

**Kentucky Division of Water
2012 Annual Report**



**Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
water.ky.gov**

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Introduction

The Kentucky Division of Water (DOW) continues to make significant progress in its mission to manage, protect and enhance the quantity and quality of the Commonwealth's water resources for present and future generations through voluntary, regulatory and educational programs. This annual report summarizes the past year's work of DOW's highly trained scientists and specialists toward reaching these goals.

One of the biggest challenges faced by the division this year has been the development of permits for coal mining operations that are consistent with regulatory requirements and are protective of water quality, particularly as it pertains to the alterations of a water body's conductivity (dissolved salts). The division continues to work with USEPA to ensure water quality is protected while the business of mining continues.

Adequate funding is also again a challenge this year, with DOW increasingly dependent upon federal monies – a trend that has continued since 2009. In 2012, federal funding made up 58 percent of the agency's budget – up from 44 percent last year.

This year DOW completed the federally required biennial "Integrated Report to Congress on the Condition of Water Resources in Kentucky." The 2012 report focuses on the Salt River/Licking and Upper Cumberland river basin management units. This report confirms that nutrient pollution has significant local impacts in Kentucky, as it does nationally. DOW is developing the first-ever Kentucky Nutrient Reduction Strategy to identify best approaches to reducing nutrient loadings to surface waters. The development and implementation of nutrient targets for certain watershed-based plans and Total Maximum Daily Loads (TMDLs) will provide necessary information for future nutrient criteria development.

In addition to the challenges, DOW has enjoyed many successes as well. The Wild Rivers program has been very successful in obtaining new properties in the past year, adding 1,400 acres of land to its inventory with the purchases of an additional 1,700 acres expected to close in 2013.

The Federal Pollution Control Act of 1972 requires states to review, adopt or develop and revise their water quality standards every three years. The current triennial review began informally in mid-2010 with the development of topics and revisions that reflect current national criteria. The recommendations include the addition of 40 stream segments to the Exceptional and Outstanding resource waters lists. The necessary regulatory revisions are currently in draft form and are scheduled to be promulgated in early 2013.

The DOW received the FFY 2011 Nonpoint Source Pollution Control Grant award in the amount of \$2.7 million to implement Kentucky's program. The division then awarded grants to 11 communities and organizations to develop watershed plans and implement nonpoint source pollution controls.

Communities in Kentucky continue to make progress updating their aging combined and sanitary sewer systems to minimize accidental discharges of untreated wastewater that is harmful to the environment. Currently, 17 communities are under consent orders to meet federal requirements through their Long-Term Control Plans, many of which DOW has approved and are now being implemented.

For the fifth straight year, the number of notices of violation (NOVs) issued by DOW to public drinking water systems has declined. For calendar year 2011, DOW issued 554 drinking water NOVs compared to 618 in 2010, 745 in 2009, 866 in 2008 and 1,054 in 2007. Education, outreach and technical assistance have contributed to improved water system performance. This translates into improved health protection for the nearly four million customers of Kentucky public drinking water suppliers.

The DOW introduced legislation in 2010 requiring certification of laboratories that conduct wastewater analyses for permitted contaminants. The legislation was passed by the 2011 General Assembly on March 7, 2011, signed into law by Governor Steven Beshear on March 17 and codified as KRS 224.10-670. The Wastewater Laboratory Certification Program has completed drafts of the regulation and a technical manual and a spring 2013 implementation timeframe is anticipated.

DOW oversaw a \$4million rehabilitation of Fox Creek Multiple Purpose Structure No. 4, a dam in Fleming County. The project transformed the former earthen barrier into an innovative stepped concrete structure designed to meet high-hazard dam safety requirements and extend its life into the next century.

I invite you to read more about these and other accomplishments of the division as we work to protect and manage the waters of the Commonwealth and serve its citizenry. I look forward to continued implementation of DOW's strategic operational plan and to meeting the challenges of the coming year.

Sandra Gruzesky, Director
Kentucky Division of Water

DIVISION OF WATER MISSION STATEMENT

To manage, protect, and enhance the quality and quantity of the Commonwealth's water resources for present and future generations through voluntary, regulatory and educational programs.

The **Division of Water (DOW) Operational Plan** is intended to serve as a road map toward accomplishing its mission, taking into consideration current environmental, regulatory and resource conditions. The division has identified four major objectives in this endeavor:

1. Protect, manage and restore water resources.

- a. Develop and implement Total Maximum Daily Loads (TMDLs).
- b. Implement a nutrient criteria strategy.

2. Conduct effective water resources planning.

- a. Revise and update the guidance for Kentucky's Watershed Approach.
- b. Promote the USEPA's Sustainable Infrastructure Initiative.
- c. Plan for sustainable infrastructure.
- d. Participate in USEPA rulemaking.

3. Meet federal and state program requirements.

- a. Meet federal grant and work plan requirements.
- b. Meet state requirements and maintain progress toward achieving and maintaining zero permit backlogs.

4. Promote better management and communication of data.

- a. Implement an integrated data management system for water quality data.
- b. Implementation of Sharepoint to educate the public and assist regulated entities with compliance with program requirements.
- c. Water Availability Tool for Environmental Resources Application (WATER) implementation on Geographical Information System (GIS) terminal server.
- d. Promote better decision making through GIS and data analysis.
- e. Transition from the Permit Compliance System (PCS) to the Integrated Compliance Information System (ICIS) to improve permit compliance, tracking and data analysis.

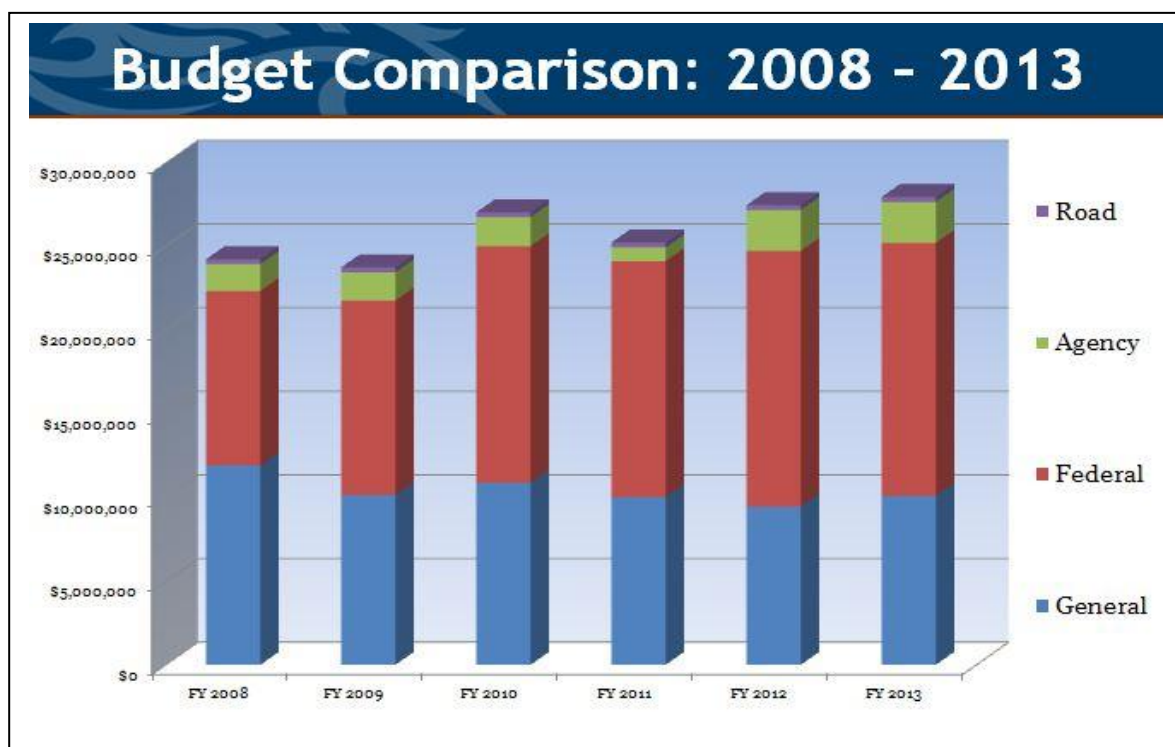
Resource Planning and Program Support

The Resource Planning and Program Support Branch is responsible for facilitating division planning, and managing the administrative, financial and infrastructure functions of DOW, including the development and management of the division's budget. The branch also facilitates the development and promulgation of the division's regulations and legislation. This involves facilitating public hearings and promulgating newly filed administrative regulations, tracking bills generated during the legislative sessions and working with the appropriate DOW programs in developing the division's response to proposed legislation.

