

Chapter 2

Current Conditions and Projected Development

This chapter discusses the current water quality conditions in Northeast Ohio for the Ohio River basin.

I. Current Water Quality Conditions in the NEFCO Region for the Ohio River Basin

Background

The definitive source of information concerning current water quality conditions in Ohio is the Integrated Water Quality Monitoring and Assessment Report prepared by the Ohio EPA on a biennial basis. This report satisfies the requirements of Sections 305(b) and 303(d) of the federal Clean Water Act. The Clean Water Act calls for states to submit to the U.S. EPA a biennial report summarizing the status and trends in water quality of both surface and ground waters. The intent is for the 305(b) report to be a routine check on the progress that states are making toward achieving the goals of the Clean Water Act. The 305(b) report also establishes baseline water quality data by which to gauge changes introduced by the implementation of best management practices. The Ohio EPA Section 303(d) report lists currently impaired waters that may need a Total Maximum Daily Load (TMDL) report. Readers are encouraged to consult the full 305(b) report and 303(d) priority list for additional information. A copy of these reports can be found on Ohio EPA's web page at www.epa.state.oh.us.

The bases for the 305(b) report are the periodic surveys of water quality and aquatic life (biosurveys) that Ohio EPA conducts on each major river system throughout Ohio. State priorities and resource availability to perform the survey work dictate the frequency with which watersheds are assessed. Northeast Ohio's major rivers are surveyed on an approximate five-year rotation.

The Ohio EPA's water quality survey goals are to assess the attainment status of water quality standards, to assess whether assigned use designations are appropriate, to determine if changes in water quality have taken place since previous surveys, and to determine whether or not the changes can be attributed to point and/or nonpoint source controls.

The findings and conclusions of the water quality surveys are published as Water Quality Permit Support Documents (WQPSDs). These documents may be reflected in regulatory actions taken by the Ohio EPA e.g. NPDES permits, Director's Orders, the Ohio Water Quality Standards (WQS), and are eventually incorporated into the Ohio Water Quality Management Plan, the Ohio Nonpoint Source Assessment, and the Ohio Water Resources Inventory (305(b) Report).

The Ohio EPA has conducted a number of analyses on streams within the Ohio River Basin for the NEFCO region. The Tuscarawas River underwent a biological and sediment survey in 1995. The Sugar Creek had a biological community and toxic impact assessment in 1992 and a biological and water quality study in 1998. A fish tissue study was undertaken for the Tuscarawas River and Sugar Creek in 1995. The Ohio EPA conducted a biological and water

quality study of the East Branch of the Nimishillen Creek in 1994 and the Lower Middle Branch of the Nimishillen Creek in 2001. The Upper Killbuck Creek had a biological and water quality study in 1996. The Sandy Creek had biological and water quality studies done between 1995 and 1997. In 1994 the Ohio EPA conducted biological, sediment, and water quality studies for the Tuscarawas River and Wolf Creek.

NEFCO Ohio River Basin Watersheds

The planning area for NEFCO includes parts of both the Lake Erie basin and the Ohio River basin (see Figure 2-1). The Ohio River basin includes three larger watershed units: Tuscarawas River watershed, Mahoning River watershed, and the Kokosing River-Walhonding River-Killbuck Creek watershed.

Tuscarawas River Watershed

The NEFCO region includes portions of the Tuscarawas River watershed. These eight subbasins are located in Stark, Summit, and Wayne County. Subwatersheds include the Sandy Creek, Sugar Creek, Nimishillen Creek, and Chippewa Creek. Each of these watersheds was included in the 2004 303(d) list of impaired, category 5 watersheds. The category 5 designation inventories watersheds needing a TMDL. In 2002, all but one of the Tuscarawas River subbasins was included on this list.

Mahoning River Watershed

The NEFCO region also includes portions of the Mahoning River watershed. Three subbasins of the Mahoning River are located in eastern Portage County and one subbasin is located in eastern Stark County. Subbasins include the Duck Creek, West Branch, and Beech Creek. In 2004 each of the subbasins was listed on the 303(d) list of impaired, category 5 watersheds. In 2002 only one Mahoning River subbasin was included among the category 5 watersheds: Mahoning River, headwaters to downstream Beech Creek.

