

## IV. Watershed Impairments

The impairments within the watershed have been identified through the Ohio EPA TMDL planning process, field assessments within the Watershed Action Plan process, assessment of the beneficial uses administered by the Great Lakes Water Quality Agreement, and through community input. These impairments and sources are outlined in this section. The problem statement and priority watershed areas have been derived from these identified impairments.

### A. TMDL Summary

The following conclusions have been developed by Ohio EPA's Euclid Creek TMDL Draft, May, 2005. The TMDL Draft is currently in the review process for local, state and federal endorsement.

#### Bacteria

Discharges from septic tanks, combined sewer overflows and urban runoff contribute bacteria to the watershed.

#### Phosphorus

Current data indicate that phosphorous in the stream is above target goals. In OhioEPA's 2000 watershed survey, 66 percent of the samples were above the target level. In 2002 and 2003, 30 percent of the samples collected by the Northeast Ohio Regional Sewer District were above the target.

<b>Table 24 - Nutrient Targets</b>		
Target Concentrations for Phosphorus		
<i>Erie-Ontario Lake Plain</i>		Phosphorus Concentration (mg/l)
Headwaters	<20 mi <sup>2</sup>	0.05
Wadable	>20 mi <sup>2</sup> <200 mi <sup>2</sup>	0.07
Small Rivers	>200 mi <sup>2</sup> <1000 mi <sup>2</sup>	0.12
Target Concentrations for Nitrate-Nitrite		
<i>Erie-Ontario Lake Plain</i>		Nitrate-Nitrite Concentration (mg/l) (75 <sup>th</sup> % value)
Headwaters	<20 mi <sup>2</sup>	1.0
Wadable	>20 mi <sup>2</sup> <200 mi <sup>2</sup>	1.05
Small Rivers	>200 mi <sup>2</sup> <1000 mi <sup>2</sup>	1.42

#### Aquatic Life

Euclid Creek currently does not meet the Ohio EPA's standards for aquatic life. Fish populations appear to be more impacted than the macroinvertebrates

## B. TMDL Pollutant Loading

As part of the Euclid Creek TMDL process, a pollutant load reduction model was developed using the water quality data resources, flow data from the USGS, and land use from the Cuyahoga County Planning Commission

### Type of Model and Justification of Use

The Ohio EPA utilized the Spreadsheet Tool for Estimating Pollutant Load (STEPL) as its model for Euclid Creek. The Ohio EPA used this model to demonstrate load reductions using different BMP's at a subwatershed level, the absence of sewage treatment plants within the watershed and phosphorous being the major contributor to chemical water quality limitations. Reductions in phosphorous will be achieved by septic tank elimination and BMP's both which are addressed by STEPL.

### Model Results and Recommendations to Guide Implementation Actions

The Ohio EPA has assembled a Phosphorous Total Maximum Daily Load for Euclid Creek as shown in Table 10 . Utilizing the STEPL model and a daily median groundwater component using USGS flow gage data at St. Clair Road the total maximum daily load for phosphorous in Euclid Creek was allocated for a reduction of 3,448 lbs of phosphorous per year to reach the target concentrations outlined in Table 25.

This model will guide the determination of best management practices and the watershed plan recommendations in both location and type of measure within the watershed to maximize the reduction of phosphorous for the entire watershed. A strategy to use the appropriate best management practices will be developed in 2006 with the Watershed Council and its Technical Committee.

Table 25 - Phosphorus TMDL				
<b>Phosphorus TMDL for Euclid Creek</b>				
TMDL (lb/year)	WLA (lb/year)	LA (lb/year)		MOS (lb/year)
		STEPL	HYSEP	
5545.13	730.58	8034.5	404.5	554.51
<b>Reductions needed to achieve Phosphorus TMDL</b>				
TMDL (with MOS)	WLA (lb/year)	LA (lb/year)		WLA note: zero load reduction needed due to elimination of discharge
4990.62	0	3448.38		

## **C. Cuyahoga RAP AOC Beneficial Use Impairments Delisting**

As part of the Great Lakes Water Quality Agreement established in 1985, the International Joint Commission designated Areas of Concern throughout the Great Lakes to river basins with the most severe impaired conditions. Euclid Creek is part of the Cuyahoga River AOC established in 1988 and the development of its Remedial Action Plan to improve its resources. Under the GLWQA, thirteen delisting targets were commissioned to measure improvements to these AOC's and determine the progress of the RAP's activities in which are called beneficial use impairments. These impairments established by the International Joint Commission are as follows:

