource waters." However, there are thirteen (13) publicly-owned lakes and/or reservoirs within the watershed study area that are designated as "state resource waters." Singer Lake, located in the southern portion of the City of Green is not designated as a state resource water because it is not publicly-owned. Nevertheless, it should be recognized as a critical resource area worthy of protection based on the numerous rare and endangered species identified by the Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves.

The watershed is largely dominated by perennial and intermittent streams (headwaters) that are tributaries of the Tuscarawas River. Headwaters that are located in subwatersheds 3 and 5 flow directly into the Portage lakes system which will eventually enter the Tuscarawas or the Ohio-Erie Canal from the Long Lake spillway. The headwaters drain and flow through mixed types of land use comprised primarily of residential or agricultural areas.

The ground water resources for the watershed were identified and mapped for areas in which yields of 100 gallons per minute and greater are produced according to Summit, Stark and Portage County ground water resources digital data layers obtained from the ODNR, Division of Real Estate and Land Management. These areas were also compared to the most recent available ground water resource paper maps for accuracy and consistency. Ground water areas containing yields of 500 to 1000 gallons per minute were found in Summit County along the Tuscarawas River. However, an area containing saline ground water unfit for human consumption was located in Summit County just south of Summit Lake.

Biologically significant wetlands were determined by overlaying known locations for Ohio's rare and endangered plant and animal species with 1987 Ohio Wetlands Inventory (OWI) maps. In order to be considered as a biologically significant wetland, at least one rare or endangered plant or animal must be present. The OWI was produced from May 1987 Landsat Thematic Mapper data. However, it is recommended that field verification should be conducted. Wetland areas shown on these maps do not necessarily correspond to the Army Corps of Engineers' jurisdictional definition of

wetlands. The Biologically Significant Wetlands are dispersed throughout the watershed, however, the most biologically significant wetland area is located in the Singer Lake area, located in subwatershed 5, with twenty-five sites identified by ODNR's Division of Natural Areas and Preserves.

Introduction

It is important to identify, inventory and produce detailed maps of critical resources areas when developing a strategy to protect water quality within a watershed. Critical resources, such as state resource waters, headwaters, groundwater resources, biologically significant wetlands and unique species and features have been examined within the Upper Tuscarawas River Watershed.

Critical resource areas in the watershed may assist in raising public awareness. This awareness will enhance the effort to develop and implement watershed stewardship projects through volunteer citizen groups or local landowners within the watershed, and encourage their participation in the use of BMPs included in the action plan for the protection of water quality within the watershed.

Characterization of Critical Resource Areas

For purposes of this report, the term "critical resources" refers to natural resources that are considered to be essential elements for the interrelation of all components of the natural environment, and are recognized as integral components to the restoration and preservation of environmental quality. Furthermore, critical resources are key to a community's overall general welfare and development in that they create and maintain conditions which promote social, economic, recreational and aesthetically pleasing surroundings.

After considerable reflection, NEFCO has determined that the following natural resources meet the aforementioned criteria to be considered as critical resources: state resources waters, headwaters, groundwater resources and biologically significant wetlands.

High Quality Waters

State resource waters, as described in Chapter 3745 of the Ohio Administrative Code (OAC), are surface waters of the state that lie within national, state and metropolitan park systems; wetlands, categorized as category 2 or 3 in accordance with Rule 3745-1-54 of the OAC; wildlife refuges, preserves; and also wild, scenic and recreational rivers, if so designated by Ohio EPA. Also included are publicly-owned lakes and reservoirs and waters of exceptional recreational or ecological significance, e.g. waters which provide a habitat for identified threatened or endangered species, as determined by the Director of the Ohio EPA.

