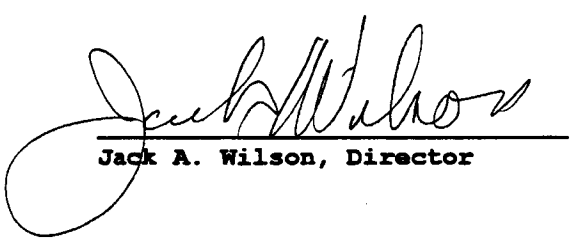
1996 303(d) LIST OF WATERS FOR KENTUCKY

Natural Resources and
Environmental Protection Cabinet

1996 303(d) List of Waters for Kentucky

Kentucky Department for Environmental Protection
Division of Water



Jack A. Wilson, Director

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Date

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INTRODUCTION

Pursuant to Section 303(d) of the Clean Water Act, the State of Kentucky has developed a list of waterbodies presently not supporting designated uses. As required by 40 CFR 130.7(b)(4), these waters have been prioritized for total maximum daily load (TMDL) development. The purpose of this report is not only to list and prioritize impacted waters, but also to describe efforts that have been and continue to be made to address problems in waters listed in previous 303(d) reports.

STATUS OF HIGH-PRIORITY PROJECTS LISTED IN THE 1994 303(d) LIST

Upper Cumberland River Basin (Poor Fork, Cumberland River, and Looney Creek). This watershed area was listed as a high priority because of prevalent bacteria problems that resulted in swimming advisories in 1994. Areas listed were 13 miles of the Cumberland River, 25 miles of the Poor Fork below Harlan, and 3 miles of Looney Creek. A list of accomplishments resulting from efforts during 1995 to restore the swimming use in these streams is shown in Table 1. Sampling has continued in 1996, and results will be used to determine the effectiveness of control activities to date.

Chenoweth Run, Floyds Fork Basin, Jefferson County. This urban stream was listed because it was not meeting the aquatic life or swimming use in its nine miles of length in an area of rapid growth and development. Poor water quality in Chenoweth Run is also impacting its receiving stream, Floyds Fork, which has been the subject of previous 303(d) reports. The Kentucky Division of Water (KDOW) applied for and received a U.S. EPA TMDL grant to conduct a study of the stream and recommend solutions. The report was published in June of 1996 and submitted to EPA for approval as a TMDL. Three measures are needed to achieve standards: 1) phosphorus removal at the four million gallons per day wastewater treatment plant serving the city of Jeffersontown; 2) creation of riparian zones and tree planting to provide shade over the stream; and 3) effective storm water management controls. The KDOW will be working with local agencies and citizen groups to implement these solutions. Phosphorus removal will be required at the next issuance of the discharge permit for the city of Jeffersontown.

TABLE 1

UPPER CUMBERLAND RIVER
BACTERIOLOGICAL SURVEY
1995 SUMMARY

- Six (6) River Sampling Events
- Four (4) Municipal Wastewater Treatment Plant Sampling Events
- Two (2) Package Wastewater Treatment Plant Sampling Events
- One (1) Special Sampling Event
- 200 Water and Wastewater Samples Collected
- 600 Fecal Coliform Bacteria Analyses Conducted
- 25 Notices of Violation Issued
- 15 Package Wastewater Treatment Plants Referred to Enforcement
- 15 Demand Letters for Penalties Sent by Enforcement
- City of Pineville Brought New WWTP on Line
- City of Pineville Referred to Enforcement for Collection System Bypasses
- City of Harlan Plans for New WWTP
- City of Benham Construction Completed on WWTP Improvements
- City of Evarts in Compliance Last Two (2) Sampling Events
- City of Lynch in Compliance
- City of Cumberland in Compliance
- City of Loyall Referred to Enforcement

ONGOING PROJECTS FROM PREVIOUS 303(d) REPORTS

The status of various projects that have been listed in previous 303(d) reports are described below.

Floyds Fork, Jefferson County. This TMDL project consisted of a study in 1991 to determine causes and recommend solutions for water quality problems throughout the 67-mile length of this stream and its watershed. The report noted a number of activities that were needed, the most important being the elimination of the numerous package wastewater treatment plants located throughout the basin through connection to or construction of new regional facilities. A site has been purchased by the Louisville and Jefferson County Metropolitan Sewer District (MSD) for a new regional facility in northeastern Jefferson County that will eliminate 12 package plants. Design of the facility is underway. This project is expected to significantly improve the 13 miles of stream that fail to meet water quality standards. The Cedar Creek regional facility began operation in 1995 and has eliminated five package plants within the Floyds Fork basin, with several more to be connected in the next two years. As noted previously in this report, the Chenoweth Run TMDL project is also expected to improve conditions in Floyds Fork. Oldham County, where the headwaters of Floyds Fork are located, has completed a draft of an "Action Plan" that describes needed sewer improvements throughout the county. Implementation of this plan will ultimately remove a number of package plants in the basin.

East Fork of the Little Sandy River, Boyd County. The TMDL study conducted in 1992 identified six miles of the river plus numerous tributaries in this reach that failed to meet water quality standards for dissolved oxygen. The source of the problem was attributed to the 50 package treatment plants that had been allowed to discharge over the course of the past 20 years. Some of these facilities were in complete failure. As a result of the TMDL, sewer lines have been, and continue to be, constructed to serve this growing area. Wastewater will be transported to regional facilities on the Ohio River. About 30 package plants have been eliminated in the past two years, and the remaining are anticipated to be removed within the next two years.