- Restrictions on Fish Consumption
- Restrictions on Wildlife Consumption
- Tainting of Fish and Wildlife Flavor
- Degradation of Fish Populations
- Degradation of Wildlife Populations
- Fish Tumors or Other Deformities
- Bird or Animal Deformities or Reproductive Problems
- Degradation of Benthos
- Restrictions on Dredging
- Eutrophication or Undesirable Algae
- Beach Closings (Recreational Contact)
- Public Access and Recreation Impairments
- Degradation of Aesthetics
- Degradation of Phytoplankton Populations
- Degradation of Zooplankton Populations
- Loss of Fish Habitat
- Loss of Wildlife Habitat

The Ohio EPA and the Cuyahoga River RAP are in the process of developing a Stage 2 Watershed Restoration Plan to 1) report the status on individual tributaries and Cuyahoga AOC segments, 2) provide specific measurable targets to measure RAP progress for delisting, 3) identify actions underway, proposed or needed to achieve restoration and delisting, and 4) identify monitoring strategies and needs. The Ohio EPA is spearheading a work group to develop a Delisting Target Document for the Cuyahoga AOC. Euclid Creek has developed an examination of the status of these impairments as part of its Watershed Planning process to determine the status and needs to determine beneficial use conditions within Euclid Creek. This evaluation will be further examined with the Ohio EPA Delisting Work Group for the remainder of 2005 and will be incorporated in the Cuyahoga RAP document.

### **BUI 1: Restrictions on Fish and Wildlife Consumption**

State of Ohio Delisting Target:

No fish and/or wildlife consumption advisories have been issued by the Ohio Department of Health that can be attributed to sources within the AOC.

Current Applicability/Conditions in Euclid Creek

### Fish Consumption

Euclid Creek has been part of the Lake Erie Fish Consumption Advisory limits imposed by the Ohio Department of Health since 2003 as part of the statewide advisories of one meal per week.

The lower two miles of Euclid Creek and its nearshore areas are highly used for recreational fishing. However, the majority of fish caught are received via Lake Erie and not part of the Euclid Creek system. The fish that reside in Euclid Creek are relatively small and not of the species typically consumed, hence the risk of consumption is low. The level of this comparison is not currently available. The Cuyahoga County Board of Health conducted a CREEL survey in 2004 along the Cuyahoga County Lake Erie shoreline which included Wildwood Park to examine the consumption practices of the fishing community. The 2004 survey indicated only 3% of the total people surveyed used the fishing for subsistence consumption along the shoreline.

The current data available to determine the consumption risks related to Euclid Creek fish can not validate the levels of risks. The data collected by Ohio EPA in 2000 found no levels of lead or PCB's within the waters in Euclid Creek which serve as potential indicators of fish contaminant sources. An evaluation of contaminated sediments particularly in the Wildwood Park area has not been conducted. These sediments need study to further determine if they are contributing to fish contamination and if any possible contamination is from Euclid Creek. Also, there have been no fish tissue data developed for Euclid Creek to determine if Euclid Creek fish tissue exceed PCB, lead or mercury levels from the creek.

### Wildlife Consumption

The Euclid Creek Metropark Reservation and the ODNR Wildwood State Park do not have deer management program for their facilities, hence, culling or consumption of deer through these agencies programs are not conducted. Due to the urban nature of the watershed, additional culling of deer by residents has minimal probability.

Level of Impairment: Not Impaired/Unknown

### **BUI 2: Tainting of Fish and Wildlife Flavor**

Current WQS data collected from Euclid Creek over the past five years indicates no significant presence of phenolics that would cause tainting to fish and wildlife. Due to the absence of wildlife consumption, the wildlife flavor is not applicable.

There has not been a survey of reporting conducted by Euclid Creek Watershed wildlife officials of tainting incidences. This may be conducted through Ohio EPA's Delisting Work Group.

Impairment: Not Impaired/Unknown

### **BUI 3: Degradation of Fish and Wildlife Populations**

#### Fish Populations

Euclid Creek is considered in non-attainment as a water body draining to Lake Erie. The current IBI and MIwb scores for Euclid Creek do not meet ecoregional biological criteria

of 40 IBI and 7.9 MIwb respectively. The data collected since 1998 does not demonstrate any improvements in scores from then to the present.