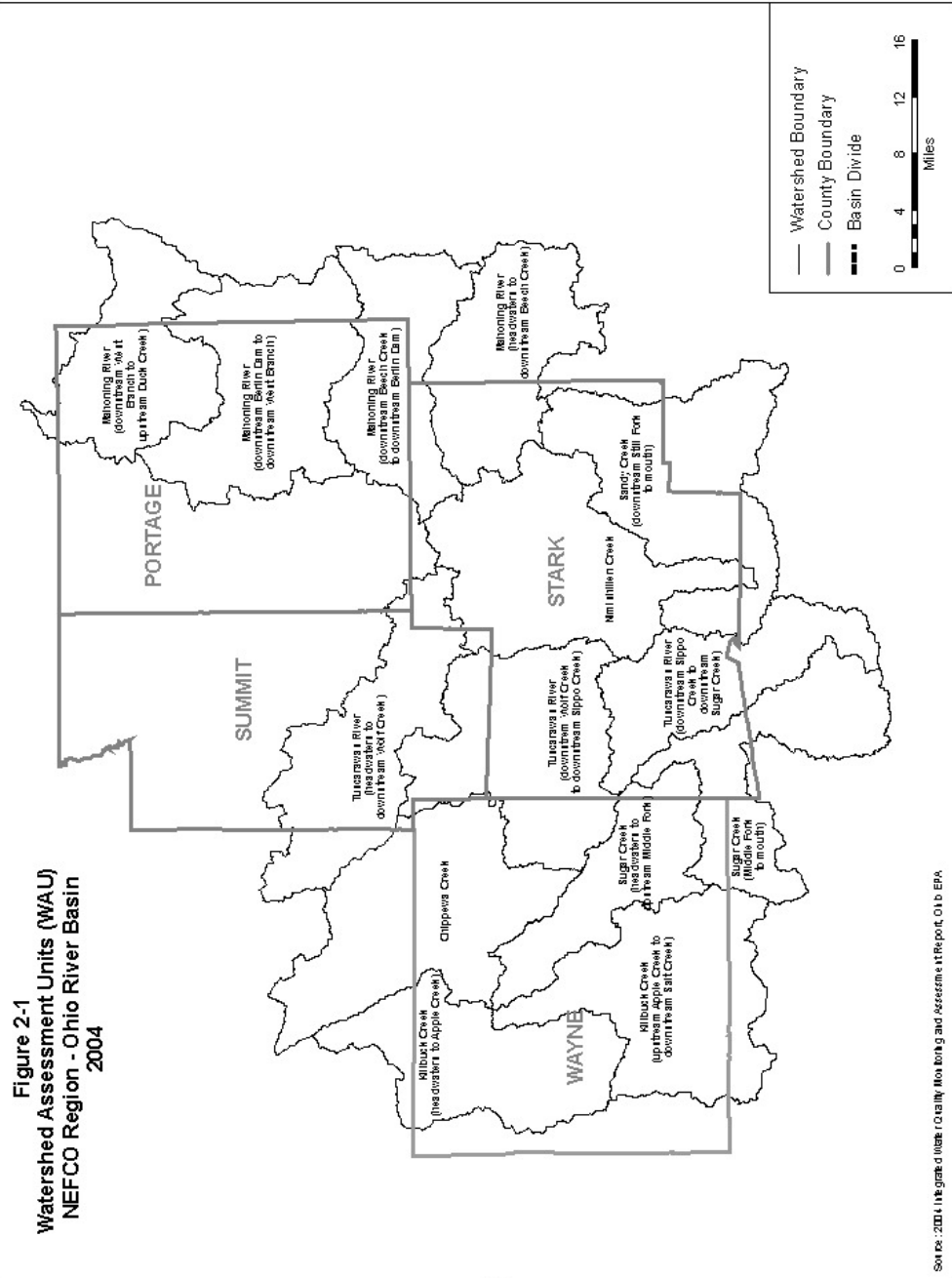
Killbuck Creek

The Killbuck Creek is part of the Kokosing River-Walhonding River-Killbuck Creek watershed assessment unit. Two subbasins of the Killbuck Creek are located in western Wayne County.

Water Quality Standards Applicable to NEFCO Region Ohio River Basin Streams

Protecting the safety of the public is accomplished through the Ohio Water Quality Standards. As articulated in the Ohio Water Quality Standards:

It is the purpose of these water quality standards, Chapter 3745-1 of the Administrative Code, to establish minimum water quality requirements for all surface waters of the state, thereby protecting public health and welfare; and to enhance, improve and maintain water quality as provided under the laws of the state of Ohio, section 6111.041 of the Revised Code, the federal Clean Water Act, 33 U.S.C. section 1251 et seq., and rules adopted thereunder (Ohio EPA, 1997).