Harrods Creek, Oldham and Jefferson Counties. The TMDL study conducted in 1990 found about three miles of lower Harrods Creek, which is essentially a backwater bay of the Ohio River, in significant violation of several water quality standards. The problems were attributed to the wastewater treatment plants located within and just upstream of the backwater area. Three of these facilities are owned by the city of Prospect. Permits for two of these facilities have been reissued with the condition that the facilities be removed and connect to MSD's comprehensive sewer system by the end of the five-year permit period. Prospect has adjudicated these permits based on their belief that the TMDL is flawed. Negotiations with Prospect are underway. Oldham County has developed a draft planning document to address wastewater needs throughout the county, half of which lies within the Harrods Creek watershed. Part of this plan is to provide regional sewer service to the city of Crestwood, which will eliminate 11 package wastewater facilities and numerous failing septic systems. Construction of the Crestwood phase of the plan is expected to begin in 1997.

Mayfield Creek, Graves County. A study conducted in 1992 found about 2.5 miles of Mayfield Creek in violation of water quality standards for dissolved oxygen. The city of Mayfield's wastewater treatment plant was failing and found to be the cause of this problem. A new treatment plant has been constructed, and a follow-up study is needed to confirm that in-stream conditions have improved. Data from the new facility and inspections by KDOW personnel indicate that the facility is operating properly, and in-stream conditions would be expected to be much improved.

North Fork Kentucky River, Southeastern Kentucky. This project was originally described in the 1992 303(d) list because of a swimming advisory on its entire 163-mile length. As a result of sampling studies and enforcement actions, the advisory was removed from the lower 76 miles in 1993. The upper portion of the basin remains under the swimming advisory. Stream and wastewater sampling have continued through 1996. Two municipal systems and five package plants remain out of compliance, and additional enforcement actions are underway. The Perry County Sanitation District operates a collection system that is overloaded and frequently bypasses raw sewage to the river. New pipelines are currently under construction that will eliminate this source. The city of Hazard WWTP has also had persistent problems. A new facility is under construction and is expected to be in operation in the spring of 1997. Full attainment with water quality standards will be difficult to achieve in some areas that are without wastewater collection systems. Many of the homes in remote areas rely on straight-pipe discharges to small streams within valleys of rugged topography.

A project with the goal of significantly reducing the number of straight-pipe discharges and inadequate on-site wastewater treatment systems in the Letcher County portion of the watershed was initiated in 1995. Project activities include: 1) an ongoing comprehensive education and public information program to raise community awareness of the problem and its solutions, 2) demonstration of alternative on-site and cluster wastewater treatment technologies appropriate to the steep topography and poor soils in the project area, and 3) implementation of a cost-share program to assist low-income residents to install on-site systems. The project will receive $398,000 in funding from a Section 319(h) grant and the Kentucky River Authority. As a result of project activities, the Letcher County Fiscal Court recently approved the formation of a county-wide water and sewer district as a means for county government to assist with eliminating straight-pipe discharges. The project seeks to initiate the long-term, continuous commitment of financial and institutional support necessary to eliminate straight-pipe discharges in the Upper North Fork watershed.

Upper Salt River/Taylorsville Lake, Central Kentucky. This TMDL project began in 1991 to address nutrient enrichment problems in the lake and high bacteria counts in the river. A report issued in 1994 by the KDOW determined the sources were primarily non-point in origin, these being from concentrated animal holding areas and runoff from farming operations. The soils in this region are among the most fertile in the state. The Corps of Engineers continues to model the lake in an effort to determine the amount of nutrients it can assimilate without adverse effects. A report of this effort is anticipated in the spring of 1997. Concurrent with this effort, nonpoint source controls and education programs have been and continue to be implemented.

Agricultural best management practice (BMP) cost-share funds have been made available to remediate nonpoint source pollution in the watershed as part of a U.S. Department of Agriculture (USDA) five-year Hydrologic Unit Area Water Quality (HUAWQ) project. The goal of the HUAWQ project is to abate or prevent water quality degradation in both surface and groundwater in the watershed. To achieve this goal, the identified sources of contamination are being addressed by the use of BMPs. For FFY91 through FFY93, the HUAWQ project received a total of approximately $850,000. In addition, $55,000 cost-share funds were awarded in FFY92 as part of a Water Quality Incentive Program for implementing non-construction, management-type BMPs. More than $1 million has already been spent to implement BMPs to treat wastewater from concentrated animal management areas on dairy farms. These BMPs have not only reduced known bacteria contamination problems, they also were a first step in reducing nutrient input to streams in the watershed. In addition, a focused riparian area BMP project, funded with Section 319(h) grant funds, is currently underway. Post-BMP monitoring of streams in the watershed and in Taylorsville Lake will determine the effectiveness of the program.

Herrington Lake/Dix River Basin, Central Kentucky. Herrington Lake was identified in the 1992 305(b) report as not meeting aquatic-life use because of low dissolved oxygen levels and repeated fish kills. The lake was given a medium priority in the 1992 303(d) report. The KDOW has collected water quality data from the Dix River just upstream of the lake since 1985. Additional baseline nutrient data have been collected at a site on Clarks Run downstream of the city of Danville's WWTP outfall, at the Danville WWTP, and at two other municipalities further upstream of the lake. In 1994, Section 104(b)(3) grant monies were obtained from EPA to perform an in-depth study of the sources of nutrients causing water quality problems and to determine the nutrient assimilation capacity of Herrington Lake. These monies are being passed through the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) to the U.S. Geological Survey (USGS). In addition, the USGS will supplement the study with calibration and validation of COE's CE-QUAL-W2 and EPA's WASP physically-based models. The effort will provide an assessment of the lake's nutrient and trophic state dynamics and their link with land use and point source discharges. The study was initiated in September 1994 and has a scheduled completion date of September 1997. The USGS reports that sample collection and model calibration are proceeding on schedule. Project progress will be provided in future 303(d) reports.