Effective May 1, 1998, “State Resource Waters” are surface waters so designated in rules 3745-1-08 to 3745-1-30 of the Ohio Administrative Code (OAC) and all publicly-owned lakes and reservoirs (OEPA, 1998, p.4). The OAC now considers all surface waters of the state as, “High Quality Waters,” or one of the 5 categories under the high quality waters classification. For example, in rule 3745-1-05(E)(1) a) Lake Erie is designated as a Superior High Quality Water; b) publicly-owned lakes and reservoirs are designated as State Resource Waters; c) all surface waters designated as state resource waters in rules 3745-1-08 to 3745-1-30 of the Administrative Code shall retain the state resource water designation until such time as the water bodies are considered under paragraph (E)(2) or (E)(3); d) all surface waters of the state meeting the definition of limited quality waters are so designated, unless the water body is the source of drinking water for a public water supply, in which case it shall be considered a general high quality water. However, no later than one year after the effective date of this rule (May 1, 1998), and at least once every three years thereafter, the director, in consultation with the director of the department of natural resources, shall consider available information on water bodies in Ohio and determine appropriate high quality water designations. At this time, the director shall rescind designations of state resource waters, in rules 3745-1-08 to 374501-30 of the Administrative Code (OEPA, 1998, pp. 27-28).

Prior to May 1, 1998, “State resource waters” also included all wetlands. However, wetlands have received new designations of either “Limited quality waters,” for wetlands designated as category 1 or “General high quality waters,” for wetlands designated as category 2 or 3 in accordance with rule 3745-1-54 of the OAC.

The following wetland categories enable the Ohio EPA to evaluate wetlands in greater detail depending on the level of functions they perform:

Category 1 Wetlands provide little wildlife habitat, floodwater storage, water quality, or recreation functions. They typically have some or all of the following characteristics: not connected to other bodies of water, low species diversity, a predominance of non-native species, no significant habitat or wildlife use, and limited potential to be restored to a fully functioning wetland. They do not contain rare, threatened, or endangered species or critical habitat for threatened or endangered species.

Category 2 Wetlands support moderate wildlife habitat, flood water, water quality, or recreational functions. They tend to be dominated by native species, generally do not contain threatened or endangered species or their habitats. They may be degraded, but have a reasonable potential to be restored to full function.

Category 3 Wetlands support superior habitat, flood water storage, water quality, or recreational functions. They have high levels of diversity, and contain mostly native species. They may include wetlands which contain or provide habitat for threatened or endangered species, high quality forested wetlands, mature forested riparian wetlands, and vernal pools (wooded pools that flood in spring). A subcategory of Category 3

wetlands, which includes types of wetlands that are regional or statewide, such as bogs and fens, would be protected from all but temporary disturbances to water quality.

Table 20 lists all of the publicly-owned lakes and reservoirs greater than 5 acres that are found within the Portage Lakes Watershed, according to Ohio EPA's Ohio Water Resource Inventory, Volume 3: Ohio's Public Lakes, Ponds, and Reservoirs, 1992.

Table 20
Publicly-Owned Lakes/Reservoirs/Ponds Greater than 5 Acres

Waterbody I.D.	Name	Surface Area (acres)	Lake Uses	Lake Type
OH10 33-359	East Reservoir	201	R	NL
OH10-33-354	Firestone Reservoir	83	WS R	DPI
OH10 33-357	Hower Lake	23	R	DPI
OH10 33-355	Lake Nesmith	80	R	NL
OH10 33-365	Miller Lake	28	R	DPI
OH10 33-358	Long Lake	180	WS R	NL
OH10 33-365	Mud Lake	85	R	NL
OH10 12-360	Nimisila Reservoir	825	WS R	DPI
OH10 33-365	North Reservior	160	R	NL
OH10 33-363	Rex Lake	48	R	DPI
OH10 33-352	Summit Lake	100	R	NL
OH10 33-364	Turkeyfoot Lake	318	R	NL
OH10 33-361	West Reservoir	104	R	NL

Lake Uses: R = Recreations; WS = Water Supply
Lake Type: NL = Natural Lake; DPI = Dammed Impoundment

Singer Lake was not included as a state resource water in the above-referenced list. However, the significant amount of biodiversity found at Singer Lake makes it worthy of consideration as a critical habitat, as will be discussed later in the study. Figure 9 shows the location of lakes and reservoirs that are considered to be state resource waters. In addition, all first order streams and intermittent streams are highlighted in color.