Budget

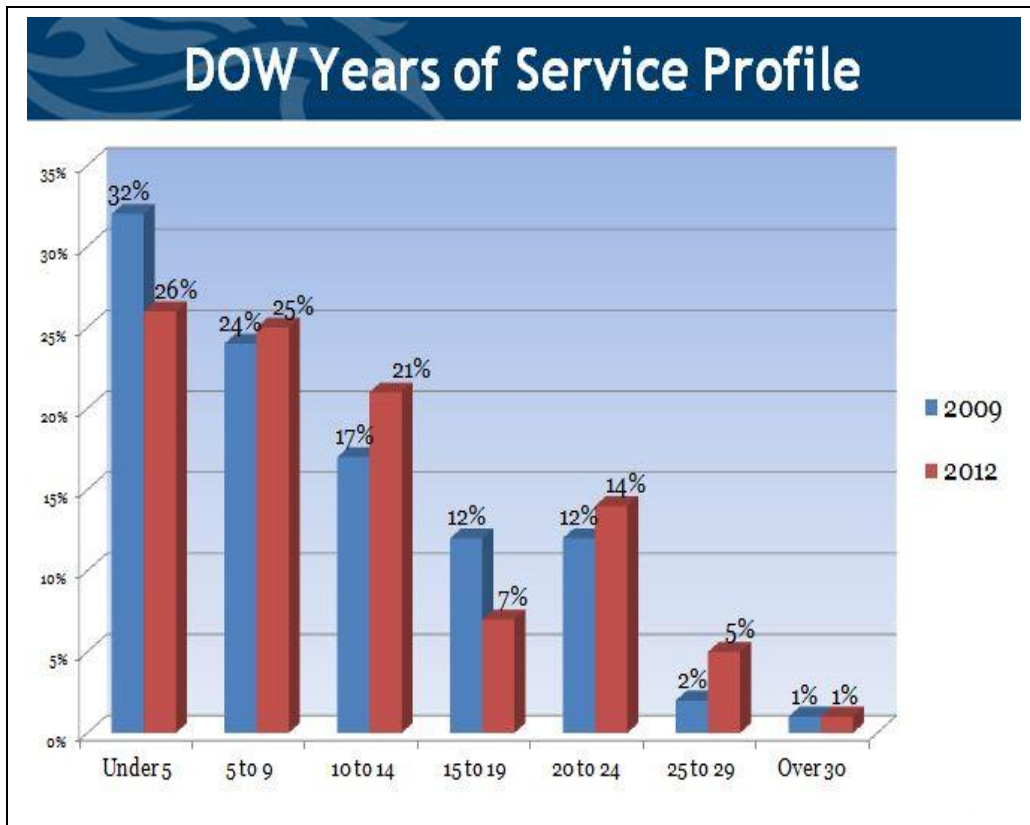
The division's activities are maintained by general fund appropriations, federal grants from the USEPA and the Federal Emergency Management Agency (FEMA), fees collected for permit and certification activities and an annual appropriation from the Road Fund. An analysis of DOW funding for SFY 2012 shows that the division is increasingly dependent upon federal funding. This trend has continued since SFY 2009. In 2012, federal funding made up 58 percent of the agency's budget – up from 44 percent in SFY 2011. This increase in the proportion of federal funds in the division's budget results from a reduced general fund appropriation and the division entering into a Performance Partnership Grant (PPG) with USEPA in 2011. The PPG allows the division to combine certain federal grants, and leverage other available federal funds to use the federal funds according to the division's priorities,

The division has the budget to maintain 261 full-time, permanent employees in SFY 2012. The number of employees the division can maintain has decreased 11 percent since 2003 – a loss of 31 positions. This reduction in personnel continues to challenge division programs to operate more efficiently and identify program priorities. The reduced personnel has been mitigated somewhat by more effective data management, communication and training.



Personnel

The Division of Water has a personnel cap of 261 positions and the division is working diligently to ensure that it maintains the number of employees “in the seats” as close as possible to that 261 positions. The division had experienced a decrease in its personnel cap from 2003 to 2009, due to some organizational changes in DEP and as a result of reduction in general fund appropriations. However, since 2009 the division has received additional federal funding, used existing federal funding via the PPG grant to leverage additional federal funds, and increased its fees which has provided for an increase in the division’s personnel cap





Status of Division of Water Administrative Regulations

The Division of Water is proposing amendments to 401 KAR 5:055, Scope and applicability of the KPDES program and 401 KAR 5:060, KPDES application requirements in order to address some deficiencies identified by EPA in the 2010 amended version of these regulations.

The Division of Water is conducting its Triennial Review of Water Quality Standards as required by the Clean Water Act Section 303(c) and 40 CFR Section 131.20. As such, the division has proposed amendments to the administrative regulations identified below. These amendments were filed with LRC Aug. 15, 2012.

- 401 KAR 10:001 Definitions for 401 KAR Chapter 10
 - The division is proposing one amendment, the definition for “eutrophication.”
- 401 KAR 10:026 Designation of uses of surface waters
 - The division is proposing to amend this chapter by updating Table B with current USGS National Hydrography Dataset (NHD) stream mile points that identify the locations of water withdrawal and where the criteria for domestic water supply designated uses are implemented. There are 27 new Outstanding State Resource Waters (OSRWs) proposed.
- 401 KAR 10:030 Antidegradation policy implementation methodology
 - The division is proposing to add 16 streams or stream segments as exceptional waterbodies in Table 2. Updates are made to 19 streams or stream segments in Table 1 and Table 2 for segment mile point reconciliation corresponding to current NHD version updates, or for other administrative purposes. Additionally, the division is proposing to amend Section 1 to clarify that an OSRW shall not be categorized as impaired water for the purpose of antidegradation review.
- 401 KAR 10:031 Surface water standards
 - The division proposes to amend the nutrients criterion for clarification purposes, adopt federal water quality standards for acrolein and phenol, and eliminate the Warm Water Aquatic Habitat acute criterion for Selenium. Until the EPA promulgates new criteria that accounts for the latest science and complexity of the causative selenium species that result in acute toxicity, the cabinet is proposing to withdraw that criterion. The proposed amendments to 401 KAR 10:031 also clarify conditions for waterbodies that are automatically included as OSRWs. The division also is proposing to amend 401 KAR 10:031 to clarify that the dissolved oxygen criteria applies in-stream and not at the end of pipe.
- The Division of Water is also developing a new administrative regulation for the Wastewater Laboratory Certification program as authorized by KRS 224.10-670. This regulation will establish the standards for the operation of laboratories, fees for certification and competency evaluation of wastewater laboratories, issuance of certificates of competency, and a certification program for laboratories that submit environmental data for compliance purposes relating to wastewater.

Compliance and Technical Assistance Branch

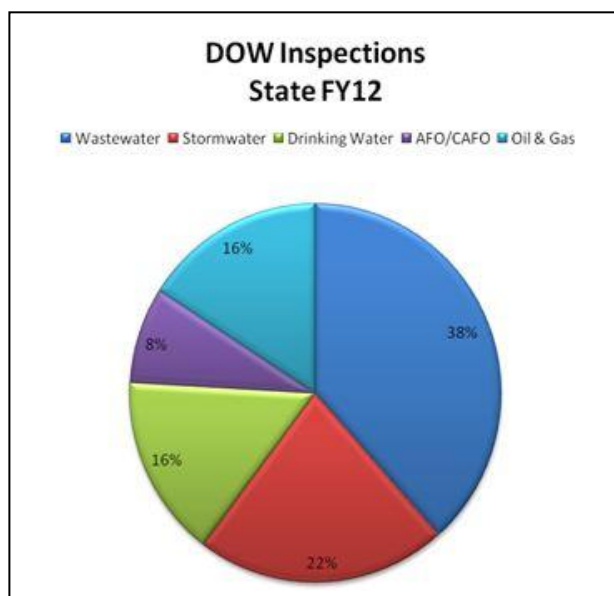
The Compliance and Technical Assistance Branch (CTAB), the largest branch in the division, is currently staffed by 79 employees. This branch includes the Regional Field Offices, the Drinking Water Program, the Compliance and Technical Assistance Section and the Wastewater Laboratory Certification Program.

Regional Field Offices

The field staff in each of DOW's ten regional offices throughout the state perform a wide variety of inspections and directly address the concerns of the public with swift response to complaints and emergencies involving the waters of the Commonwealth of Kentucky. DOW inspectors are required to have broad programmatic knowledge (49 inspection types) and experience in addressing compliance issues. They must also be well trained and well-equipped in order to perform consistent inspections, technical assistance and enforcement.

During SFY2012, 38 DOW inspectors performed 4,995 inspections in the areas of wastewater, storm water, drinking water, animal feeding operations, concentrated animal feeding operations and oil and gas. This represents a 26 percent increase in the number of inspections performed as compared to SFY 2011, when 3,695 inspections were completed. Each inspection type is integral to the protection and improvement of Kentucky's water quality.

DOW is required to perform a number of inspections at preselected facilities based on an EPA 106 grant work-plan commitment. DOW committed to performing 1,290 inspections during the FFY2012. DOW inspectors fulfilled 100 percent of this commitment to EPA. As of June 30, 2012, 808 inspections were completed at pre-selected sites to satisfy the requirements of the EPA 106 grant work-plan. With 75 percent of the committed inspections completed, DOW's inspectors are on track to fulfill 100 percent of their EPA commitment by the end of the federal fiscal year.