NEW INITIATIVE: WATERSHED MANAGEMENT

The KDOW has begun the transition into a watershed management approach to solving water-based environmental problems. A 22-agency workgroup has been meeting since late March 1996 to discuss the concept of a watershed approach. The primary link between the various agencies is that all have a stake in the management, protection, or conservation of water resources. To that end, the group will produce a framework document of resource agencies, what they can contribute to an interagency watershed approach, and how the resource will benefit.

The framework development process will be fairly involved; however, with sufficient planning, agency resources should be utilized more effectively.

The early tasks of the framework development process that have been completed include:

- establishing ground rules
- identifying existing impediments to a statewide approach
- developing a work plan
- developing a common vision -- purpose, goals and objectives, as well as clarification of definitions of terms
- selection of Basin Management Units
- reviewing the experiences of other states
- conducting educational forums on framework needs and development

Five subcommittees have been identified to address issues and carry out tasks that are too detailed for the umbrella workgroup. The following subcommittees have been identified:

- Public Participation - This subcommittee has met one time and identified a matrix of audiences, key supporting organizations, and methods for information distribution; also, methods for public participation in the five-year cycle have been discussed.
- Monitoring and Assessment - This subcommittee has met one time and has begun to compile an inventory of monitoring and assessment activities; from this information, a coordinated monitoring strategy will be planned within the individual basin management units.
- Prioritization, Targeting, Planning, and Implementation - This subcommittee will meet for the first time in September to consider various prioritization/targeting schemes utilized by various agencies and how these might be coordinated.
- Funding - This subcommittee will meet for the first time in October to discuss the various funding mechanisms and impediments of various funding sources.
- Data/GIS - This group will meet for the first time in September to continue the dialogue of the USGS/KGS Data Summit in February. This subcommittee will meet only once or twice since there are already several Data/GIS committees; they want to assure that watershed applications are being covered by the various committees.

Objectives and representation on the various subcommittees have been identified by the Interagency Workgroup. Future priority rankings of waters for TMDL development will be based on processes defined from this initiative.

OTHER PROGRAMS TO ADDRESS WATER QUALITY ISSUES

The KDOW has numerous programs underway that are designed to improve water quality on a statewide basis. Projects are funded through the 319 Nonpoint Source Program. The KDOW serves as the lead agency for this program, which involves the input and cooperation of numerous federal, state, local, and university organizations. From 1990-1995, a total of $7.4 million was received from the U.S. EPA for 319 projects, which include education, technical assistance, watershed projects, demonstration projects, financial assistance, training, and/or enforcement. Section 319(h) grant funds will continue to be targeted to 303(d) listed waters for nonpoint source pollution control activities.

Wastewater regionalization is a major effort toward eliminating package wastewater treatment plants by connection to larger regional facilities. Previous TMDL studies and data compiled by the KDOW show that these facilities often do not meet effluent limits due to poor operation and maintenance. Beginning in 1990, more discharge facilities have been inactivated than new ones constructed. Thirty-one package plants in the Northern Kentucky area (Boone, Campbell, and Kenton counties) and 40 package plants in the Louisville/Jefferson County area were eliminated in the two-year reporting period.

Combined sewer overflows (CSOs) occur in sewer systems that carry both storm water and sewage. Currently, Kentucky has 17 combined sewer systems with 311 CSO points. Discharge permits have been issued containing CSO language to all but one of these systems, and the remaining permit should be issued by the end of the 1996 calendar year. Controlling CSO discharges will improve water quality in streams impacted by those discharges and play a part in the TMDL process.

Kentucky's state revolving fund for wastewater has been a key element in initiating various construction projects to resolve existing point source problems and provide additional treatment capacity. Since the fund began making commitments in 1989, 83 projects totaling $204 million have been funded.

The Agriculture Water Quality Act was passed by the Kentucky General Assembly in 1994. The main goal of the Act is to protect surface and groundwater resources from pollution resulting from agriculture and silviculture activities, and help restore waters that currently fail to meet designated uses. Many of the impaired waters in Kentucky experience problems from agricultural run-off. The Agriculture Water Quality Act will require all landusers with 10 or more acres to develop and implement a farm water quality plan based upon guidance from a Statewide Water Quality Plan. This statewide plan provides guidance to landusers on protecting the water resources in Kentucky. Technical assistance will be available during the development and implementation of individual farm plans. Financial assistance may also be available. Landusers will select applicable best management practices to be included in their individual plan from the Statewide Water Quality Plan. Landusers will then have five years to put best management practices in place.

Section 401 Water Quality Certification, as authorized in KRS 224.16-50, is a program that allows the state to issue, waive, or deny water

quality certification for any federally permitted or licensed activity that may result in a discharge into one acre or more of wetlands or 200 linear feet of a blue-line stream as designated on a U.S. Geological Survey 7.5 minute topographic map. The state is to certify that the materials to be discharged into surface waters of the Commonwealth will comply with the applicable effluent limitations, water quality standards, and any other applicable conditions of state law. Discharges may include, but are not limited to, dredged spoil, solid waste, garbage, rock, and soil. The KDOW (1993) also has issued guidelines to mitigate unavoidable impacts to streams.