There has not been a biological indice assessment of the lacustuary and nearshore reaches conducted within and immediately adjacent to Euclid Creek and therefore this plan can not determine its biological conditions and its impacts on fish and wildlife populations within Euclid Creek.

Level of Impairment: Impaired

#### Wildlife Populations

The presence of sentinel species that include resproducing populations of great blue heron, mink, bald eagle osprey and river otter are not fully determined or identified for the watershed. Great blue heron do exist throughout the watershed as a result of sightings during field surveying in 2004. Mink has been sighted at Wildwood Park in years past, but not in 2004.

The Kirtland Bird Club has conducted a bird survey that will help identify bird populations within the watershed and will assist in evaluating this impairment further for the watershed.

Additional resources to examine the level of impairment will be through Cleveland Metroparks and OhioDNR.

Level of Impairment: Impaired

#### **BUI 4: Fish Tumors or Other Deformities**

The Ohio EPA water quality sampling results in 2000 indicate one of four sites that exceed the 0.5% DELT levels in fish. This sampling site is at River Mile 0.7 on the lower reach of the main stem along Euclid Creek.

The Euclid Creek does not have the presence of PAH's in its water quality sampling results over the past five years. Historical data will be presented in the final Draft report.

Level of Impairment: In Recovery

#### **BUI 5: Bird or Animal Deformities or Reproductive Problems**

There is currently no established information available to determine the presence of bird or animal deformities within the Euclid Creek Watershed.

Level of Impairment: Unknown

#### **BUI 6: Degradation of Benthos**

The ICI results for Euclid Creek from Ohio EPA 2000 sampling results currently exceed warm water habitat ICI value standards of 34 in one location at river mile 1.6 determined a score of 40 for ICI. The site at river mile 0.7 determined a score of 32.

In addition, the presence of invasive invertebrates species such as zebra mussels in the lacustuary and nearshore areas of Euclid Creek is unknown.

Level of Impairment: Impaired/Unknown

**BUI 7: Dredging**

Currently, there is no dredging activity being conducted within Euclid Creek. However, the Wildwood Marina and the access channel immediately adjacent to Euclid Creek is dredged as permitted by the U.S. Army Corps of Engineers and managed by the Ohio Department of Natural Resources on a regular basis. The purpose of the dredging is to maintain safe access for boaters to and from the marina. The dredging most recently was conducted in 2000 and 2003 of sandy sediment being removed to an approximate bottom elevation of 563.5 IGLD within the access channel of the marina harbor. The material dredged from the channel has a high concentration of sand and the dredge material in both 2000 and 2003 was relocated just to the east of the marina basin in the littoral area.

Additionally, during the 2003 project, about 70 cubic yards of material was dredged from the eastwardly launch ramp area. This material was not suitable for near shore relocation and was relocated to the nearby upland site within the oxbow area within the park.

In addition to the marina dredging, future dam removal will require sampling of sediments to examine the disposal options required and identify potential impairments.

Level of Impairment: Unknown.

**BUI 8: Eutrophication or Undesirable Algae**

The Euclid Creek sampling conducted in 2000 meets the dissolved oxygen parameters of the WQS criteria of greater than 5 mg/l. Hence, dissolved oxygen is not a concern within the watershed. Also, the 2000 sampling by Ohio EPA presents the BOD less than 2 within the watershed that provides an additional indicator that eutrophication is not an impairment.

However, the sampling has been highly concentrated in the lower portions of the watershed. Field Surveys have sited some concentrated areas with algae within the stream. Further determination of algae types and their significance to the impairment of the watershed is recommended. In addition, a survey of the CSO's and storm water outfalls has not been conducted to further evaluate eutrophication in the watershed and determine potential sources if concentrations are found.

Level of Impairment: In Recovery

**BUI 9: Restrictions on Drinking Water Consumption or Taste and Odor Problems**

The Euclid Creek watershed communities receive their drinking water from Lake Erie through the City of Cleveland Water system. The Ohio EPA published the Source Water Assessment Report in 2004 and establishes the risks level to be low as a result of the intake location and conditions of the system.

Although, there is a presence of ground water wells in the watershed from historic use prior to urbanization, these wells are not being utilized for drinking water purposes.