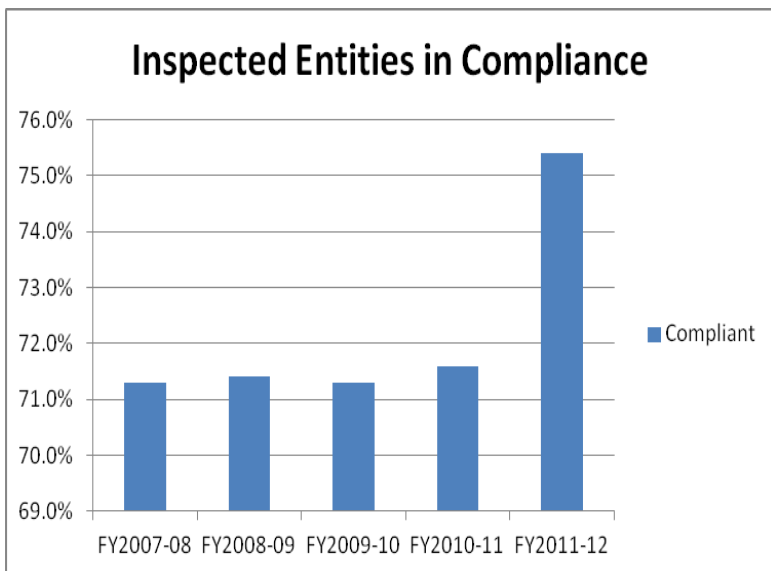


DOW inspector Robert Back with the Hazard Regional Office performs in-stream monitoring.

Compliance is Up, Complaints are Down

Compliance regulations require permitted facilities to notify DOW when certain disruptions occur. The most common notifications are wastewater bypasses/overflows and drinking water main breaks, low pressure or loss of pressure in a drinking water distribution system, loss of disinfection or other treatment disruption.

Previous years show that as the number of complaints has decreased, the number of notifications has increased -- suggesting that the reporting requirement has elicited quick responses from permitted facilities to correct compliance issues. SFY2012 is the first year in which data shows a decrease in both complaints and notifications. The division received 8,110 required notifications in SFY2012, compared to 10,486 notifications during SFY2011.



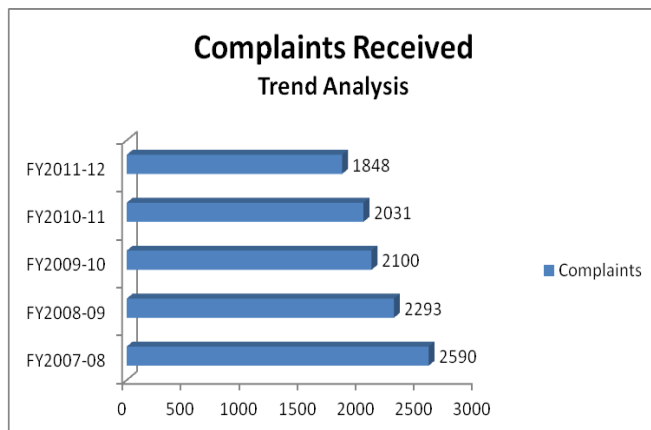
Along with the decrease in the number of complaints and notifications received in SFY 2011, overall compliance has improved in the areas of wastewater, stormwater, drinking water, oil and gas, animal feeding operations and concentrated animal feeding operations. In the previous four fiscal years, the overall compliance of inspected entities hovered at 71 percent. Inspection data from SFY2011 shows an increased compliance rate of 75.4 percent.

A large portion of the workload for DOW regional office staff is to respond to complaints and notifications. Responses

can range from the mundane to extensive commitment of resources (e.g., ice storm or flooding response). DOW is challenged in planning for such issues, especially significant issues because of the unexpected nature of the problem. Division inspectors continue to respond to complaints, emergencies, and other matters in a timely and professional manner.

During SFY2012, field office inspectors investigated a total of 1,848 water related citizen complaints. This marks the fourth consecutive year that the number of complaints statewide has decreased.

Since SFY2008, the number of complaints received by DOW has decreased by 28.6 percent. The decrease in citizen complaints is due, in part, to outreach and technical assistance provided by inspectors as well as more rigorous inspection schedules that encourage regulated entities to remain in compliance.



Performance Audit Inspections Ensure Lab Quality

In 2010, DOW began Performance Audit Inspections (PAIs) of coal facilities and laboratories with regard to water sample collection and analysis. The coal PAI process requires the participation of DOW field inspectors, inspectors from the Department of Natural Resources, a project coordinator, CTAB laboratory auditors and management. On the day of the inspection, DOW and DNR inspectors observe the collection of samples for analysis while collecting their own samples for comparison purposes. The inspectors also perform an onsite records review at the time of inspection.

Finally, the inspectors review the discharge monitoring reports (DMRs) and compare them with data collected from the site during the inspection. The laboratory data is further analyzed for quality control parameters that are reported by the laboratory. The laboratory data, together with the inspection report, are compiled for a final assessment of practices that may result in issuance of a Notice of Violation (NOV) or enforcement action.

Since 2010, DOW and associated staff have conducted 27 PAIs on laboratories performing water analyses for coal, resulting in the issuance of 22 Notices of Violation. In SFY2012, inspectors and auditors completed 14 PAIs. The final two coal PAIs will be performed during SFY2013 to complete the task.

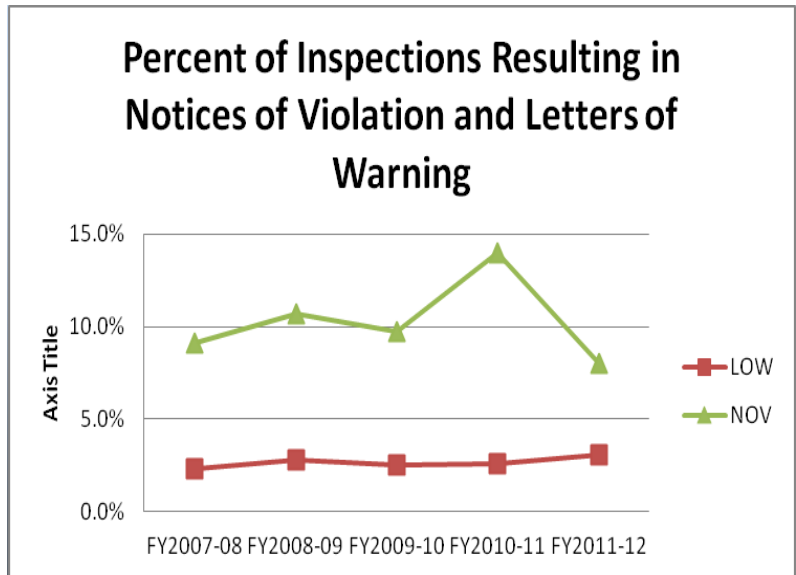
The second part of a coal PAI takes place in the laboratory that is contracted to analyze the water samples collected by the coal company's sampler. CTAB personnel audit the laboratory's staffing and qualifications, quality assurance plans and laboratory standard operating procedures. Equipment maintenance and calibration may also be reviewed. The laboratory auditors observe and evaluate analysts as they perform various methodologies, ultimately making a determination on the competency of the laboratory and staff based on the results of "blind spike samples." Performance of the laboratory portion of a PAI usually requires one day.



DOW inspector Joshua George, left, with the Hazard Regional Office discusses sampling practices with a contract sampler during a June 2012 Performance Audit Inspection.

Letters of Warning Are Up, Violations Are Down

While the compliance rate of permitted facilities up, it is also important to note that the number of sites receiving Notices of Violation decreased to a five-year low of eight percent. The number of Letters of Warning issued to facilities increased slightly to 3.1 percent, which demonstrates that violations identified during inspection are being addressed without the escalation of enforcement activity required in previous years.



Wastewater Laboratory Certification Program

The DOW introduced legislation in 2010 requiring certification of laboratories that conduct wastewater analyses for permitted contaminants. The legislation was passed by the 2011 General Assembly on March 7, 2011, signed into law by Governor Steven Beshear on March 17, and codified as KRS 224.10-670.