Two other programs are underway to protect and improve waters impacted by toxic discharges from permitted point sources. These are the Effluent Toxicity Testing program and the Pretreatment Program. Whole Effluent Toxicity (WET) limitations are developed for both acute and chronic levels based on a case-by-case evaluation of the discharge type and volume and the size of the receiving water. During 1994 and 1995, a total of 2,073 tests were conducted by permitted facilities, showing an 84 percent compliance rate. This rate is an improvement over previous reporting periods. The reduction of toxic discharges is being achieved through new treatment plant construction, plant improvements, plant operational changes, removal of toxic sources and enforcement of pretreatment program requirements. The pretreatment program regulates toxic discharges from industrial facilities into municipal sewer systems. Kentucky assesses the effectiveness of this program by reviewing wastewater sludge quality for five heavy metals: cadmium, copper, lead, nickel, and zinc. Sludge quality has shown continuous improvement in the 1994-1995 period.

METHODS OF ASSESSING USE SUPPORT FOR 1996 305(b) REPORT

The list of streams and lakes for TMDL development (Table 2) was derived primarily from the "1996 Kentucky Report to Congress on Water Quality" (KDOW 1996), hereafter referred to as the "305(b) report." Methods used to assess Kentucky's waters, described in detail in the 305(b) report, are summarized below. All known and readily available water quality and biological data that could be found were used to assess the state's waters. Only streams with monitored water quality data or additional knowledge are listed in Table 2 for TMDL development. Streams with only evaluated information based on informal surveys or questionnaires are not included in this list.

Monitoring Programs. Information from biological monitoring conducted by the KDOW in 1994-1995 at 44 ambient water quality stations, 17 intensive survey sites, and 40 reference reach sites was the basis of assessing support of aquatic life uses in many instances. Water quality data collected on a regular basis by: 1) the KDOW at 44 stations, 2) the Ohio River Valley Water Sanitation Commission (ORSANCO) at 18 mainstem and five tributary stations of the Ohio River, and 3) the U.S. Geological Survey (USGS) at several sites in Jefferson County was another means of assessing water quality and support of aquatic life and recreation uses. Surveys and other data provided by the Kentucky Department of Fish and Wildlife Resources district biologists allowed for the evaluation and assessment of many additional waters. Intensive bacteriological surveys by the KDOW in the North Fork Kentucky River basin, the lower Licking River

basin, the upper Cumberland River basin, and three lakes were also used in assessing the state's waters for recreational uses. Surveys were conducted at each of the KDOW's ten regional offices to identify additional problems and probable causes and sources of those problems.

Domestic water supply use was assessed by comparing the quality of finished drinking water to maximum contaminant levels set by EPA. These data are required by the Safe Drinking Water Act at public water systems as part of the Phase II/Phase V sampling program. Also, surveys of operators of drinking water plants on lakes regarding algal and taste and odor problems allowed some drinking water use assessments to be made for lakes.

Lakes were assessed primarily by: 1) a KDOW sampling program that periodically determines the trophic state and water quality of all Kentucky's major lakes and many of its smaller lakes by nutrient and chlorophyll *a* sampling during the growing season, 2) similar data supplied by the COE on several major impoundments, and 3) data collected by Murray State University on Kentucky Lake and by Morehead State University at several eastern Kentucky lakes through funding by Section 314 Clean Lakes grants.

Use of Data. Water quality data were compared with their corresponding criteria. The segment did not support the warmwater aquatic habitat use if the criteria for dissolved oxygen, un-ionized ammonia, temperature, or pH were exceeded in greater than 25 percent of the samples collected during the period of October 1993 - September 1995. Also, data collected prior to October 1993 were used where more recent data were not available. Generally, if these data were less than five years old, the waters were considered to be monitored. However, even if the data were older than five years, the waters were often considered monitored if the data were still believed to be representative of current conditions.

Data for mercury, cadmium, copper, lead, and zinc were analyzed for violations of acute criteria listed in state water quality standards using three years of data (October 1992 - September 1995). At stations where data were collected quarterly or less frequently, the segment was partially supporting if less than ten percent of observations exceeded criteria and not supporting if more than ten percent of the observations exceeded criteria. At stations where data were collected monthly, the segment was partially supporting if more than one but less than ten percent of the observations exceeded criteria. The segment was not supporting if criteria were exceeded in more than ten percent of the samples.

In areas where both chemical and biological data were available, the biological data were generally the determinant factor for establishing warmwater aquatic habitat use-support status. This was especially true when copper, lead, or zinc data were contradicted by biological data.

Biological assessments were done by means of selected metrics for fish, macroinvertebrates, and diatom communities and habitat and physicochemical characteristics. A waterbody did not support its designated uses if the biological community was severely altered (dominated by pollution-tolerant organisms, had very high or low biomass, or possessed other significant functional alterations) or habitat characteristics were

severely impacted.

Fecal coliform bacteria data were used to indicate degree of support for primary contact recreations (or swimming) use. Primary contact recreation was not supported if the fecal coliform criterion was exceeded greater than 25 percent of the time based on two years of monthly data collected during the recreation season (May through October). In addition, streams or lakes with a pH below 6.0 units were listed as not supporting the swimming use.

Fish consumption is a category that, in conjunction with aquatic life use, assesses attainment of the fishable goal of the Clean Water Act. Assessment of the fishable goal was separated into these two categories in 1992 because a fish consumption advisory does not preclude attainment of the aquatic life use and vice versa. Separating fish consumption and aquatic life uses gives a clearer picture of actual water quality conditions. The following criteria were used to assess support for the fish consumption use:

- Fully Supporting: No fish advisories of bans in effect.
- Partially Supporting: "Restricted consumption" fish advisory or ban in effect for general population or a subpopulation that could be at potentially greater risk (e.g., pregnant women, children). Restricted consumption is defined as limits on the number of meals consumed per unit time for one or more fish species.
- Not Supporting: "No consumption" fish advisory or ban in effect for general population, or a subpopulation that could be at potentially greater risk, for one or more fish species; commercial fishing ban in effect.