The analyses of biological criteria in a stream recognizes the assimilative ability of a stream and subsequent response by flora and fauna to levels of pollution. In general the more degraded the biological community the greater the threat of a disease-causing condition that could deleteriously affect human health.

Water quality standards consist of numerical standards geared to attainment of designated stream uses. Use designations consist of two broad groups, aquatic life and non-aquatic life uses. There are four different aquatic life uses currently defined in the Ohio WQS that apply to Northeast Ohio streams of the Ohio River basin. These include: Warmwater Habitat (WWH), Coldwater Habitat (CWH), Modified Warmwater Habitat (MWH-C), and Limited Resource Water (LRW).¹

The vast majority of these stream segments are designated Warmwater Habitat. There are some notable exceptions. A portion of the Eagle Creek, in the Mahoning River watershed, has been classified as Coldwater Habitat. Portions of these streams are classified as Modified Warmwater Habitat: Nimishillen Creek, Tuscarawas River, Chippewa Creek. Some portions of Nimishillen Creek have also been designated Limited Resource Water.

The Ohio EPA employs biological criteria that have been codified in the Ohio Water Quality Standards (WQS) to ascertain the attainment status of aquatic life uses in streams.² It uses three different indices to measure fish and macroinvertebrate community characteristics and to determine if aquatic life uses are in FULL, PARTIAL or NON-ATTAINMENT status. Attainment of aquatic life use is in FULL ATTAINMENT if all three indices meet the applicable criteria, PARTIAL ATTAINMENT if at least one of the indices does not attain and biological community performance is at least fair, and NON-ATTAINMENT if all indices fail to attain, or

¹**Warmwater Habitat** (WWH) - this use designation defines the “typical” warmwater assemblage of aquatic organisms for Ohio rivers and streams; this use represents the principal restoration target for the majority of water resource management efforts in Ohio. **Exceptional Warmwater Habitat** (EWH) - this use designation is reserved for waters which support “unusual and exceptional” assemblages of aquatic organisms which are characterized by a high diversity of species, particularly those which are highly intolerant and/or rare, threatened, endangered, or special status (i.e., declining species); this designation represents a protection goal for water resource management efforts dealing with Ohio’s best water resources. **Coldwater Habitat** (CWH) - this use is intended for waters which support assemblages of cold water organisms and/or those which are stocked with salmonids with the intent of providing a put-and-take fishery on a year round basis which is further sanctioned by the Ohio DNR, Division of Wildlife; this use should not be confused with the Seasonal Salmonid Habitat (SSH) use which applies to the Lake Erie tributaries that support periodic “runs” of salmonids during the spring, summer, and/or fall. **Modified Warmwater Habitat** (MWH) - this use applies to streams and rivers which have been subjected to extensive, maintained, and essentially permanent hydro modifications such that the biocriteria for the WWH use are not attainable and where the activities have been sanctioned and permitted by state and federal law; the representative aquatic assemblages are generally composed of species which are tolerant to low dissolved oxygen, silt, nutrient, enrichment, and poor quality habitat. **Limited Resource Water** (LRW) - this use applies to small streams (usually less than a three square mile drainage area) and other water courses which have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; such waterways generally include small streams in extensively urbanized areas, those which lie in watersheds with extensive drainage modifications, those which completely lack water on a recurring annual basis (i.e. true ephemeral streams), or other irretrievably altered waterways.

²Ohio Administrative Code {OAC} 3745-1-07, Table 8-14.

any index indicates poor or very poor performance. PARTIAL ATTAINMENT or NON-ATTAINMENT indicates that the receiving water is impaired and does not meet the designated use criteria specified by the Ohio WQS.

Water Quality Trends in Northeast Ohio

The Ohio EPA has identified that major changes have occurred, which have contributed to the improvements in current statewide water quality conditions. The Ohio EPA notes that most of these water quality improvements can be attributed to improvements in point source control and that future threats to water quality will come from nonpoint sources of pollution. Their assessment is applicable to Northeast Ohio as well. The Ohio EPA states:

“the impacts from nonpoint sources of pollution, such as combined sewer overflows, urban storm water, siltation of substrates, and habitat degradation, agricultural and storm water run-off, etc., are becoming increasingly evident as historically more pronounced impacts from point sources e.g. municipal WWTPs, some industrial effluents, are reduced. Since 1988, there has been a 48% decline in point sources as a major source of impairment in reassessed streams in Ohio...Nonpoint sources have emerged as a major source of impairment in streams and rivers during this period...River and stream attainments will not be achieved by the restoration of point source related impairments alone. Even if point source associated impairment is virtually eliminated (and assuming no new nonpoint source impacts are revealed) the result would be over 70% of streams and rivers fully attaining aquatic life criteria. Given these facts, “new” successes in controlling, abating, and preventing nonpoint and other sources of impairment will be needed.”