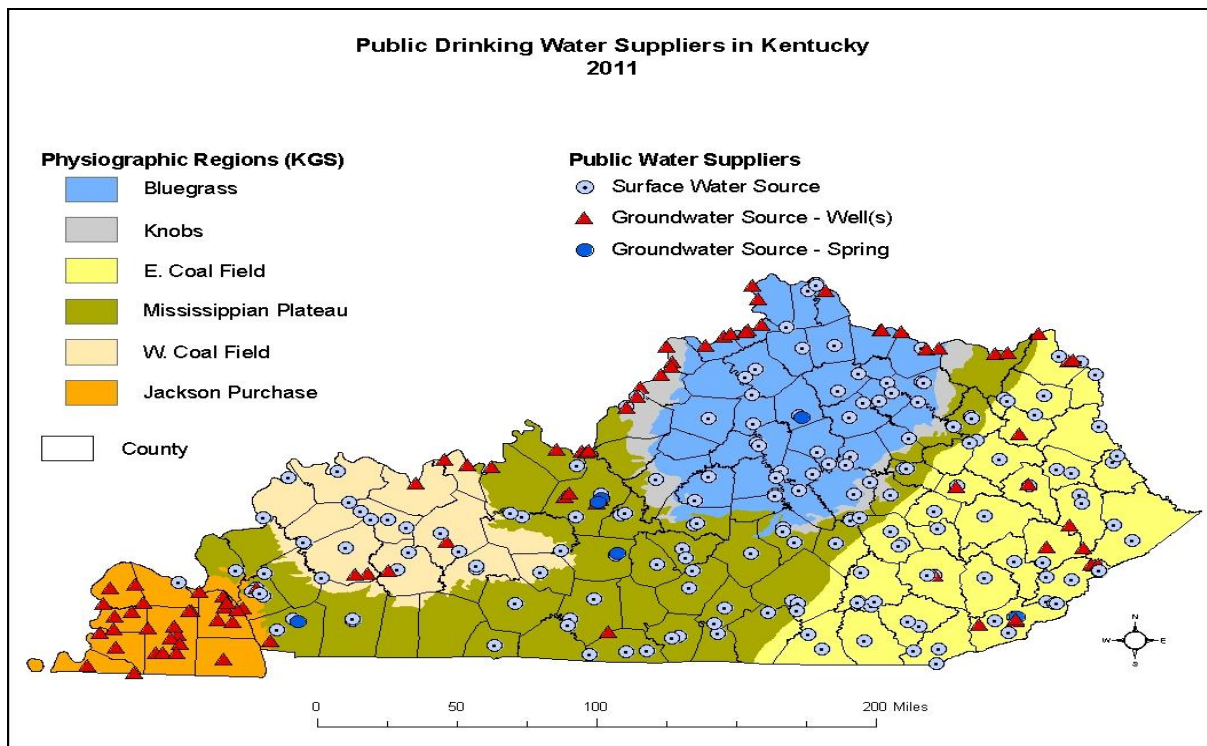
The Wastewater Laboratory Certification Program has completed drafts of the regulation and a technical manual. The program has had two external and three internal stakeholder meetings as well as numerous meetings with individual stakeholders to address their concerns. The program now has three FTE employees to develop and implement the program. The program will affect approximately 300 laboratories which perform analysis under the KPDES program. The regulation is tentatively set to be filed in September 2012 with a February 2013 final date.

Drinking Water Program

Approximately 95 percent of Kentuckians receive drinking water from public water systems that must meet the strict standards of the federal Safe Drinking Water Act (SDWA). In Kentucky the DOW has the administrative and regulatory authority to implement SDWA, through which the EPA sets maximum contaminant levels (MCLs) for the amounts of metals and contaminants that may occur in finished drinking water. The Kentucky DOW is responsible for ensuring that the water produced at public drinking water treatment plants does not exceed those established levels.

The DOW also works closely with drinking water treatment plants and distribution systems to ensure they make good source water choices, that they treat and distribute water properly and that they test and monitor for contaminants. Public water systems (PWSs) must sample the finished water on a prescribed schedule to ensure that treatment is removing contamination from the source water before it is sent through the distribution system. DOW requires that all sample testing be performed in laboratories that have been certified by the DOW Drinking Water Program.

The division's Drinking Water Program works closely with more than 460 water systems across Kentucky to ensure Kentuckians are provided safe drinking water. Drinking water is tested by individual systems with results submitted to DOW for review and approval. Specific chemicals are analyzed on a regular basis to ensure that drinking water meets established standards under the Safe Drinking Water Act.



Drinking Water Primacy

As of June 2012, there were 461 public water systems in Kentucky. The DOW provides primary enforcement authority (“primacy”) oversight for implementing the Safe Drinking Water Act (SDWA) for these water systems. As a condition of primacy, the state must adopt and administer state rules that are at least as stringent as federal requirements. In June 2012, the DOW was notified by EPA Region 4 that final primacy had been granted for seven SDWA regulations; three additional regulations are pending final approval by the region’s legal staff. Primacy of regulations enforcement allows DOW to work directly with the public water systems in Kentucky to help them meet federal laws.

State	Total # PWS	# CWS*	# NonCWS**	% population served
Border States				
Kentucky	461	401	60	95
Tennessee	910	490	420	90
West Virginia	1027	486	541	84.8
Missouri	2752	1459	1293	88.6
Virginia	2755	1164	1591	83
Indiana	4157	804	3353	83
Ohio	4821	1236	3585	93.6
Illinois	5720	1755	3965	98
EPA R4 States				
Kentucky	461	401	60	95
Alabama	606	527	79	92.5
Tennessee	910	490	420	90
Mississippi	1254	1097	157	90
South Carolina	1435	599	836	82
Georgia	2484	1778	706	87
Florida	5470	1704	3766	
North Carolina	6004	2068	3936	79.4

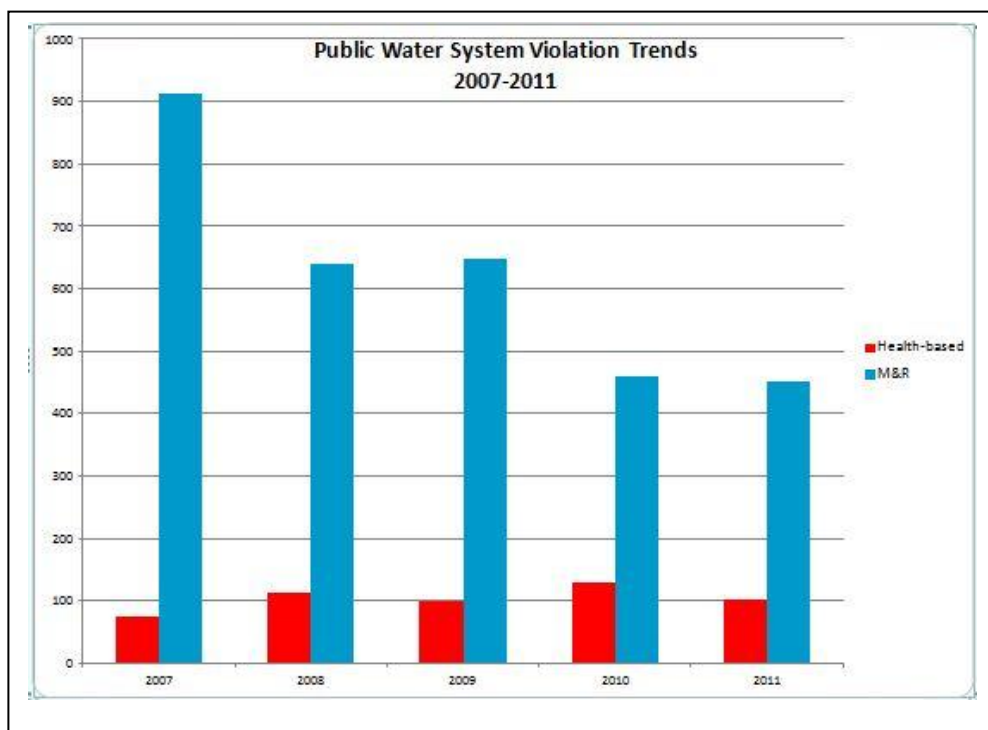
***Community Water System** -- serves primarily a residential customer base year-round.

****Non-Community Water System** -- serves either a transient customer base (e.g., campgrounds, resorts) or the same population base at least six months of the year (e.g., schools, industries).

The table above shows how Kentucky compares to surrounding states in number of public water systems. Kentucky is primarily a small-system state, in which 75 percent of the PWSs serve less than 10,000 in population. Only 25 percent of the systems have a water treatment plant.

Drinking Water Violations at Public Water Systems

Drinking water violations are issued on a calendar year cycle. There were 554 violations issued for calendar year 2011, continuing the decline seen over the past five years. Eighty-five percent of the violations issued in 2011 were for monitoring and/or reporting (“paperwork”) violations. By the end of SFY2012, DOW had referred only nine systems to the Division of Enforcement for formal action under the EPA’s Enforcement Referral Policy.



Drinking Water Technical Assistance Improves Performance

Technical assistance is provided to all public water systems in the form of site visits, training and sanitary surveys. A successful component of technical assistance continues to be the Area-Wide Optimization Program or AWOP. AWOP is a voluntary effort by those drinking water systems that treat surface water and focuses on turbidity (microbial) removal and disinfection by-product reduction beyond that required by the SDWA. For 2011, the DOW recognized 49 surface water treatment plants for commitment to AWOP and for meeting more stringent turbidity goals. In 2010, only ten plants reached this goal. This translates into 1.5 million Kentuckians receiving drinking water made safer in 2011 compared to 400,000 in 2010.

Surface Water Permits Branch

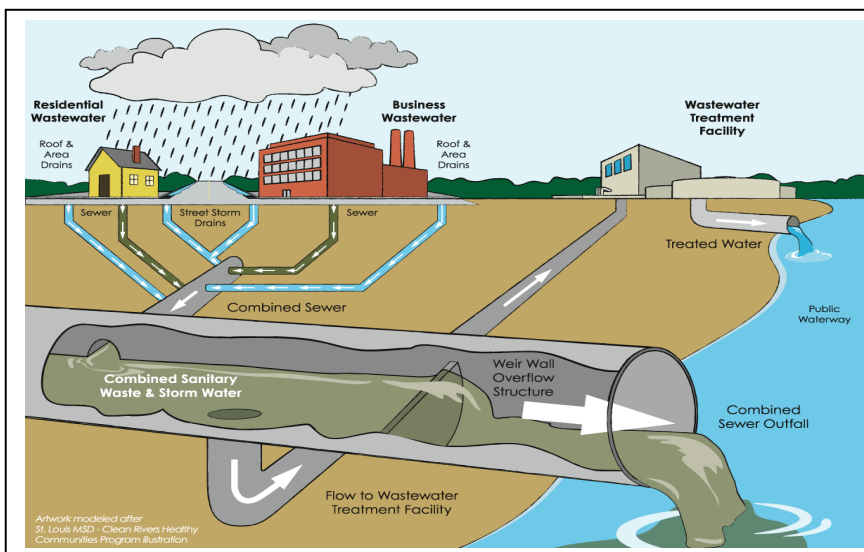
The 1972 Clean Water Act introduced a system of permitting and regulating point sources of pollution. It is illegal to discharge point source pollutants to surface waters without a permit from the National Pollutant Discharge Elimination System (NPDES). The Surface Water Permits Branch (SWPB) consolidates many of the activities associated with issuing permits that have a direct impact on surface water. The branch issues operational permits for wastewater and storm water discharges and permits for construction in a floodplain.