Drinking Water Use Support was based on the Phase II/Phase V data collection program as required by the Safe Drinking Water Act. Results were compared to EPA's Maximum Contaminent Levels for a variety of pollutants. Although not a quantitative measurement of ambient water quality, it highlights waters in which certain pollutants are high enough to exceed drinking water criteria even after conventional treatment by the drinking water plant. Lacking instream data, which historically has been scarce in Kentucky for drinking water constituents, EPA's 1996 305(b) report guidance recommends using the finished water data for assessing drinking water use. Surveys of drinking water plant operators on lakes were also conducted in an effort to determine those lakes with taste and odor problems, which are generally the result of excessive algae concentrations in the raw water supply.

RESULTS OF 1996 USE ASSESSMENTS

Of 9,219 stream miles assessed, 5,983 miles (65 percent) fully supported uses, 2,056 miles (22 percent) did not support uses, and 1,180 miles (13 percent) partially supported uses. Full support of warmwater aquatic habitat use was attained in 75 percent (6,379 of 8,478 miles) of waters assessed. Full support of the swimming use was attained in only 18 percent (418 of 2,342 miles) of waters assessed. The two most common causes of swimming and warmwater aquatic habitat use nonsupport were fecal

coliform bacteria contamination and siltation, respectively. Agricultural activities, package plants, and inadequate or nonexistent onsite waste disposal systems were major sources of fecal coliform bacteria contamination. Mining and agricultural activities were the primary sources of siltation.

Of 120 lakes assessed, uses were fully supported on 86 (199,718 acres), partially supported on 28 (18,192 acres), and not supported on 6 (452 acres). Of individual uses, swimming was supported in all but 219 of 217,328 acres assessed, and aquatic life use was supported in more than 97 percent of the same number of assessed acres. Nutrients from nonpoint sources caused the majority of use nonsupport in lakes, resulting in low dissolved oxygen levels that affected support of the warmwater aquatic habitat use. The second leading cause of use nonsupport in lakes was priority pollutants (PCBs) from an industrial point source that resulted in a fish consumption advisory in Green River Lake.

RECOMMENDED WATERS FOR TMDL DEVELOPMENT

A number of factors are involved when determining the waters for TMDL development. Obviously, the waters chosen for consideration failed to support one or more designated uses. The severity of use impairment is of prime concern. Public health, public interest, source of the problems, availability of resources to focus on a project, and practicality of implementing needed controls to solve the problems are also considered when choosing waters for TMDL development. Those listed as first priority and chosen for the next two-year cycle are described below and shown in Table 2. These streams have severe water quality problems and have high levels of public interest to see these problems resolved. Additional TMDL studies will be conducted based upon comments submitted from both government agencies and public interest groups and where resources become available.

A second and third priority level of waters recommended for TMDL development are shown in Table 2. This list does not include streams or lakes listed in previous 303(d) reports which have TMDL studies already underway or completed, or watersheds where control strategies and remedial measures are underway. The second priority streams are those that do not support the aquatic life, fish consumption, drinking water, and/or swimming uses. Those waters that partially support uses are listed as priority three. Additional streams may be added to this list as supporting documentation and TMDL proposals are submitted to the KDOW.

Elijah Creek and Gunpowder Creek, Boone County. Elijah and Gunpowder creeks in Boone County are severely impacted from de-icing fluids applied to aircraft at the Cincinnati/Northern Kentucky International Airport. There are also impacts from package wastewater treatment facilities. The headwaters of these streams are located on airport property. The streams then flow through rapidly developing areas prior to discharging to the Ohio River. Local public and media have expressed concern about these conditions, especially since the airport is undergoing significant expansion and urbanization is increasing. This TMDL project will focus on studying the impact these sources are having upon aquatic life, the relative contribution from each source, the reductions needed to restore the aquatic life use to these streams, and working with the airport to bring about the needed reductions.

Fleming Creek. Fleming Creek, a tributary of the Licking River, is 39 miles long and drains an area of 61,670 acres. The mainstem and tributaries are contained almost entirely within Fleming County in northeastern Kentucky. Fleming County ranks third statewide in number of dairy cattle. There are eighty-five feedlot operations in this watershed. Moreover, an estimated 1.7 million cubic feet of animal waste is washed into local streams annually, resulting in water quality degradation.

Baseline water quality monitoring for this project is being conducted in two distinct phases. The first phase consists of a bacteria and nutrient survey throughout the watershed during both high- and low-flow conditions. This information will be used to target BMP implementation. The second phase consists of biological and physicochemical data collection at two of the more impacted tributaries within the watershed as well as a station located on Fleming Creek downstream of all proposed BMPs. Biological communities will be compared over time to evaluate and document changes in community structure that reflect improvements in water quality. Second phase monitoring will be conducted before and after BMP implementation in order to determine if the BMPs have restored appropriate stream uses.

The U.S. Department of Agriculture and the Kentucky Division of Conservation are targeting BMP cost-share funds in the Fleming Creek watershed. In addition, Section 319(h) grant funds will continue to be used to assist with watershed coordination, BMP technical assistance and education/outreach activities. A watershed coordinator will continue to be employed through the Fleming County Conservation District. The Community Farm Alliance is continuing to conduct student education and outreach efforts related to NPS pollution control in the Fleming Creek watershed.