Headwaters

For purposes of this study, headwaters include all intermittent and first order perennial streams. Headwater streams are the collecting system--the small tributaries that are the origin of most rivers. They are the primary interface between land uses and water resources. Headwaters serve as building blocks for healthy streams and rivers.

As one examines the watershed, it becomes evident that the watershed consists primarily of intermittent and first order perennial streams. The identification of intermittent and first order streams was determined through the Department of the Interior, United States Geological Survey (U.S.G.S.) 7.5 Minute Series Topographic maps at a scale of 1:24,000:

a. 4665 I NE; Canal Fulton Quadrangle
b. 4765 IV NW; North Canton Quadrangle
c. 4765 IV NE; Hartville Quadrangle
d. 4666 II SE; Akron West Quadrangle
e. 4766 III SW; Akron East Quadrangle

Intermittent streams are defined as stream channels which carry water during part of the year and which are dry the other part, but which receive flow from the groundwater table when it is high enough (Streams, 1968, p. 11).

Perennial streams are streams which carry water year round and which are fed by a fairly stable groundwater flow (Streams, 1968, p. 11).

The first order or the upper most reach of streams (Figure 9) are part of the critical resource areas that NEFCO has identified as areas for protection against human activities that may adversely affect the mainstem. These stream segments are more likely to have a higher quality of biological and aquatic life use attainment. At the same time, these stream segments may need protection from nonpoint source runoff from agricultural practices, or may need protection from storm water runoff from development that could increase flow and, consequently, increase the amount of heavy metals, salts, nutrients transported downstream, in addition to erosion, transport, and deposition of sediment. Downstream problems, such as flooding, bank erosion, and deepening of channels are often directly linked to headwater stream degradation. Additional reasons to protect headwater areas are as follows: 1) to maximize contact of water volume for absorption of pollutants by vegetation; 2) to maximize the opportunity for groundwater percolation per volume of flow; 3) to increase aquatic-soil-plant interfaces for plant and animal habitat; and 4) to reduce stream energy for erosion by maximizing the wetted perimeter of a stream.

Ground Water Resources

Ground water resource areas are included as critical resource areas that warrant protection because ground water is one of NEFCO's most important resources. For this reason, it is NEFCO's intent that, with proper management and increased public awareness, the protection of ground water/aquifers from disruptive activities caused by agriculture or urbanization may help prevent ground water threats, maintain the hydrologic balance, and also prevent the contamination of ground water supplies or aquifer drawdown. This will insure the present and future availability of safe, clean drinking water for those living in the Upper Tuscarawas River Watershed.

Figure 10 shows the ground water resources for the watershed. The Summit County portion was revised by ODNR Division of Water, Ground Water Section, in 1994; Portage County in 1979; and Stark County in 1974, reprinted in 1988. The major ground water categories are based on well yields, which may vary depending upon the type of aquifer, e.g. confined bedrock vs. unconsolidated buried glacial valley aquifer.

Portage County - Most of the Portage County portion of the Upper Tuscarawas Watershed is located in areas in which yields of 100 to 300 gallons per minute can be developed (orange area). The area in Portage County is interbedded and interlensing sand, gravel, silt and clay in buried valleys. Yields of as much as 300 gallons per minute are available where sufficient coarse material is found.

Stark County - The only area in Stark County that yields greater than 100 gallons per minute is located in the Lake Township area (green area). This area's wells, which may yield 100 to 500 gallons per minute, can be developed. It is considered a good ground water area. Permeable sand and gravel deposits not traversed by major streams may supply sustained yields of several hundred gallons per minute. According to ODNR Division of Water these are suitable for industrial and municipal well field development.

Summit County - Areas in which yields of more than 100 gallons per minute can be developed are located along the Tuscarawas River. These areas are generally located in the southern portion of Springfield Township and the central portion of Coventry Township extending north following the canal corridor. The yellow areas (Figure 10) in Summit County contain permeable sand and gravel deposits traversed by major streams. Wells may yield 500 to 1,000 or more gallons per minute, and are adequate for municipal and industrial well field deposits according to ODNR. The gray areas are of permeable sand and gravel deposits not traversed by major streams. Infiltration supplies cannot be developed, and sustained yields may range from 200 to 500 gallons per minute. Seasonal yields (short term pumping) in excess of 500 gallons per minute may be available. The area within the red zone located just south of Summit Lake contains large amounts of salt, making ground water from this area unsuitable for human consumption.