“While successes resulting from the abatement of point sources have been documented, there are other indications that impact from nonpoint source runoff, habitat degradation, and watershed disturbances may be worsening. Siltation of substrates i.e. stream bed, stream channel, stream bottom, etc. and habitat degradation are now the second and third leading causes of aquatic life impairment in Ohio streams and rivers, surpassing ammonia and heavy metals. These impairments are principally the result of agricultural land use, intensive urbanization, and suburban development, the latter of which is emerging as one of the most significant threats to watersheds...Increasingly, water pollution problems are associated with nonpoint sources such as, construction sites, farm land, abandoned mines, landfills, pits and lagoons, oil and gas wells, domestic sewage systems, manure and treatment processing residuals.”³

Each of the 14 11-digit HUC watersheds lying in the NEFCO Ohio River basin was included on the 2004 Ohio EPA 303(d) list of prioritized impaired waters. This list includes category 5 watersheds. Category 5 designates watersheds that are impaired or threatened and require a TMDL.

³Ohio Water Resources Inventory: Executive Summary (Ohio EPA, 1996), pp. 11-13.

Watershed Scores and Large River Scores

The Ohio EPA measures both watershed units and large river units for aquatic life attainment status. 2000 was the last year the Ohio EPA used stream segments when determining attainment status. The Ohio EPA now analyzes watershed units instead of stream segment units, since TMDLs are watershed-based reports.

Watershed Scores

Each of the 331 11-digit watersheds in Ohio is assessed for aquatic life attainment. The watersheds receive scores between 0 and 100 based on the percentage of full aquatic life attainment; the higher the score, the closer to full aquatic life use attainment. In 2000 the state average was 47. Table 2-1 lists and Figure 2-2 maps the scores received in 2002 and 2004 for 12 of the 14 basins in the NEFCO region.

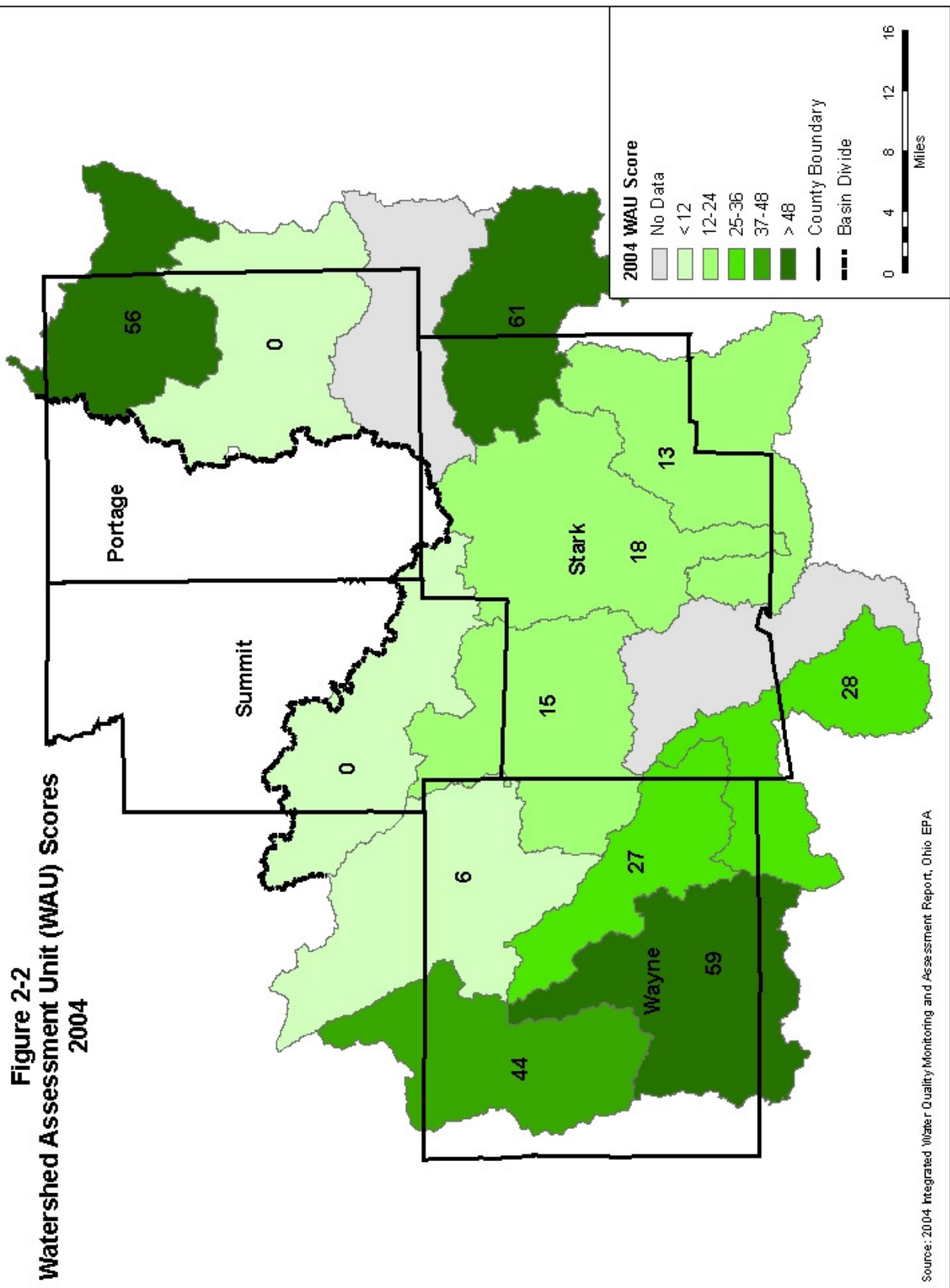
Table 2-1: Average Watershed Score, 2002-2004