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
FIRST PRIORITY			
Elijahs Creek (Boone Co.)	AL	0.0-5.2	Nonpriority Organics
Gunpowder Creek (Boone Co.)	AL	15.7-18.9	Nonpriority Organics
Fleming Creek (Fleming and Nicholas Co.) (includes Allison Creek, Craintown Branch, Doty Creek, Logan Run, Sleepy Run, Town Branch and Wilson Run)	AL-SW	0.0-39.2	Organic Enrichment Low DO Pathogens Nutrients
SECOND PRIORITY - STREAMS			
BIG SANDY RIVER BASIN			
Levisa Fork (Lawrence Co.)	SW SW	57.6-124.1 1.0-38.9	Pathogens
Tug Fork (Lawrence Co.)	SW	0.0-36.2	Pathogens
GREEN RIVER BASIN			
Barren River (Warren Co.)	SW	29.4-43.6	Pathogens
Cypress Creek (McLean Co.)	AL-SW	25.0-33.3	pH
Drakes Creek (Hopkins Co.)	AL-SW	0.0-8.5	pH
Lewis Creek (Ohio Co.)	AL-SW	0.0-11.8	Siltation pH
Nelson Creek (Muhlenberg Co.)	AL-SW	0.0-4.3	pH
North Fork Panther Creek (Daviess Co.)	AL	0.0-12.7	Other Habitat Alterations Flow Alterations
Pleasant Run (Hopkins Co.)	AL-SW	0.0-7.9	pH
Pond Creek (Muhlenberg Co.)	AL-SW	0.0-23.8	pH
Render Creek (Ohio Co.)	AL-SW	0.0-3.3	pH
Rhodes Creek (Daviess Co.)	AL	1.2-7.3	Other Habitat Alterations Siltation
Richland Slough (Henderson Co.)	AL	0.0-6.2	Siltation
South Fork Panther Creek (Daviess Co.)	AL	22.6-32.5	Other Habitat Alterations Flow Alterations
South Fork Russell Creek (Green Co.)	AL	0.0-0.6	Salinity/TDS/Chlorides

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Southards Creek (Ohio Co.)	AL-SW	0.0-2.3	pH
KENTUCKY RIVER BASIN			
Baughman Fork (Fayette Co.)	AL	0.0-1.1	Organic Enrichment Low DO Nutrients
Cane Creek (Breathitt Co.)	SW	0.0-9.5	Pathogens
Carr Fork (Perry Co.)	SW	0.2-8.9	Pathogens
Elkhorn Creek (Franklin Co.)	SW	0.0-17.8	Pathogens
Laurel Creek (Clay Co.)	AL-SW	2.5-5.4	Suspended Solids Pathogens Organic Enrichment Low DO Nutrients Unionized Ammonia
Little Eagle Creek (Scott Co.)	SW	10.0-11.0	Pathogens
Red River (Powell Co.)	SW	9.5-41.1	Pathogens
Sand Lick Fork (Powell Co.)	AL	0.0-5.5	Salinity/TDS/Chlorides
South Fork Red River (Powell Co.)	AL	0.0-10.1	Salinity/TDS/Chlorides
Town Branch (Fayette Co.)	AL	0.0-11.3	Nutrients Organic Enrichment Low DO
Troublesome Creek (Breathitt Co.)	SW	0.0-49.5	Pathogens
LICKING RIVER BASIN			
Banklick Creek (Kenton Co.)	AL-SW	0.0-19.0	Pathogens Other Habitat Alterations Organic Enrichment Low DO Nutrients
Licking River	SW SW	0.0-4.6 226.4-239.3	Pathogens
North Fork Licking River (Bracken Co.)	SW	0.0-31.8	Pathogens

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Three Mile Creek (Campbell Co.)	AL-SW	0.0-4.7	Pathogens Organic Enrichment Low DO Nutrients
LITTLE SANDY RIVER BASIN			
Little Sandy River (Greenup Co.)	SW	11.7-37.7	Pathogens
Newcombe Creek (Elliott Co.)	AL	0.0-11.9	Salinity TDS Chlorides
MISSISSIPPI RIVER BASIN			
Central Creek (Carlisle Co.)	AL	0.0-0.4	Chlorine
Long Creek (Carlisle Co.)	AL	0.0-0.8	Suspended Solids
Obion Creek (Graves Co.)	AL	37.5-38.5	Siltation
Truman Creek (Carlisle Co.)	AL	2.5-3.1	Chlorine Organic Enrichment Low DO Suspended Solids
West Fork Mayfield Creek (Carlisle Co.)	AL	17.2-18.2	Nutrients
OHIO RIVER BASIN (Minor Tribs)			
Allen Fork (Boone Co.)	AL	2.0-4.6	Suspended Solids Other Habitat Alterations Nutrients
Bayou Creek (McCracken Co.)	AL	0.0-11.3	Priority Organics
Beargrass Creek (Jefferson Co.)	AL	0.0-1.6	Metals Organic Enrichment Low DO
Brush Creek (Campbell Co.)	AL	0.0-1.6	Organic Enrichment Low DO
Butchers Creek (Hancock Co.)	AL-SW	0.0-2.3	pH
Crooked Creek (Crittenden Co.)	SW	22.3-23.3	Pathogens
Dry Creek (Gallatin Co.)	AL	0.0-1.3	Suspended Solids Organic Enrichment Low DO