Figure 11 shows the interconnectivity (hydrologic cycle) of surface and ground water. Ground water resource areas consist of a geological formation, part of a formation, or a group of formations capable of yielding a significant amount of water to either a well or spring. Additionally, there are perennial streams that discharge to the Tuscarawas River within the watershed. During the baseflow conditions of drier months, ground water containing contaminants could be a source of nonpoint source (NPS) pollution to the surface waters of this watershed. During wetter months, once contaminated, surface waters can become NPS pollution to the ground water of the watershed as it recharges. However, this is a worst-case scenario, which could take many years to occur.

Figure 11
Confined and unconfined aquifer

Source: State Coordinating Committee on Ground Water, 1996

It is for this reason that ground water resources should be protected from disruptive activities that may threaten ground water in order to maintain the hydrologic balance and also prevent contamination of ground water supplies or aquifer drawdown.

Ground water is susceptible to pollutants and, once polluted, it is very costly to clean up. Contamination of ground water resources may occur from toxins that were dumped on the ground in the past making their way into the ground water. Examples of surface

pollutants are pesticides, fertilizers, road salt, toxic chemicals, septic systems, and underground storage tanks.

Biologically Significant Wetlands

Wetlands, as defined by the OAC are "areas of land where the water table is at, near or above the land surface long enough each year to result in the formation of characteristically wet (hydric) soil types, and support the growth of water-dependent (hydrophytic) vegetation. Wetlands include, but are not limited to, marshes, swamps, bogs and other such low-lying areas." (OAC section 3745-1-02). Figure 12 depicts hydric soils and hydric soils with non-hydric inclusions in the watershed. Hydric soils do not necessarily represent wetland areas, but may help indicate where they are located.

Wetland areas serve very important functions that are generally overlooked, or not understood, by many watershed residents. Watershed residents benefit from wetlands in the following ways: flood prevention, as wetlands areas moderate water flow by detaining storm water which in turn reduces flood peaks during storm events; improving water quality; by retaining or transforming excess nutrients, trapping sediment and heavy metals; by acting as aquifer recharge areas; and by providing wildlife habitat as well as habitat for many threatened and endangered plant and animal species. However, as wetlands are generally beneficial, in some cases, water discharging from wetland areas may yield bacteriological loads and reduced dissolved oxygen levels.

NEFCO's identified biologically significant wetlands are those which contain a high degree of biodiversity and/or contain rare, endangered or threatened species. According to sections 3745-1-50(L) and 3745-1-50(LL) effective May 1, 1998, "endangered species" and "threatened species" mean a native Ohio plant species listed or designated by the ODNR as endangered or threatened with extirpation pursuant to section 1518.01 of the Revised Code; and animal species listed or designated as endangered or threatened with statewide extinction by the ODNR pursuant to section 1531.25 of the Revised Code; or a species that appears on the threatened species registry, as defined in rule 3745-1-05 of the OAC; or any plant or animal species that is native to Ohio or that migrates or is otherwise reasonable likely to occur within the state and which has been listed as threatened pursuant to section 4 of the Endangered Species Act, 16 U.S.C.A. 1531 et seq., as amended.

Shown in Figure 13 are the biologically significant wetlands that are located within the Upper Tuscarawas Watershed study area. The locations of biologically significant wetlands were obtained through the use of the National Wetland Inventory (for wetlands with areas greater than 5 acres) developed by the Department of the Interior, the Ohio Wetland Inventory produced from May 1987 Landsat (satellite) Thematic Mapper data, cross-referenced with U.S.G.S. Quads and overlaid with the ODNR Department of Natural Heritage's list of Ohio's's rare and endangered special plant and/or animal species. In order to be considered a biologically significant wetland, at least one special plant or animal species must be located within the wetland. Fifteen