The SWBP implements programs to control surface water pollution caused by point source discharges of wastewater from public and private sewage collection and treatment systems, industrial wastewater treatment facilities, and municipal and industrial landfills. The terms and conditions of individual NPDES permits require the installation, operation and maintenance of appropriate wastewater treatment technology to protect and enhance the quality of Kentucky waters.

The branch also implements the wet weather compliance program, the CSO/SSO program, the municipal separate storm sewer (MS4) program, the pretreatment program, and the whole effluent toxicity (WET) program. SWPB consists of five sections: Resource Extraction, Operational Permits, Permit Support, Floodplain Construction and Wet Weather.

Combined and Separate Sewer Systems

Combined sewer systems are an old design practice in civil engineering that involves the conveyance of both sanitary and storm wastewater in the same pipe. When wet weather events occur, these systems often become inundated with storm water flow, causing the combined sanitary and storm waters to overflow. Even when sanitary sewer pipes are separate from storm water pipes, sanitary sewer overflows can result from inflow or infiltration due to precipitation or leaky infrastructure, equipment malfunctions, power outages and blockages.



Combined sewer overflows (CSOs) are permitted discharges under the NPDES program that are required to comply with the 1994 USEPA Combined Sewer Overflows Policy. Sanitary sewer overflows are illegal discharges and must be eliminated. Since the 1994 CSO Policy was issued, communities in Kentucky have been making progress updating their aging systems and minimizing these discharges of untreated wastewater.

But overflows are complex and costly problems to solve. When progress lagged behind federal timetables, some communities in Kentucky were placed under federal and state consent orders to facilitate their progress addressing the issues. Currently, 17 Kentucky CSO communities are under such orders and are working toward meeting their requirements. In addition, two Kentucky communities with SSOs in separate sewer systems are under joint state/federal consent orders to eliminate SSOs and other unpermitted discharges.

Communities placed under consent orders must comply with remedial measures including developing early action plans, long-term control plans for CSOs and sanitary sewer overflow plans for SSOs. DOW reviews and approves the plans in conjunction with the Kentucky Division of Enforcement and USEPA Region 4.

Summary Table of CSO Remedial Measure Status

	<u>Map</u>	<u>SUO</u>	<u>SORP</u>	<u>CMOM</u>	<u>SSOP</u>	<u>NMC Report</u>	<u>Interim LTCP</u>	<u>LTCP¹</u>	<u>Annual or Quarterly Reports²</u>	<u>Annual Review (SORP)</u>	<u>Other remedial measures³</u>	<u>Final Compliance Date⁴</u>	<u>Review Status</u>
<u>Ashland</u>	●	●	●	⊙	■	●	●	⊙	⊙	○	■	2017	● Approved
<u>Catlettsburg</u>	●	●	●	⊙	■	●	■	⊙	⊙	■	■	*	■ Not requested
<u>Frankfort</u>	●	●	●	⊙	●	●	●	⊙	⊙	○	■	2018	● Approved
<u>Harlan</u>	●	●	●	⊙	■	●	■	⊙	⊙	○	■	*	⊙ Review In Progress
<u>Henderson</u>	●	●	●	⊙	●	●	■	●	⊙	○	■	2017	○ Not due yet
<u>Louisville</u>	■	■	●	●	●	●	●	●	⊙	⊙	■	2020	◇ To Be Determined
<u>Loyall</u>	●	●	●	⊙	■	●	■	⊙	⊙	○	◇	*	
<u>Maysville</u>	●	●	●	⊙	⊙	●	●	●	⊙	○	■	2017	
<u>Morganfield</u>	●	●	●	⊙	■	●	■	●	⊙	○	■	2017	
<u>Northern KY SD #1</u>	■	■	●	●	⊙	●	●	⊙	⊙	⊙	■	2025	
<u>Owensboro (RWRA)</u>	●	●	●	■	■	●	⊙	○	⊙	⊙	■	2017	
<u>Paducah</u>	●	●	●	⊙	⊙	●	●	⊙	⊙	⊙	■	2017	
<u>Pikeville</u>	●	●	●	⊙	■	●	■	■	⊙	■	●	2014 ¹	
<u>Pineville</u>	●	●	●	⊙	■	⊙	■	⊙	⊙	○	◇	*	
<u>Prestonsburg</u>	●	●	⊙	⊙	■	⊙	■	■	⊙	■	■	2015 ¹	
<u>Vanceburg</u>	●	⊙	⊙	⊙	⊙	⊙	■	⊙	⊙	■	◇	*	
<u>Worthington</u>	●	●	⊙	⊙	■	●	■	⊙	⊙	■	■	*	

¹ Pikeville and Prestonsburg have deadlines for separation in lieu of an LTCP

² Overall status of all annual and quarterly reports

³ Requirements that may not produce a document to be reviewed by the Wet Weather Section

⁴ A final compliance date is an enforceable date by which full compliance with the 1994 CSO Policy must be achieved; Pikeville and Prestonsburg must achieve full sewer separation by this date or submit an LTCP. These dates are included in a consent order, an Administrative Order issued by U.S. EPA Region 4, or in an approved LTCP.

Maysville, Henderson Solving Sewer Overflow Problems

The cities of Maysville and Henderson are two of 15 mid-sized Kentucky cities under a federal consent order to reduce the amount of untreated sewage flowing into rivers and streams during heavy rain events.

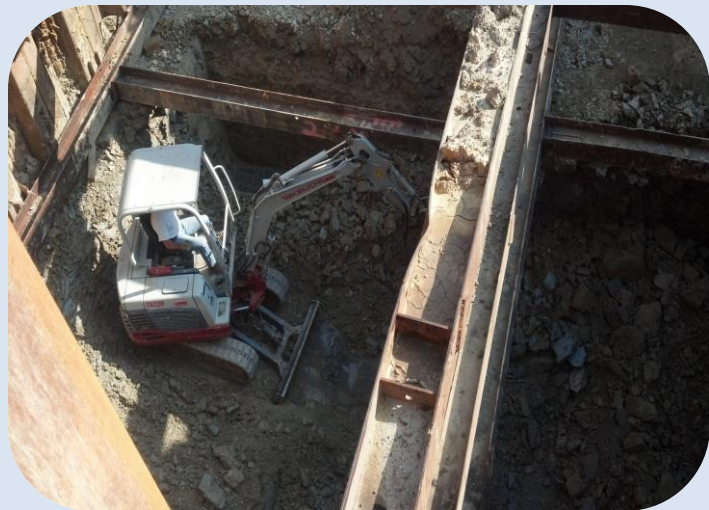
In January 2012, the Energy and Environment Cabinet (EEC) and USEPA approved the City of Maysville's long-term control plan for combined sewer overflows. The plan includes sewer separation, increasing the capacity of pump stations and force mains and improvements to the wastewater treatment plant to eliminate all untreated overflows. Projects will be constructed in three phases for an estimated total cost of \$13 million with completion scheduled for 2015.



East Second Street in Maysville receives new sewer and storm drains as part of the combined sewer overflow project. Maysville is one of 15 communities along the Ohio River mandated to separate storm water and sanitary sewer lines.

Photo by Terry Prather, The Ledger Independent

In April 2012, EEC and USEPA approved Henderson Water Utility's long-term control plan. The \$39 million plan will reduce CSOs by capturing 89 percent of the combined sewage collected in the combined sewer system during precipitation events. The largest project in the plan, called Canoe Creek Phase 2, includes construction of a new North Fork pump station (pictured right) and new force main to the wastewater treatment plant. Construction is expected to be complete by 2018.



New wastewater treatment plant in northern Kentucky features 6-mile tunnel to move millions of gallons of wastewater

When Dry Creek Wastewater Treatment Plant began operation in 1979, the population of Boone, Campbell and Kenton counties totaled around 220,000, and the plant had a treatment capacity of 20 million gallons per day (GPD). Over the years, the population and businesses have multiplied, overtaxing the sanitary infrastructure.

The new 20 million GPD Western Regional Water Reclamation Facility and conveyance tunnel in Boone County are expected to reduce the volume of sanitary sewer overflows in the region by nearly 60 percent. This significant reduction will help to better protect public health and keep northern Kentucky's creeks and rivers clean.

A six-mile-long, 8.5-foot-wide conveyance tunnel will carry sewage to the new facility, serving most of Boone County and portions of Kenton County, and alleviate stress on the sewer systems throughout northern Kentucky. By maximizing the use of gravity sewer mains to the plant, 14 older pump stations will be eliminated, increasing efficiency and reducing facility maintenance costs.