Level of Impairment: Not Impaired

**BUI 10: Beach Closings (Recreational Contact)**

The Ohio 2004 Integrated Water Quality Monitoring and Assessment Report outlines the historical data on beach closings associated with E. coli exceeding 126 over a geometric mean of 5 consecutive samples within a 30 day period. The data was collected for the past five years from 1999 -2003. The Villa Angela and Euclid beaches adjacent to the mouth of Euclid Creek were reported in the 2004 Integrated Report as beaches ranking one and three respectively among the twenty-two public beaches monitored with the most closings due to poor water quality standards. Sources of pollution may include the existing CSO's, the Easterly Wasterwater Treatment Plant nearby and illicit discharges from Euclid Creek. The exact sources of impairment have yet to be determined and are currently being examined with the USGS/NEORSDDStudy Work Group.

**Table 26. Days closed/Days available to be open**

<b>Beach</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>All year %</b>
Villa Angela	35/98	69/105	55/105	73/106	78/106	310/520 (60%)
Euclid Beach	65/127	30/104	36/98	34/85	31/98	196/512 (38%)

The results from the data collected show a decrease in improvement at the Villa Angela Beach over the five years and a small increase of improvement at the Euclid Beach.

Partial body contact standards are met due to the fecal and *e coli* do not exceed the required standards within Euclid Creek. (Need to determine that is ok for partial or secondary contact.)

Level of Impairment: Impaired

**Figure 44: Ranking of Public Beach Closings,**



March, 2004, Toledo Blade, OEPA Integrated Assessment Report

**BUI 11: Degradation of Aesthetics**

Although not documented, Euclid Creek continues to experience algae and odor nuisances as a result of illicit discharges. In association with the presence of “free froms” as designated in the OAC section 3745-1-04, Euclid Creek does continue experience the presences of substances, nuisances and debris associated with this definition.

The extent of impairment is unknown but is recognized as improved due to the continued elimination of home septic systems and the reduction of illicit discharges from industrial uses over the last twenty years.

**Level of Impairment:** In Recovery.

**BUI 12: Added Costs to Agriculture or Industry**

There are no agricultural uses within Euclid Creek. There are industrial uses in the lower Euclid Creek. It is unknown their use of water for their facilities. However, the water received is from the Nottingham Water Plan and meets the source water requirements for use to these facilities.

**Level of Impairment:** Not applicable

**BUI 13: Degradation of Phytoplankton and Zooplankton Populations**

Euclid Creek does contain a small lacustrine region from the Lakeshore Boulevard bridge to the Lake that may have the potential for phytoplankton and zooplankton populations to exist if restored. The present conditions of this lacustrine region is unknown. More study is needed to assess restoration options and define the re-introduction of these populations within the lacustrine and nearshore region of Euclid Creek.

Level of Impairment: Not Known

**BUI14: Loss of Fish and Wildlife Habitat**

The current QHEI in Euclid Creek meets the target score of 60 in two locations in the Ohio EPA 2000 sampling survey. These locations are located along the main stem in the lower reaches and at the mouth of the East Branch. The areas not meeting attainment are located in the southern portions of the main stem. These scores have not improved from previous sampling conducted by the Northeast Ohio Regional Sewer District in 1998.

The Cleveland Metroparks has conducted HHEI assessment for over 80 stream segments of the watershed's headwater streams in 2004. Once this information becomes available, it will provide detailed information on levels of impairment and recommendations for targeted restoration and protection measures as a result.

The nearshore and lacustrine area have not been evaluated to determine its impairment status for habitat loss or absence.

Level of Impairment: Impaired/In Recovery

**D. Coastal Non-Point Pollution Control Limitations**

In association with meeting the State of Ohio Coastal Non-Point Pollution Control plan, the Watershed Action Planning process has evaluated the conditions of Euclid Creek to determine the applicability and current limitations of the Coastal Control Plan management measures and secondly, to determine what implementation actions will best fit these limitations to meet those measures. This assessment and determination of action is outlined in the Implementation chapter of this report.

## E. Problem Statement

Based upon the impairments identified in Euclid Creek, the following problem statements have been developed to guide goals and implementation activities for the watershed.

1. Remaining phosphorus nutrient loads result from remaining septic systems, CSO's and urbanization.
2. Flash flows as a result of bedrock substrate and upstream urbanization increase erosion and entrenchment rates.
3. Low fish populations and diversity, hydrologic modifications, channel alterations, and loss of stream and wetland areas decrease stream conditions.
4. Development activities and practices accelerate erosion/sedimentation, loss of habitat and increase of impervious cover that limits water quality attainment.
5. Discharges from CSO's and remaining septic systems contribute to water quality limits.

### Linking Sources and Causes in Euclid Creek

As the Euclid Creek TMDL and the Ohio EPA 303(d) list have outlined, the following linkages can begin to be made in developing solution strategies.