(15) biologically significant wetlands were identified, three of which include biologically significant wetlands already managed by ODNR. Managed areas within the watershed include Portage Lakes Wetland, Karlo Fen State Nature preserve, and Portage Lakes State Park, appendices J, K and L, respectively. Proposed managed areas include Myersville Fen State Nature Preserve and Singer Lake. These two areas have been recommended on the basis of the Natural Heritage data, and botanists' and zoologists' field surveys. The proposed Myersville Fen State Nature Preserve, a 27.243 acre site, still needs to go through final approval procedures. The proposed Singer Lake Preserve is not currently managed by ODNR, however, the Division of Natural Areas and Preserves has recommended and identified the extent of the proposed managed area (330 acres). Singer Lake is in the top 10 list for proposed managed areas, 4 of the 10 are now being managed by ODNR. However, it is recommended that field verification of wetland areas should be conducted. Wetland areas shown do not necessarily correspond to the Army Corps of Engineers' jurisdictional definition of wetlands.

Inventory and Status of Unique Species and Features

The data from the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, was received in two forms. One was in computer printouts containing the scientific name, common name, federal and state status, class code, latitude, longitude, accuracy, and manages areas. The second was in an ASCII file including the same data as the computer printouts, an endangerment/class code list, and a rare plant and animal list.

The data from ODNR listed significant natural areas, high quality plant communities, rare and endangered plants and animals, and managed areas within the study area. As a result, a total of 135 records were discovered in the study area, shown by point symbols, that indicate the location, accuracy, type and occurrence of each incident. The location of unique plant and animal species, along with one other class category, are also shown in Figure 13. Each point location symbol and color indicate whether it is a plant (orange), animal (green), or other (blue). The symbol shape indicates the accuracy of the point data; a circle - exact location and a triangle - within one square mile. Gazettes shown in red indicate where three or more species are located at the same location.

Appendix M is a computer printout of the Natural Heritage records per county obtained from the Ohio Department of Natural Resources, Division of Natural Areas and Preserves. Appendix N shows the number of records within the study area, the fields, location accuracy codes, class codes, status codes for unique species and features found within the study area.

Conclusion

The importance of the Upper Tuscarawas River Watershed Critical Resource Areas Study is that it builds upon previous and current NEFCO studies for the development and implementation of an action plan. It is NEFCO's intent that the Critical Resource Area Study will help provide a sound technical and ecological base for effective management, use and protection of natural resources important to watershed residents while minimizing adverse impacts to environmental and ecological systems that are key to maintaining environmental quality.

Currently, there are no streams in the watershed designated as "state resource waters," although the following thirteen (13) publicly-owned lakes and/or reservoirs are designated as state resource waters: Nimisila Reservoir, Turkeyfoot Lake, Rex Lake, Mud Lake, West Reservoir, East Reservoir, Miller Lake, Hower Lake, North Reservoir, and Long Lake, which are located in subwatershed 3, Lake Nesmith and Summit Lake, which are located in subwatershed 1, and the Tuscarawas Diversion Dam, which is located in subwatershed 2.

Headwaters consisting of intermittent and perennial (first order) streams were prevalent throughout the watershed. The identification of headwaters was important in that they are more likely to have higher quality biological and aquatic life which are susceptible to point and nonpoint sources of pollution.

Ground water resources are one of the watershed's most important resources that warrant protection. Major ground water resource areas with yields of more than 100 gallons per minute were identified and mapped. The location of the major ground water resources were located along the Tuscarawas River mainstem in subwatershed 2, from the west side of West Reservoir in subwatershed 3, and north along the Ohio & Erie Canal in subwatershed 1. Some areas are capable of yielding 500 to 1,000 gallons per minute. However, the area outlined in red, south of Summit Lake, contains saline ground water unfit for human consumption.

Fifteen biologically significant wetlands were identified within the watershed. The location of these areas was determined by downloading wetland information from NHI, OWI, and U.S.G.S. wetland sites. At least one special plant or animal species must have been located at the site. NEFCO discovered that of the fifteen, three biologically significant wetlands, Portage Lakes Wetland, Karlo Fen State Nature Preserve, and Portage Lakes State Park, are currently under ODNR's management. Two proposed managed areas include Myersville Fen State Nature Preserve, currently going through final approval procedures, and Singer Lake, which is in the top ten for proposed natural areas recommended by ODNR staff to by managed by ODNR.