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Four Mile Creek (Campbell Co.)	AL SW	8.4-9.4 0.0-0.2	Pathogens Organic Enrichment Low DO Nutrients
Goose Creek (Jefferson Co.)	AL-SW	0.0-4.5 4.5-11.7	Metals Organic Enrichment Low DO Pathogens
Hite Creek (Jefferson Co.)	AL	0.0-5.5	Unknown Toxicity
Little Goose Creek (Jefferson Co.)	SW AL	0.0-8.7	Pathogens Metals Organic Enrichment Low DO
Little Bayou Creek (McCracken Co.)	AL-FC	0.0-6.5	Priority Organics
Massac Creek (McCracken Co.)	AL	0.0-10.0	Organic Enrichment Low DO Nutrients
Middle Fork Beargrass Creek (Jefferson Co.)	AL	0.0-15.2	Organic Enrichment Low DO Metals
Mill Creek (Jefferson Co.)	AL-SW	0.0-4.4	Pathogens Siltation Organic Enrichment Low DO Turbidity Other Habitat Alterations
Muddy Fork (Jefferson Co.)	AL SW	0.0-6.9	Metals Organic Enrichment Low DO Unknown Toxicity Pathogens
Perkins Creek (McCracken Co.)	AL SW	0.0-3.0	Organic Enrichment Low DO Nutrients Pathogens
South Fork Beargrass Creek (Jefferson Co.)	AL SW	0.0-14.6 6.0-14.6 0.0-6.0	Pathogens Metals Organic Enrichment Low DO

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
West Fork Massac Creek (McCracken Co.)	AL	0.0-3.7	Organic Enrichment Low DO Nutrients
Woolper Creek (Boone Co.)	AL	11.5-13.6	Suspended Solids Other Habitat Alterations Organic Enrichment Low DO Nutrients
SALT RIVER BASIN			
Brooks Run (Bullitt Co.)	AL-SW	0.0-6.0	Organic Enrichment Pathogens
Buckhorn Creek (Marion Co.)	AL-SW	0.0-2.3	pH
Fern Creek Northern Ditch (Jefferson Co.)	AL-SW	0.0-10.1	Metals Organic Enrichment Low DO Pathogens
Fishpool Creek (Jefferson Co.)	AL-SW	0.0-5.4	Metals Organic Enrichment Low DO Pathogens
Mill Creek (Hardin Co.)	AL	6.0-7.0	Organic Enrichment Low DO Chlorine Metals
Mussin Branch (Marion Co.)	AL-SW	0.0-0.5	pH
Pond Creek (Bullitt Co.)	AL SW	0.0-17.0	Organic Enrichment Low DO Metals Nutrients Chlorine Pathogens
UT of Rolling Fork at MP 94.6 (Marion Co.)	AL-SW	0.0-0.6	pH
UPPER CUMBERLAND BASIN			
Bear Creek (McCreary Co.)	AL-SW	0.0-3.2	pH
Big Lily Creek (Russell Co.)	AL	4.4-7.0	Salinity/TDS/Chlorides Organic Enrichment Low DO

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Brush Creek (Rockcastle Co.)	SW	1.1-7.5	Pathogens
Buck Creek (Whitley Co.)	AL	1.4-2.8	Turbidity Other Habitat Alterations Siltation
Bucks Branch (Whitley Co.)	AL-SW	0.0-2.3	pH
Cane Branch (McCreary Co.)	AL-SW	0.0-2.0	pH
Catron Creek (Harlan Co.)	SW	0.0-8.5	Pathogens
Cloverlick Creek (Harlan Co.)	AL	0.0-5.0	Suspended Solids Other Habitat Alterations
Copperas Creek (McCreary Co.)	AL-SW	0.0-3.8	pH
Left Fork Straight Creek	AL-SW	0.0-13.0	Pathogens Suspended Solids pH
Little Laurel River (Laurel Co.)	AL-SW	12.4-14.6	Pathogens Organic Enrichment Low DO Nutrients
Marsh Creek (McCreary Co.)	AL	18.7-24.0	Other Habitat Alterations Siltation
Martins Fork (Harlan Co.)	SW	0.0-10.1	Pathogens
Roaring Paunch Creek	AL	0-15.6	Suspended Solids
Rock Creek (McCreary Co.)	AL-SW	0.0-4.1	Suspended Solids Other Habitat Alterations pH Metals
Ryans Creek (McCreary Co.)	AL	0.0-5.3	Suspended Solids pH
Whitley Branch (Laurel Co.)	SW	0.0-2.5	Pathogens
Wildcat Branch (Pulaski Co.)	AL-SW	0.0-2.1	pH
SECOND PRIORITY - LAKES			
LAKE	**USE NOT SUPPORTED**	**RIVER BASIN**	**POLLUTANTS OF CONCERN**
Briggs	AL	Green	Nutrients

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Corbin	DWS	Upper Cumberland	Nutrients
Loch Mary	DWS	Tradewater	Metals (Mn) Other Inorganics (Noncarbonate Hardness)
Mauzy	AL	Ohio (Minor Trib)	Nutrients
Metcalfe Co.	AL	Green	Nutrients
Reformatory	AL	Ohio (Minor Trib)	Nutrients
THIRD PRIORITY-STREAMS			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
BIG SANDY RIVER BASIN			
Knox Creek (Pike Co.)	AL	0.0-7.6	Siltation
Levisa Fork (Lawrence Co.)	AL	116.2-124.1	Siltation
GREEN RIVER BASIN			
Bacon Creek (Hart Co.)	SW	0.0-31.2	Pathogens
Cypress Creek (McLean Co.)	AL-SW	22.9-25.0	pH
Green River (Henderson Co.)	AL SW	71.3-108.6 183.5-250.2	Pathogens Nutrients
Little Pitman Creek (Taylor Co.)	AL	5.9-10.1	Metals Pesticides Unknown Toxicity
Nolin River (Edmonson Co.)	SW	44.0-93.2	Pathogens
Pond River (Hopkins Co.)	AL-SW	1.0-31.1	pH
KENTUCKY RIVER BASIN			
Carr Fork (Perry Co.)	AL	15.8-26.4	Siltation
Copper Creek (Lincoln Co.)	AL	0.0-11.8	Siltation Nutrients
Eagle Creek (Carroll Co.)	AL SW	0.0-38.8	Pathogens Nutrients
Kentucky River (Carroll Co.)	SW SW	64.5-158.1 190.8-226.2	Pathogens