**Table 27: Sources and Causes**

Source	Causes
Phosphorous Loads exceed water quality limits	CSO's Septic Systems Urban Runoff
Bacteria Counts reported continue to be elevated during rain events.	CSO's Aging Infrastructure Septic Systems
Habitat Reduced fish and macroinvertebrate populations and diversity.  Reduced physical habitat acreage along riparian areas.	Dams in Lower Section of Watershed. Decreased forest cover along riparian corridors Increased flows due to increase impervious cover, development patterns. Other hydrologic modifications.
Acceleration of erosion, sedimentation, entrenchment and volume throughout the watershed.	Development patterns resulting in increased impervious covers, loss of water storage and infiltration capacity. Loss of forest cover and riparian buffers to stabilize streambanks.

### Phosphorous Load StepL Model and Land Use Allocation

The Step L Model was utilized as part of the Euclid Creek TMDL to identify the load reduction needs for Euclid Creek at 3448 lbs/yr. The Step L model developed by Ohio EPA for the TMDL outlines the loads based upon land use types within seven sub-watersheds. Table \_\_ outlines these existing loads with no bmp's in place. Table \_\_ outlines a generalized application of 20% of bmps to the watershed such as bioretention areas in the watershed and resulting load reductions. While this presents a generalized application of best management practices to reduce phosphorous loads, it presents the opportunity that best management practices can play to improve water quality in the watershed. The recommendations in the **Implementation Chapter** of this document provide an integrated approach to addressing the sources and causes of Euclid Creek.

**Table 28. Total Nutrient Loads by Sub-Watershed**

1. Total load by subwatershed(s)														
Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	%N Reduction	
	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	%	
W1	8516.7	852.2	28616.5	136.0	0.0	0.0	0.0	0.0	8516.7	852.2	28616.5	136.0	0.0	
W2	5680.2	701.3	20631.2	90.8	0.0	0.0	0.0	0.0	5680.2	701.3	20631.2	90.8	0.0	
W3	13206.8	1769.9	46167.8	188.6	0.0	0.0	0.0	0.0	13206.8	1769.9	46167.8	188.6	0.0	
W4	8363.2	979.1	29589.6	127.5	0.0	0.0	0.0	0.0	8363.2	979.1	29589.6	127.5	0.0	
W5	9351.5	1111.3	33285.8	150.7	0.0	0.0	0.0	0.0	9351.5	1111.3	33285.8	150.7	0.0	
W6	6411.0	852.8	27274.9	76.0	0.0	0.0	0.0	0.0	6411.0	852.8	27274.9	76.0	0.0	
W7	16647.1	2009.9	65815.3	226.5	0.0	0.0	0.0	0.0	16647.1	2009.9	65815.3	226.5	0.0	
Total	68176.6	8276.5	251381.2	996.0	0.0	0.0	0.0	0.0	68176.6	8276.5	251381.2	996.0	0.0	

**Table 29. Total Nutrient Load Reductions with BMP's by Sub-Watershed**

1. Total load by subwatershed(s)														
Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	%N Reduction	
	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	%	
W1	8516.7	852.2	28616.5	136.0	942.9	159.1	0.0	0.0	7573.8	693.0	28616.5	136.0	11.1	
W2	5680.2	701.3	20631.2	90.8	2938.6	507.6	0.0	0.0	2741.6	193.7	20631.2	90.8	51.7	
W3	13206.8	1769.9	46167.8	188.6	7011.0	1026.7	0.0	0.0	6195.8	743.2	46167.8	188.6	53.1	
W4	8363.2	979.1	29589.6	127.5	4663.3	746.5	0.0	0.0	3699.8	232.6	29589.6	127.5	55.8	
W5	9351.5	1111.3	33285.8	150.7	5000.5	814.0	0.0	0.0	4351.0	297.3	33285.8	150.7	53.5	
W6	6411.0	852.8	27274.9	76.0	3843.9	661.4	0.0	0.0	2567.1	191.4	27274.9	76.0	60.0	
W7	16647.1	2009.9	65815.3	226.5	10242.6	1598.0	0.0	0.0	6404.6	411.9	65815.3	226.5	61.5	
Total	68176.6	8276.5	251381.2	996.0	34642.8	5513.3	0.0	0.0	33633.7	2763.2	251381.2	996.0	50.8	

Source: OhioEPA Euclid Creek TMDL, 2005