A total of 135 unique plant and animal sites were identified within the watershed. The most significant area was Singer Lake, located in subwatershed 5, with 25 unique species located within the proposed boundary recommended by ODNR staff. The Singer Lake area warrants serious consideration for protection due to its biodiversity and wetland areas.

IV. Riparian Zone Analysis

Summary

The purpose of this Upper Tuscarawas River Watershed Riparian Habitat Inventory was to evaluate the condition of the riparian corridor along the Tuscarawas River mainstem; Myersville Creek (a tributary of the Tuscarawas River); Graybill Creek (a tributary to Myersville Creek); Wonder Lake Creek (a tributary to Cottage Grove Lake (East Reservoir)); Cottage Grove Creek (a tributary to Mud Lake); and Nimisila Creek. The riparian evaluation revealed that overall 34.5 percent of the six waterways were of high quality riparian habitat (i.e. forest, swamp, shrub, old field).

NEFCO believes that streams are important components of the environment, and that such natural areas are subject to adverse impact caused by commercial and residential development, which is exacerbated by habitat and hydrologic modifications. Action should be taken to restore/protect/preserve riparian corridor habitat may be augmented by guidance from an analysis and mapping of conditions in the watershed.

Introduction

The intent of this project is to update an existing riparian inventory (from 1990 aerial photographs) of the Tuscarawas River and selected tributaries that flow into the Portage Lakes system. The updated assessment was conducted through the use of 1995 aerial photos, supplied by the Akron Metropolitan Area Transportation Study (AMATS) and 1997 aerial photos supplied by the Stark County Regional Planning Commission, of the Tuscarawas River Watershed. A comparison of the 1990 and 1995 riparian inventory results was made to characterize trends that may be occurring in the watershed. The criteria with which to evaluate the habitat are from the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) matrix for Riparian Zone and Bank Erosion. However, the extent of stream bank erosion could not be evaluated from the aerial photos (Appendix N). Additionally, the riparian evaluation will help NEFCO identify and prioritize low, moderate and high quality riparian habitat that could be used to target streams or stream segments in need of protection and/or restoration efforts.

It is also the intent of this study that the results of the Upper Tuscarawas River Watershed Riparian Inventory raise public awareness and help guide land use decisions by key stakeholders in order to protect the integrity of stream segments that are threatened by urbanization, thereby protecting water quality standards within the watershed.

Riparian Habitat Inventory and Evaluation

The integrity of the riparian habitat is just one component of the Upper Tuscarawas River Watershed's Strategic Action Plan because an intact riparian corridor helps the stream resist erosion and protects water quality from inflows of pollutants, sediment and over-land runoff. These factors help maintain important chemical and physical characteristics needed to support biodiversity in the streams. The biodiversity preserves the stream's ability to assimilate pollution and prevent development of nuisance and health threatening algal blooms.

The intent of the riparian habitat inventory and evaluation of the Tuscarawas River mainstem and other tributaries is to examine current conditions of the riparian habitat quality through the use of aerial photos and Ohio EPA's Qualitative Habitat Evaluation Index (QHEI) matrix for Riparian Zone and Bank Erosion. This was accomplished by delineating each evaluated watercourse into a series of 400 foot wide by 600 foot long segments which were scored according to riparian habitat width and quality. The data will then be tabulated for the purpose of prioritizing either a specific stream, subwatershed, or stream segment that is of low, moderate, or high riparian habitat quality that may then be targeted for outreach efforts for either protection or restoration.

Once impaired stream(s), subwatershed(s), minor subwatershed(s) and/or stream segments were determined, the data results were be compared with previous riparian habitat evaluations to characterize possible trends. The results may facilitate the development of goals and objectives dedicated toward habitat restoration. However, high quality stream(s), subwatershed(s), and/or stream segments may be viewed as worthy of preservation and/or protection by implementing Best Management Practices (BMPs) to prevent degradation of these stream segment habitats.