Watershed	2002 Score	2004 Score
Mahoning River (headwaters to downstream Beech Creek)	61	61
Killbuck Creek (upstream Apple Creek to downstream Salt Creek)	59	57
Mahoning River (downstream West Branch to upstream Duck Creek)	56	56
Killbuck Creek (headwaters to upstream Apple Creek)	44	74
Sugar Creek (upstream Middle Fork to mouth)	28	28
Sugar Creek (headwaters to upstream Middle Fork)	27	27
Nimishillen Creek	18	18
Tuscarawas River (downstream Wolf Creek to downstream Sippo Creek)	15	19
Sandy Creek (downstream Still Fork to mouth)	13	21
Chippewa Creek	6	6
Tuscarawas River (headwaters to downstream Wolf Creek)	0	0
Mahoning River (downstream Berlin Dam to downstream West Branch)	0	0

According to these data, only three of the basins scored above the state average in 2002 and only four in 2004. Many of these watersheds had very poor scores, indicating severe water quality problems; two basins had a score of zero, equivalent to 100 percent non-attainment.

Table 2-2 lists the impairments for the 14 basins in the NEFCO region for the Ohio River basin. These data are from Appendix D2 of the Ohio 2004 Integrated Water Quality Monitoring and Assessment Report. The three columns correspond to the three variables measured for water quality: aquatic life, recreational use, and fish consumption.

Figure 2-2
Watershed Assessment Unit (WAU) Scores
2004



Source: 2004 Integrated Water Quality Monitoring and Assessment Report, Ohio EPA

Table 2-2: Watershed Impairments

Watershed (11-digit)	Aquatic Life Impairment	Recreational Use Impairment	Fish Consumption Advisory
Mahoning River (downstream West Branch to upstream Duck Creek)	Yes	No	Yes
Mahoning River (downstream Berlin Dam to downstream West Branch)	Yes	Unknown	Yes
Mahoning River (downstream Beech Creek to downstream Berlin Dam)	Unknown	Unknown	Yes
Mahoning River (headwaters to downstream Beech Creek)	Yes	Yes	No Data
Sandy Creek (downstream Still Fork to mouth)	Yes	No	Yes
Nimishillen Creek	Yes	Yes	Yes
Tuscarawas River (downstream Sippo Creek to upstream Sugar Creek, excluding mainstem)	Unknown	Yes	No Data
Tuscarawas River (downstream Wolf Creek to downstream Sippo Creek)	Yes	Yes	Yes
Tuscarawas River (headwaters to downstream Wolf Creek)	Yes	Yes	Yes
Chippewa Creek	Yes	Yes	No Data
Sugar Creek (headwaters to upstream Middle Fork)	Yes	Yes	No Data
Sugar Creek (upstream Middle Fork to mouth)	Yes	Yes	No Data
Killbuck Creek (headwaters to upstream Apple Creek)	Yes	Yes	No Data
Killbuck Creek (upstream Apple Creek to downstream Salt Creek)	Yes	Yes	No Data