DOW approved and monitored the Western Regional project, which will help Sanitation District No. 1 meet the requirements of its federal order to reduce sanitary overflows in the 220-square-mile area that encompasses Campbell, Kenton and Boone counties.

Municipal Separate Storm Sewer Systems (MS4s)

The MS4 program is an important program the DOW manages to help prevent nonpoint source pollution from entering Kentucky's streams, rivers, lakes and groundwater through stormwater runoff.

Contaminated stormwater runoff is commonly transported through Municipal Separate Storm Sewer Systems that discharge the runoff directly into local waterbodies. To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain an NPDES permit and develop a stormwater management program. "Operators" could include local jurisdictions, state departments of transportation, universities, local sewer districts, hospitals, military bases and prisons.

MS4 categories

- Large -- 250,000+ population
 - Louisville/ Jefferson Co. and co-permittees
 - Lexington/Fayette Co.
- Medium -- 100,000+ population
- Small -- fewer than 10,000 or a density of 1,000 per square mile (103 Phase II under 47 permits)

MS4 permit program activities

- Illicit discharge detection and elimination
- Construction site runoff controls
- Post-construction site runoff controls
- Public involvement and outreach programs
- Facility good housekeeping and pollution prevention
- Monitoring

The MS4 program in Kentucky took another step forward by issuing the Kentucky Transportation Cabinet (KYTC) an individual MS4 permit in August of 2012 to ensure the cabinet provides consistent stormwater quality management.

KYTC partners with most MS4 communities in Kentucky to implement practices that protect our waterways. Through these partnerships, called inter-local agreements, KYTC provides statewide stormwater resources to partner communities. Partner communities implement these resources at a local level.

The DOW individual permit issued to KYTC will allow the inter-local agreements established previously to remain in place and requires KYTC to fulfill all the permit requirements in regulated MS4 areas where inter-local agreements are not in place. As a permittee, KYTC is required to provide reports to DOW regarding its MS4 program activities and tasks.

Update on Conductivity

In April 2010, EPA issued an “interim guidance” document intended to “provide further clarification of EPA’s roles and expectations” in coordinating with EPA’s federal and state partners and to ensure “more consistent, effective, and timely compliance of Appalachian surface coal mining operations” with the CWA and other environmental laws (Interim Detailed Guidance, or IDG). The IDG applied to both Clean Water Act sections 404 and 402 (water quality) permits, and, among other things, identified acceptable “conductivity” levels for streams impacted by coal mining.

Since that time, USEPA has objected to approximately 40 proposed individual NPDES coal mining permits in the Commonwealth; the DOW process of issuing individual permits for coal mining operations has essentially ceased. The IDG was finalized in a memo from USEPA on July 21, 2011. Due to the impact to the industry, the National Mining Association and the states of Kentucky and West Virginia filed suit against USEPA in *National Min. Ass’n et al v. Jackson*. Judge Walton found that USEPA could not substitute guidance for rulemaking and vacated the USEPA guidance and indicated states have the authority to make Reasonable Potential Analysis (RPA) determinations.

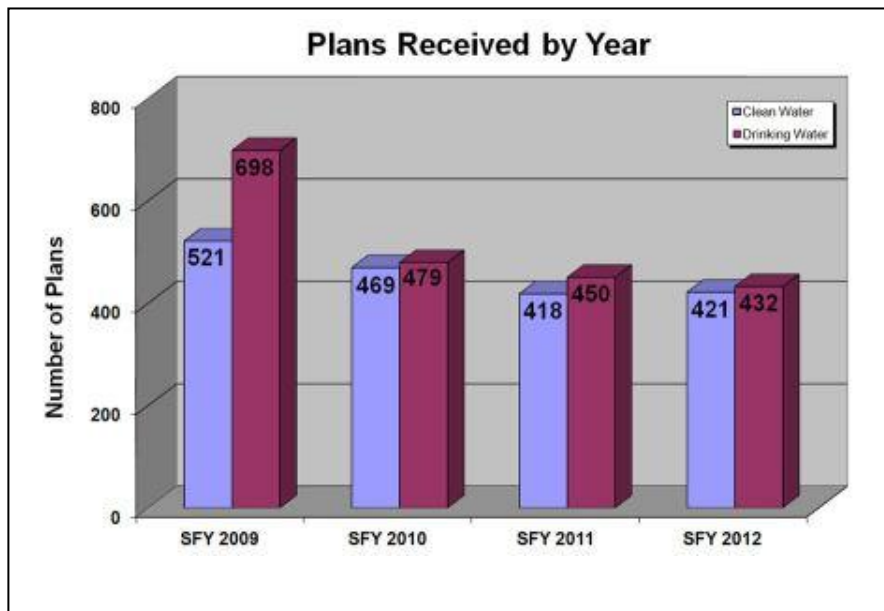
The division is evaluating the outcome of the litigation and in the meantime is producing permits in accordance with currently approved standards and regulations in order to protect water quality.

Water Infrastructure Branch

The Water Infrastructure Branch (WIB) consolidates the activities associated with water infrastructure planning, construction, management and funding. The branch is responsible for drinking water and wastewater planning; construction permitting of water line extensions; sewer line extensions and dams; evaluation of management of public water systems, publicly owned wastewater treatment works and dams; and implementation of the technical components of the federal special appropriations grant program of the clean water and drinking water state revolving funds (CWSRF and DWSRF). The branch also manages dam safety and floodplain compliance. The branch places increasing emphasis on projects that incorporate sustainability and green infrastructure.

Engineering

The Engineering Section of the Water Infrastructure Branch conducts the technical and engineering reviews and approves various infrastructure facilities including includes sewer collection projects, drinking water treatment and distribution projects and semi-public water system projects Since SFY 2009, the Engineering Section has finished the year with no permit backlog. Again this year, all projects were reviewed and processed within the 45-day regulatory timeframe.



The decline in the number of projects submitted for review reflects the continuing economic slowdown that began in SFY2009. In response to the reduced workload, and to meet increasing workload relating to coal wastewater permit applications, four review engineers were reassigned to the Surface Water Permits Branch. The remaining six review engineers and two administrative assistants continue to develop their knowledge base for reviewing both drinking water and wastewater treatment projects. They also continue to review projects funded by state revolving funds.

DOW Approves Plan to Send Water Over a Mountain

When the City of Pineville began repairs on its water treatment plant in January 2012, it had to cut back water production. This hurt the Green Hills Water District (GHWD), which purchased finished water from Pineville to supply its system. As a result, many Green Hills customers were going without water service, which had become quite a hardship.

As the crisis continued, the Harlan County Water Works Board of Commission approved a project to supply water from its Black Mountain Utility District to Green Hills. However, this meant installing a pipeline up and over Black Mountain. In February, the project engineers sent the plans to DOW's Engineering Section for review.

Harlan had agreed to supply 125,000 gallons per day at a rate not to exceed 140 gallons per minute. The plans called for construction of a water line from outside of Harlan, heading north along US 421 to the top of Pine Mountain and back down Pine Mountain to Bledsoe, where it would connect into the GHWD system. To facilitate movement of water up the mountain, four booster pump stations would be located along US 421 heading up the mountain, at the top of which would be constructed a 104,000-gallon water storage tank.

Upon review of the plans, the DOW engineers "ran the numbers" on the hydraulics and determined that while the first two pump stations could do the job of moving water, pump stations three and four would not be powerful enough to get the water to the mountaintop tank. The plans were returned to the engineers, who incorporated DOW's recommendations for more powerful pumps. Upon resubmission, DOW engineers approved the plan in March and construction got underway. Work is expected to be completed by fall of 2012.



Workers (left) construct one of the four pump stations to force water up the mountain to the water tank being built at the top of Black Mountain (right). Photos by David Messer and Ryan Wilson, DOW field inspectors at the London Regional Office.

Wastewater Planning

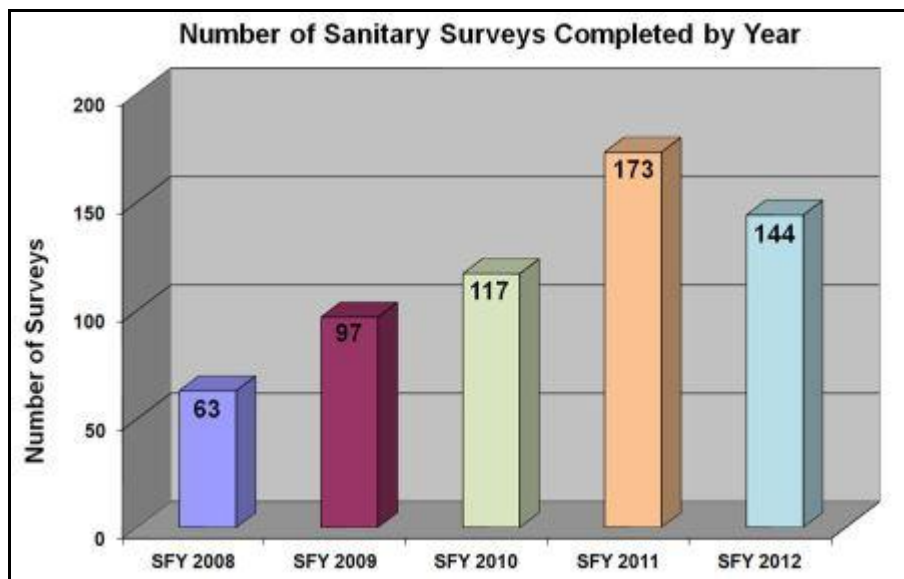
The Wastewater Planning Section (WPS) reviews and approves regional facility plans for municipal wastewater collection, conveyance and treatment systems in the state of Kentucky. The plans are reviewed for compliance with regulations, efficiency through regionalization, application of the best available and most appropriate technology and project implementability. During SFY2012, the section reviewed and approved four facility plans and prepared environmental assessments for 26 projects receiving financial assistance from the clean water state revolving fund. Five facility plans are currently under review.