Source Materials

The source materials used include the following:

1. Department of the Interior, United States Geological Survey (U.S.G.S.) 7.5 Minute Series Topographic maps at a scale of 1:24,000 as follows:

    a. 4765 IV NW, North Canton Quadrangle
    b. 4665 I NE, Canal Fulton Quadrangle
    c. 4766 III SW, Akron East Quadrangle
    d. 4666 II SE, Akron West Quadrangle
    e. 4765 IV NE, Hartville Quadrangle

2. Twenty one (21) blue line aerial photos, at a scale of 1":400', produced in March 1997, obtained from the Stark County Regional Planning Commission; and forty-eight (48) blue line aerial photos, also at a scale of 1":400', produced in April 1995 received from the AMATS.

Methodology

To prepare a comprehensive evaluation of the Upper Tuscarawas River Watershed, NEFCO examined streams that were spatially distributed throughout the watershed to gain insight of the overall existing riparian habitat condition.

NEFCO evaluated and scored six (6) waterways, for a total of 42.61 river miles, which included the following: Tuscarawas River, located in subwatersheds 1 and 2; Myersville Creek, a tributary of the Tuscarawas River, located in subwatershed 4; Graybill Creek, a tributary of Myersville Creek, also located in subwatershed 4; Cottage Grove Creek, a tributary to Mud Lake, located in subwatershed 3; Wonder Lake Creek, a tributary to East Reservoir, located in subwatershed 3; and Nimisila Creek, a tributary to Nimisila Lake, located in subwatershed 5.

Each watercourse on the blue line aerial photos was marked off into 600 by 400 foot segments from intersection points, labeled, and numbered consecutively. Using a template corresponding to the study area scale, the first 400 feet of each 600 foot segment was evaluated, while the remaining 200 feet was assumed to be similar to the first 400 feet in each segment. However, if the remaining 200 feet was significantly different from the first 400 feet, then the entire segment was evaluated. Each stream bank was analyzed for both riparian width and quality and scored numerically. Riparian width is evaluated as the width of high quality habitat (forest, swamp, shrub, and old field) from the center of the stream.

The scoring criteria are found in paragraph 4 of the Ohio EPA Qualitative Habitat Evaluation Index Field Sheet (EPA Form 4520) (Appendix O contains a copy of the entire field sheet) as follows:

Riparian Width (per bank) [total max score]	Flood Plain Quality (Most Predominant, Per Bank) [total max score]
L R	L R
__ __ Wide >50m [4pts.]	__ __ Forest, Swamp [3 pts.]
__ __ Moderate 10-50m [3 pts.]	__ __ Shrub or Old Field [2 pts.]
__ __ Narrow 5-10m [2 pts.]	__ __ Fenced Pasture [1 pt.]
__ __ Very Narrow <5m [1 pt.]	__ __ Residential, Park, New Field [1 pt.]
__ __ None	__ __ Conservation Tillage [1 pt.]
	__ __ Open Pasture, Rowcrop [0]
	__ __ Urban or Industrial [0]
	__ __ Mining/Construction [0]

Once the analysis was completed for each 600 foot segment, a chart was prepared for each watercourse segment where the right and left bank values were added together to give each segment a single numerical value.

An example of the data is illustrated in Table 21. Stream segment #Tusc-1 of the Tuscarawas River, located in Coventry Township in Summit County, north of Long Lake exhibited a riparian width of greater than 50 meters, with the flood plain quality consistency of swamp. Consequently, this stream segment received the maximum score of 7.0. In comparison, stream segment #Gray-9 (Graybill Creek), a tributary of Myersville Creek, located in the City of Green in Summit County exhibited "habitat modifications" such as streambank modifications, stream burial and removal of riparian vegetation. This stream segment had no riparian width, and the flood plain quality fell into the residential/park/new field category. The total score for this stream segment was 1.0.