Large River Scores

The Ohio EPA also assesses the 23 large rivers on aquatic life use attainment status. These large rivers are scored in the same manner as the watershed units. The NEFCO region includes parts of two large river assessment units within the Ohio River basin: the Tuscarawas River and the Mahoning River (Table 2-3). In 2000 the state average for large rivers was 62. In 1980 the state average score was 21, indicating a remarkable improvement in overall water quality. The Tuscarawas River had a score of 0 in 2002 and a score of 10 in 2004. The Mahoning River had a score of 1 in both 2002 and 2004. These poor scores indicate severe water quality impairments for the region. The scores for the Tuscarawas River indicate improving water quality over the past two years.

Table 2-3: Mean QHEI by Stream Segment, 2000

Stream Segment	2000 Mean QHEI
Mahoning River	
Mahoning River (headwaters to Beech Creek)	61.4
Mahoning River (Beech Creek to Berlin Dam)	61.3
Mahoning River (Milton Dam to West Branch)	49.8
Mahoning River (West Branch to Duck Creek)	51.6
Upper Tuscarawas River	
Tuscarawas River (Pigeon Run to Sandy Creek)	64.7
Tuscarawas River (Newman Creek to Pigeon Run)	49.4
Tuscarawas River (Chippewa Creek to Newman Creek)	65.5
Nimisila Creek	65.4
Chippewa Creek (Steele Ditch to Tuscarawas River)	27.5
Little Chippewa Creek	34.0
Unnamed Tributary to Little Chippewa Creek	60.0
River Styx	36.4
Tributary to Nimisila Creek	75.5
Chippewa Creek (headwaters to Steele Ditch)	29.0
Tuscarawas River (Wolf Creek to Chippewa Creek)	44.9
Pigeon Creek	37.3
Wolf Creek	40.2
Hudson Run	51.0
Van Hyning Run	49.5
Metzger's Ditch	62.3
Tuscarawas River (headwaters to Wolf Creek)	50.5
Nimishillen Creek	
Sandy Creek (Nimishillen Creek to Tuscarawas River)	64.0
Nimishillen Creek	73.8
Hurford Run	41.6
Domer Ditch	58.1
Sherrick Run	53.2
West Branch Nimishillen Creek	51.8
East Branch Nimishillen Creek	66.8
Middle Branch Nimishillen Creek	54.7
Swartz Ditch	35.2
Guiley Ditch (Hartville)	34.3
Tributary to East Branch Nimishillen Creek	44.0
Hoover Ditch	48.0
Zimber Ditch	47.3
McDowell Ditch	34.0
Osnaburg Ditch	40.5
Sandy Creek (headwaters to Still Fork)	71.3

Stream Segment	2000 Mean QHEI
Sugar Creek	
Middle Fork Sugar Creek	59.0
Sugar Creek (headwaters to Middle Fork)	47.0
Sugar Creek (South Fork to Tuscarawas River)	72.0
North Fork Sugar Creek	48.1
Killbuck Creek	
Killbuck Creek (Apple Creek to Salt Creek)	52.5
Killbuck Creek (Salt Creek to Sapps Run)	75.2
Apple Creek	72.3
Killbuck Creek (Shade Creek to Apple Creek)	66.6
Killbuck Creek (headwaters to Shade Creek)	56.0
Shade Creek	47.5
Camel Creek	71.2
Little Killbuck Creek	63.7
Shreve Creek	54.0
North Branch Salt Creek	69.0
Martins Creek	63.0
Paint Creek	84.0
Salt Creek	60.5
North Branch Salt Creek	69.0

Field Monitoring/TMDL

The Ohio EPA has created a comprehensive timeline that lists when particular watersheds will be monitored and when TMDL reports will be filed. Field monitoring is typically done 2 years prior to submittal of the TMDL report for a particular watershed. The goal for the Ohio EPA is to have the entire TMDL program in place by 2010.

In 2002, a TMDL report was completed for Sugar Creek, the fifth approved for Ohio by the USEPA. This TMDL found that most of the watershed was in non-attainment and that the Sugar Creek watershed as a whole was among the most degraded in Ohio. Sedimentation, habitat alteration, and nutrient enrichment were cited as the primary causes of impairment.