The WPS staff revised the wastewater planning regulation to streamline the planning process and reduce the cost of complying with the planning requirements while ensuring public and environmental protection. Letters were sent to 129 regional planning entities that were impacted by the update regulation. These entities had to submit either a facility plan or an asset inventory report by July 1, 2012. As of June 30, 2012, 28 regional planning entities had submitted an asset inventory report and three entities submitted a facility plan; 18 entities requested time extensions.

Capacity Development

Every community water system is required to meet the same water quality standards using approved treatment processes and chemicals regardless of size or age of the plant or the number of customers served. The Capacity Development Section takes a pro-active approach to helping water systems stay within their capacities while complying with state and federal requirements.

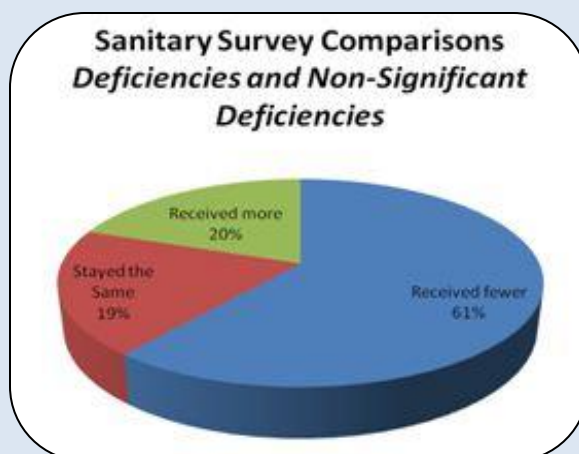
The CDS performed 144 sanitary surveys at public drinking water plants in SFY2012. A sanitary survey is an on-site review of a public water system's water source, facilities, equipment, operation and maintenance. Surveys point out sanitary deficiencies and assess a system's capability to supply safe drinking water to lower the risk of waterborne disease and identify systems that require technical or capacity development.



Study Reveals Improvement in Performance of Drinking Water Producers

Analysis of the drinking water sanitary survey for surface water producers and purchasers indicates an overall improvement in technical, managerial and financial operations as water systems strive to comply with the Safe Drinking Water Act (SDWA). Operators are better informed, they are required to articulate in writing the remedial measures taken to correct deficiencies and they benefit from technical assistance provided by the DOW Capacity Development Section.

Kentucky's drinking water sanitary surveys for surface water producers and purchasers were analyzed for the state fiscal years July 2011 through June 2012 and July 2008 through June 2009 to examine any improvement or decline in technical, managerial and financial operations based on the significant deficiencies, non-significant deficiencies and recommendations that were cited in the sanitary survey conducted during July 2008 through June 2009.



Data analysis indicated an overall improvement in performance. Sixty-one percent of the systems that received significant and non-significant deficiencies during 2008-2009 survey had fewer deficiencies or eliminated their non-compliance during the 2011-2012 survey. Nineteen percent of the systems identified with significant and non-significant deficiencies had no change between surveys. Twenty percent of the systems had more deficiencies/ recommendations in 2011-2012 survey compared to their previous one.

New Program Provides Funding to Small Water Utilities

Seven small drinking water treatment systems in Kentucky will receive financial assistance through a new program designed to improve their technical, managerial and financial capabilities to ensure production of safe drinking water in a consistent, cost-effective manner. Small systems are those that serve fewer than 10,000 customers.

The funding program, which is in its first year, is a cooperative venture of the DOW and the nonprofit Community Action of Kentucky (through the Rural Community Assistance Program). The two agencies worked together to identify small drinking water systems in need of capacity development assistance based on factors that are not regulated, such as equipment, training and office management.

Many small treatment plants are at a disadvantage because of their budget and personnel limitations, yet they face the same challenges as larger plants that have more money and staff.

Funding was made possible through funds set aside by the Commonwealth of Kentucky from the Drinking Water State Revolving Fund capitalization grant.

The seven facilities selected for funding through the Capacity Development Assistance Program for Small Systems include the following:

Bronston Water Association – \$3,200 for interior and exterior tank inspection.

Calhoun Water Works – \$2,000 to perform two tank inspections using a remotely operated vehicle to evaluate interior condition, corrosion areas and other deterioration problems.

Horse Cave Water Company – \$25,000 to perform mapping of the distribution system to locate all lines and valves to enable effective leak detection.

Monroe County Water District – \$16,985 to purchase leak detection equipment for locating leaks within the distribution system.

Morgan County Water District -- \$18,700 to purchase leak detection equipment for locating leaks within the distribution system.

Wallins Water System -- \$19,200 to obtain assistance with leak detection within the distribution system.

Williamsburg Water Department -- \$18,500 to develop procedures to identify and repair water line leaks and to identify and monitor unmetered water usage.

State Revolving Funds (SRF) and Special Appropriation Projects (SPAP)

The SRF and SPAP Section is primarily responsible for the administrative functions of the Clean Water and Drinking Water State Revolving Funds (SRF Program) and the EPA Special Appropriation (SPAP) Grants. This entails working with the planning and technical sections of the WIB to commit grant and loans funds for drinking water and wastewater facilities.

The SRF and SPAP Section this year assisted the Kentucky Infrastructure Authority program administrators in committing approximately \$123.3 million in SRF funds to drinking water and clean water projects. Demand for the SRF funds remains healthy as communities throughout the state continue to seek low-interest loans from the state revolving funds to rehab the old and build new infrastructure. The section manages 167 active SRF and SPAP projects.

Bowling Green Wastewater Treatment Plant Expansion

A low-cost loan from the Clean Water State Revolving Fund has allowed Bowling Green Municipal Utilities to perform a \$52 million expansion and renovation of its wastewater treatment plant. The loan, which is administered through the Kentucky Infrastructure Authority and the Division of Water, allowed the municipality to expand the utility's treatment capacity, change the way wastewater is treated, and add a process that recycles sludge the formerly was landfilled. With the expansion, the plant's treatment capacity increased from 10.6 million gallons per day (mgd) to 12 million, with the potential for increasing the capacity to 15 million gallons when needed.

The Division of Water places heavy emphasis on sustainability and cost-effectiveness when awarding SRF loans. The renovated and expanded wastewater treatment facility includes a new influent pump station, odor control, septage receiving station, high efficiency turbo-compressor blowers, ultraviolet disinfection, and dewatering centrifuges. An indirect thermal dryer was designed to convert dewatered biosolids into 12.5 dry tons per day of a sustainable Class A product that will be used in agriculture as a supplemental fertilizer.



Photo courtesy
of Gresham,
Smith and
Partners

The Green Project Reserve

The Green Project Reserve (GPR) is a provision that originated in the American Recovery and Reinvestment Act (ARRA) of 2009, and has been included in SRF capitalization grants since that time. The GPR has generally stated that between ten and 20 percent of the clean water and drinking water SRF capitalization grants be used to fund projects that address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities. These four categories of projects make up the components of the GPR that define “green” projects.

Because the SRF programs provide below-market interest rates, these loans are competitive. To be selected for a SRF loan, projects must rank high on an annual priority list that is developed by DOW and is based on a set of ranking criteria. As a result of the national interest in green infrastructure, Kentucky responded by adding green infrastructure incentive points to the ranking criteria for Drinking Water and Clean Water SRF programs.

The DOW adopted the federal GPR guidance to use in its evaluation of green infrastructure projects. Those water and wastewater systems that claimed “green” points were asked to submit a short business case to demonstrate eligibility under one of the four green categories.

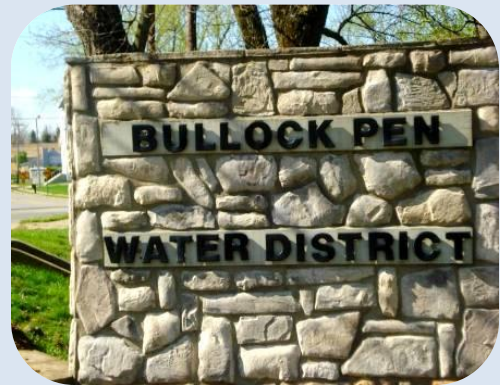
Kentucky GPR Requirements		
Capitalization Grant Year	Drinking Water SRF	Clean Water SRF
2009 ARRA Grant	\$4,090,000 (\$20,450,000 grant)	\$9,975,620 (\$49,878,100 grant)
2011 Cap. Grant	\$2,675,800 (\$13,379,000 grant)	\$3,758,000 (\$18,794,000 grant)
2012 Cap. Grant	\$0	\$1,798,700 (\$17,987,000 grant)

As the table above shows, there was no GPR minimum requirement in the 2012 capitalization grant for the Drinking Water SRF. Regardless of the federal GPR provisions in the future, Kentucky plans to continue to provide incentive points for green projects, as well as for sustainable infrastructure and asset management practices.