Table 21
Sample Riparian Habitat Data Entry From the Riparian Width and Quality

	Riparian Width			Flood Plain Quality			Total Habitat Score
Segment #	Right Bank	Left Bank	Total	Right Bank	Left Bank	Total	
Tusc-1	2.0	2.0	4.0	1.5	1.5	3.0	7.0
Gray-9	0.0	0.0	0.0	0.5	0.5	1.0	1.0

Results

A total of 375 stream segments within the Upper Tuscarawas River Watershed were evaluated for riparian width and predominant vegetation cover. This represents approximately 225,000 feet, or 42.61 miles, of stream length, about two thirds of which, 150,000 feet, or 28.42 miles, were actually evaluated. Again, this methodology assumed that the remaining 200 feet of the 600 foot stream segment was similar to the first 400 feet. The tabulated data of the streams can be found in Appendix O.

Table 22 provides a summary of the frequency of the total scores for the Upper Tuscarawas River, tributary and other streams that were included in this study. Again, a score of 7.0 suggests that a high quality (HQ) riparian corridor and vegetative cover exist along a stream segment, while a low score indicates a poor riparian and vegetative cover.

Table 23 shows the average total score for each selected waterway. In an effort to prioritize streams, NEFCO established three categories consisting of low, moderate, and high riparian quality with scores of 0-2.0, 2.5-4.5, and 5.0-7.0, respectively. The average riparian habitat score is calculated by dividing the total points by the total number of stream segments found in Table 23. Additionally, the ranking was based on Average Riparian Habitat Score.

Table 23
Percentage of Low, Moderate and High Quality Riparian Habitat

Stream Name	Average Percentage Score			Avg. Riparian Habitat Score	Ranking based on Avg. Riparian Habitat Score
	Low	Moderate	High		
Tuscarawas River Mainstem	27.51	20.12	52.39	4.23	3
Myersville Creek	13.70	32.88	53.43	4.63	1
Graybill Creek	46.44	25.00	28.57	2.80	6
Wonder Lake Creek	26.67	20.00	53.32	4.15	4
Cottage Grove Creek	23.53	35.29	41.17	4.13	5
Nimisila Creek	19.68	27.87	52.46	4.29	2

Table 24 provides an approximation of acreage of high quality habitat identified along the evaluated riparian corridors. The high quality habitat only includes flood plain quality consisting of either forest, swamp, shrub or old field. Table 24 also shows the maximum acres evaluated, the total stream corridor area (acres) and the percentage of stream corridor as high quality habitat.

Figure 14 is a generalized map of the distribution of riparian habitat scores as calculated from the total habitat evaluation results found in Appendix P. Scores that ranged between 0.0 - 2.0 are shown in red, 2.5 - 4.5 are shown in yellow, and 5.0 - 7.0 are shown in green. A 200 foot effort for each side of the watercourse corresponds with the evaluation procedures during the habitat evaluation scoring process.

Figures 15 through 20 are graphs that reflect the total score of the riparian width and flood plain quality scores. Again, a stream segment score between 0-2.0 is of low quality, a score of 2.5-4.5 is considered to be moderate, and a score of 5.0-7.0 is recognized as a segment that is of high quality. The graphs also indicate the current overall riparian health of the Upper Tuscarawas River Watershed.

Table 24
Estimates of acreage of forest, swamp, shrub and old fields habitat along segments of the Tuscarawas River and other streams

Stream Name	Riparian Corridor (Acres)			Max. Acres (Evaluated acres)	Total Stream Corridor Area* (acres)	Percent of Stream Corridor as H.Q. Habitat**
	Left Bank	Right Bank	Total			
Tuscarawas River Mainstem	114.69	101.45	216.14	547.29	820.94	40
Myersville Creek	62.13	56.75	118.88	268.14	402.20	44
Graybill Creek	10.83	8.72	19.55	102.85	154.27	19
Wonder Lake Creek	22.16	20.49	42.65	110.19	165.29	39
Cottage Grove Creek	20.64	18.31	39.95	124.89	187.33	31
Nimisila Creek	34.71	42.05	76.76	224.06	336.09	34

* Total stream corridor is equivalent to the length of evaluated area and 200' on either side of the stream times the total number of segments.

** This percentage represents the amount of acreage relative to maximum obtainable, then extrapolated out to the total riparian area segment (400' x 600'). Note this High Quality (HQ) habitat is described as forest, swamp, shrub and old field.