The following subbasins were field monitored in 2004 and will be submitting TMDL reports to the USEPA in 2006:

1. Tuscarawas River (headwaters to downstream Wolf Creek)
2. Chippewa Creek
3. Tuscarawas River (downstream Wolf Creek to downstream Sippo Creek, excluding Chippewa Creek)
4. Nimishillen Creek
5. Tuscarawas River (downstream Sippo Creek to upstream Sugar Creek, excluding Tuscarawas River mainstem)

The following subbasins will be monitored in 2007 and will submit a TMDL in 2009:

1. Killbuck Creek (headwaters to upstream Apple Creek)
2. Killbuck Creek (upstream Apple Creek to downstream Salt Creek)

The following subbasins will be monitored in 2008 and will submit a TMDL in 2010:

1. Mahoning River (headwaters to downstream Beech Creek)
2. Mahoning River (downstream Beech Creek to downstream Berlin Dam)
3. Mahoning River (downstream Berlin Dam to downstream West Branch)
4. Mahoning River (downstream West Branch to upstream Duck Creek)

The following subbasins will be monitored in 2012 and will submit a TMDL in 2014:

1. Sandy Creek (downstream Still Fork to mouth, excluding Nimishillen Creek)
2. Sugar Creek (headwaters to upstream Middle Fork)
3. Sugar Creek (upstream Middle Fork to mouth, excluding South Fork)

II. Regional Population & Employment Developments Since 1979

A significant factor influencing water quality in Northeast Ohio is the continuing dispersal of people and jobs. This dispersal is an ongoing phenomenon, affecting people, businesses and communities in complex ways.

Population Trends

Following the devastating loss of manufacturing industries in the late 1970s and early 1980s which precipitated widespread population declines in many of the region's communities, the four county region has experienced steady growth. The 2000 Census figures provide evidence that the area has recovered. All four counties posted favorable increases in populations compared to previous decades. Estimates of county populations (as of July 1, 2004) calculated the 2000-2004 annual average percentage change for NEFCO's counties at or double that of the State. Stark and Summit County population trends matched Ohio's 0.2 percent increase, while the more rural Portage and Wayne Counties saw populations increasing annually at the rate of 0.4 percent. Table 2-4 depicts these population trends.

Table 2-4 Population Change 1980-2000 and 2004 Estimate					
County	2000 Census	July 1, 2000 Estimate	July 1, 2004 Estimate	2000-2004	
				Annual Average Percentage Change	Rank
Portage	152,061	152,366	154,764	0.4%	35
Stark	378,098	378,133	381,229	0.2%	48
Summit	542,899	543,574	547,314	0.2%	49
Wayne	111,564	111,699	113,577	0.4%	34
NEFCO	1,184,622	1,185,772	1,196,884	N/A	

Source: U.S. Bureau of Census, 2000; Ohio County Profiles, State of Ohio, Office of Strategic Research, 2001; Office of Strategic Research website, 2005

Although the NEFCO region as a whole saw population losses between 1980 and 1990, the turnaround and resulting population growth of over 5 percent over the previous decade is evidence of a stable region that has made many efforts to preserve economic gains and to provide a good quality of life for its residents. As in many other locations, NEFCO's four counties have communities which exhibit high population growth and the resulting increased need for services. Other communities within these counties face the challenges of failed septic systems or old systems in need of repair. Meeting the current infrastructure needs and planning for future expansion in stable and high-growth areas will be necessary.

Employment Trends

Employment trends also reveal patterns that may have consequences for the area's water quality. The economic downturn of over two decades ago has been reversed with the rise of key industries such as polymers, liquid crystal and agricultural research, providing economic diversification in the region.

Table 2-5 describes the annual averages of the civilian labor force, employment, unemployment and unemployment rates for Portage, Stark, Summit and Wayne Counties and the state of Ohio in 2004. The 6.1 percent regional unemployment equaled that of the state. For 2004, all but one county experienced unemployment rates at or below the State of Ohio's rate. These unemployment rates are higher than in past years, and some of the area's larger cities exhibit unemployment rates far exceeding the U.S. rate of 5.5 percent.