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Middle Fork Kentucky River (Lee Co.)	AL SW SW	71.9-74.8 0.0-43.2 71.9-74.8	Suspended Solids Pathogens Organic Enrichment Low DO
Red River (Powell Co.)	AL	59.9-94.2	Siltation Nutrients Unionized Ammonia
South Elkhorn Creek (Franklin Co.)	AL-SW	16.4-34.0	Pathogens Organic Enrichment Low DO Pesticides
South Fork Kentucky River (Lee Co.)	SW	11.5-45.0	Pathogens
LICKING RIVER BASIN			
Hinkston Creek (Bourbon Co.)	AL	63.0-65.9	Nutrients Unknown Toxicity
Licking River (Bracken Co.)	AL SW	237.7-244.1 71.6-106.8	Salinity Organic Enrichment Low DO Chlorides Pathogens
South Fork Licking River (Pendleton Co.)	SW	11.5-27.1	Pathogens
LOWER CUMBERLAND BASIN			
Elk Fork (Todd Co.)	AL	27.6-28.6	Suspended Solids Nutrients
Little River (Trigg Co.)	AL	23.6-61.0	Nutrients Siltation
MISSISSIPPI RIVER BASIN			
Bayou de Chien (Fulton Co.)	AL-SW	14.0-25.9	Pathogens pH
OHIO RIVER BASIN (Minor Tribs)			
Kinniconick Creek (Lewis Co.)	SW	0.0-24.5	Pathogens
SALT RIVER BASIN			

TABLE 2. THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Cane Run (Jefferson Co.)	AL	0.0-7.6	Organic Enrichment Low DO
Mill Creek Branch (Hardin Co.)	AL	0.0-0.7	Organic Enrichment Low DO
Rolling Fork (Bullitt Co.)	SW	0.0-20.1	Pathogens
TENNESSEE RIVER BASIN			
Clarks River	AL	37.7-59.2	Nutrients Sediment Suspended Solids
TRADEWATER RIVER BASIN			
Tradewater River (Union Co.)	AL	63.0-92.2	Siltation
TYGARTS CREEK BASIN			
Tygarts Creek (Greenup Co.)	SW	0.0-45.7	Pathogens
UPPER CUMBERLAND BASIN			
Crooked Creek (Rockcastle Co.)	SW	1.0-6.4	Pathogens
Greasy Creek (Bell Co.)	SW	0.0-11.4	Pathogens
Little Clear Creek	AL	0.0-16.4	Sediment Sulfate Metals
Pitman Creek (Pulaski Co.)	AL	4.0-5.7	Nutrients Unknown Toxicity
Puckett Creek (Bell Co.)	SW	0.0-10.0	Pathogens
Richland Creek	SW	0-19.6	Pathogens
Rockcastle River (Pulaski Co.)	SW	8.5-41.3	Pathogens
Yellow Creek (Bell Co.)	AL	0.0-18.5	Siltation Nutrients
THIRD PRIORITY-LAKES			
LAKE	**USE NOT SUPPORTED**	**RIVER BASIN**	**POLLUTANTS OF CONCERN**
Beshear	AL	Tradewater	Nutrients
Buckhorn	SW	Kentucky River	Suspended Solids

TABLE 2: THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Campbellsville	AL-SW	Green River	Nutrients Shallow Lake Basin
Caneyville	DWS-SW	Green River	Nutrients Shallow Lake Basin
Carr Fork	SW	Kentucky River	Suspended Solids
Cranks Creek	AL-SW	Upper Cumberland	pH
Dewey	SW	Big Sandy	Suspended Solids
George	AL	Ohio River	Nutrients
Grapevine	DWS	Green River	Nutrients
Green River	FC	Green River	Priority Organics (PCBs)
Guist Creek	DWS-AL	Salt River	Nutrients Metals (Mn)
Honker	AL	Lower Cumberland	Nutrients
Jericho	AL	Little Kentucky	Nutrients
Kincaid	AL	Licking River	Nutrients
Luzerne	DWS	Green River	Nutrients
Marion County	SW	Salt River	Nutrients
McNeely	AL	Salt River	Nutrients
Pewee	DWS	Tradewater	Nutrients
Salem	SW	Green River	Shallow Lake Basin
Sand Lick Creek	AL SW	Licking River	Nutrients Shallow Lake Basin
Scenic	AL	Ohio River	Nutrients
Shelby (Shelby Co.)	AL	Salt River	Nutrients
Spa	AL SW	Green River	Nutrients Shallow Lake Basin
Stanford	DWS	Kentucky River	Nutrients
Washburn	AL	Green River	Nutrients

TABLE 2: THE 303(d) LIST OF WATERS FOR TMDL DEVELOPMENT			
STREAM	**USE NOT SUPPORTED**	**SEGMENT MILEPOINTS**	**POLLUTANTS OF CONCERN**
Wilgreen	AL-SW	Kentucky River	Nutrients
Woodcreek	DWS	Upper Cumberland	Nutrients

Abbreviations:

AL - Aquatic Life
SW - Swimming
FC - Fish Consumption
DWS - Domestic Water Supply
TDS - Total Dissolved Solids