Table 2-5 Civilian Labor Force Estimates Annual Average – 2004				
County	Civilian Labor Force	Employment	Unemployment	Unemployment Rate
Portage	86,800	81,700	5,000	5.8
Stark	190,200	177,600	12,500	6.6
Summit	284,100	266,800	17,300	6.1
Wayne	60,000	568,000	3,200	5.3
NEFCO Region	621,000	583,000	38,100	6.1
Ohio (seasonally adjusted)	5,884,800	5,523,000	361,800	6.1

Source: Local Area Unemployment Statistics, Labor Market Information website, April 2005

Overall, Ohio's economy has been healthy, with officials reporting a large number of business expansions over the past few years. However, in recent years, actual and potential job losses at or closures of some of the region's large and established manufacturing plants raise concern for the economy. Table 2-5 denotes the number of business formations between 1998 and 2003 shows some decline in business starts after 2001 but also some gains signifying recovery in 2003.

Table 2-5 Number of Business Starts 1998-2003						
Area	1998	1999	2000	2001	2002	2003
Portage	299	292	285	338	288	286
Stark	770	733	690	853	817	899
Summit	1,263	1,148	1,273	1,372	1,237	1,360
Wayne	238	224	216	255	194	258
NEFCO	4,568	4,396	4,464	4,819	4,538	4,806
Ohio	26,908	26,763	26,522	30,451	27,985	30,665

Source: Ohio County Indicators, Office of Strategic Research, Ohio Department of Development, August 2004.

The manufacturing sector continues to decline in the region, which in recent years has lost significant industries such as Rubbermaid and sustained job losses at Hoover, Goodyear, and possibly Timken. The region continues to evolve from relying on heavy manufacturing to an economically healthier and diverse industrial base. As in many other places, trade and services are a significant part of the local economies in Portage, Stark, Summit and Wayne Counties (Table 2-6).

Table 2-6					
2000 Employment by Industry					
	Portage	Stark	Summit	Wayne	Ohio
2000 Total Employment	52,352	173,012	258,093	47,917	5,349,465
Agriculture/Forestry/Fishing	0	248	240	365	14,707
Manufacturing	13,565	40,004	43,228	15,149	955,485
Construction	2,430	8,085	11,145	2,408	240,036
Transportation	838	2,155	9,006	1,243	158,722
Utilities	0	568	1,987	0	24,418
Trade	24,294	80,031	103,936	25,392	2,151,673
F.I.R.E.**	1,158	69,009	12,544	1,647	297,757
Services***	14,221	65,679	104,346	11,891	2,074,940
Mining	249	485	193	367	12,321
Government	11,382	18,238	28,262	6,784	666,375

Source: Ohio Department of Development, Office of Strategic Research, Ohio County Profiles, 2000.

* Some of the figures do not include the industries that reported a range of employees; other figures show a range of jobs as reported.

** F.I.R.E. - Finance, Insurance, Real Estate

*** Services include: Professional, scientific, technical services; Management of companies; educational services; health care; arts/recreation; accommodation and food services; and other services (except public administration).

A key factor in ensuring the health of the area's manufacturing base while maintaining water quality has been the development and use of regulations allowing brownfield redevelopment. Planners in the area's larger cities, Akron and Barberton, have made exceptional use of former brownfields. Other communities such as Kent, Canton and Cuyahoga Falls are also exploring redevelopment of brownfields to increase their tax base and curb urban sprawl.

Future Changes in Regional Population and Employment

If current housing market trends continue, there will be a need to closely monitor the effects of land use on water quality. Despite slight downturns in the economy, sales of new homes remain high and the average square footage of homes continues to increase. Recent population statistics predicting steady growth for the region and the national trend of declining numbers of persons per household, will increase the demand for housing.

Northeast Ohio's more diversified economy has exhibited its ability to weather plant closures and layoffs. The emphasis on relatively new industries and on encouraging the creation and growth of high-tech companies will be factors in both attracting complementary industries and retaining and creating jobs for the region's labor force. Continued upgrading of the transportation network and revitalization of inner cities will increase the attractiveness of the region to employers and workers alike.

Conclusion

The most recent concern to water quality today is occurring in the rapidly developing areas of the region on the periphery of the existing urban areas. This threat comes from a variety of potential sources, including nonpoint source discharges from residential and commercial developments, but most significantly from the combined effects of land disturbances to construct these new developments. This transformation is threatening regionally important water resources once thought relatively secure from water pollution threats (upland drinking water reservoirs, headwaters areas, and high quality streams once far removed from urbanization). Thus, while the perceived water pollution problems of the 1970s have largely been addressed, there remains a whole new set of water pollution challenges at the turn of the century to be confronted. Land uses will change from a predominantly rural character to urbanizing uses, and this will affect whether water runs off the land surface or seeps into the ground. This trend will have an impact on water quality.