Green Project Reserve Case Studies

City of Murray – The Bee Creek Wastewater Treatment Plant Expansion and Collection System Improvements Project met all four “green” categories. The city received a Clean Water SRF loan of \$46 million to upgrade from a 5.25 million gallons per day (MGD) to 8.75 MGD for rehabilitation and upgrade of the existing wastewater collection system and pump station to accommodate current wastewater flows. Construction is anticipated to begin in 2014. The “green” components of the project include nonpotable water pumps that will allow treated effluent to be reused, energy-efficient pumps and equipment used in treatment, variable frequency drives, use of environmentally conscientious construction materials such as permeable pavers, ultra-violet disinfection and the use of biological nutrient removal for phosphorous and nitrogen. By re-using treated effluent to water the grounds at the wastewater treatment plant, the utility estimates a savings of approximately \$4,680 and 9 million gallons annually.

Grant County Improvements Project – The Bullock Pen Water District will benefit from a \$1.6 million DWSRF loan for construction of a new 500,000-gallon water storage tank, a new pump station and nearly one mile of replaced waterlines. The “green” components include new energy-efficient pumps and the installation of variable frequency drive controllers at the new pump station. The total efficiency of the new pumps and motors is 28 percent over the existing equipment, resulting in a savings of \$2,600 and 50,600 KWhr annually.



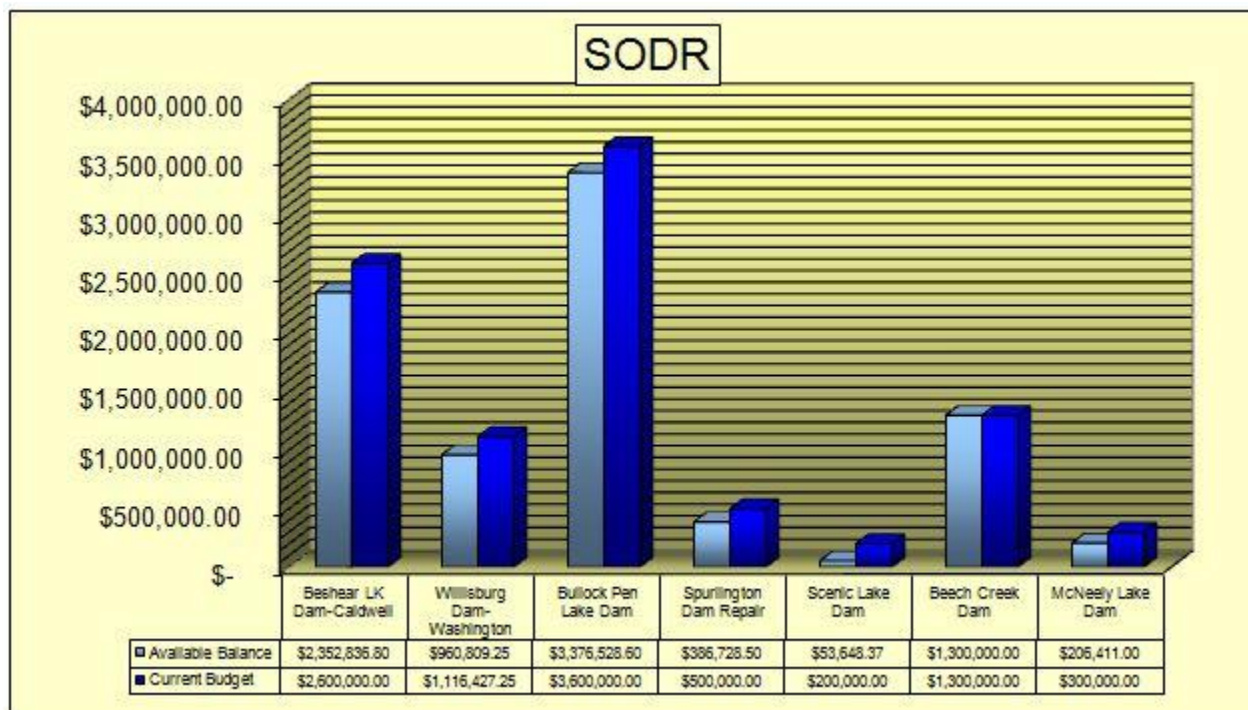
Jessamine South Elkhorn Water District
The Northwest Watermain Replacement and Hydraulics/Dixon Town Waterline Replacement Project received a DWSRF loan of \$3 million for plans that will improve water quality and reliability while incorporating “green” infrastructure. This project includes the replacement of various waterlines dating from the 1970s, installation of new waterlines to provide much-needed looping to improve hydraulics, replacement of old water meters to include backflow preventers, and the installation of isolation valves. The utility anticipates an annual savings of approximately \$200,200 and 53,226,906 gallons.

Dam Safety and Floodplain Compliance

The Dam Safety and Floodplain Compliance Section is primarily responsible for inspecting and permitting of dams and providing oversight in identifying and resolving floodplain compliance issues. Staff inspect between 200 and 300 dams a year. They also investigate and handle remedial actions on cases of construction in floodplains without the appropriate permits or violation of floodplain permit limitations.

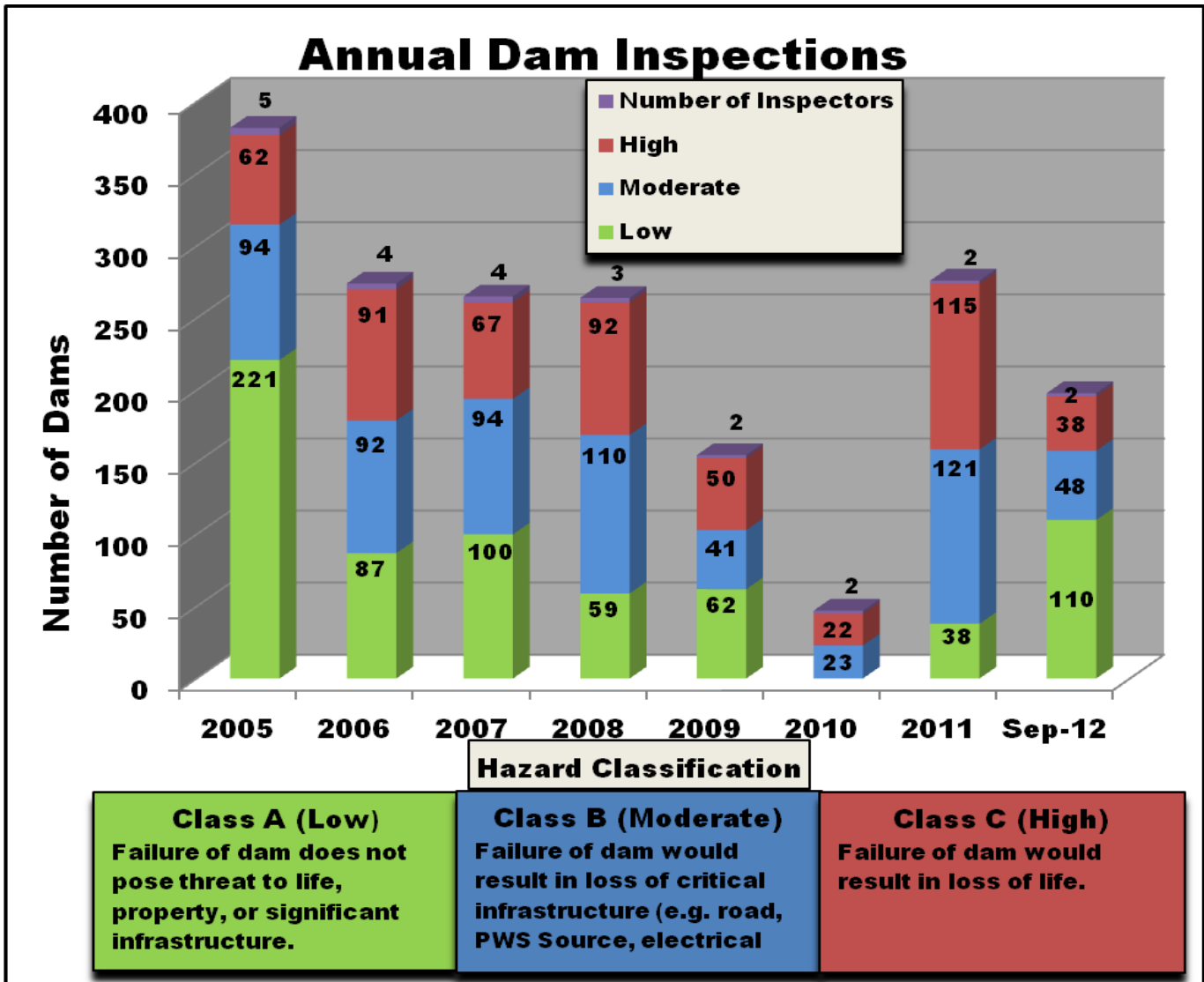
Through the State-Owned Dam Repair Program, DOW has identified seven state-owned dams not meeting moderate- or high-hazard design requirements and is working to get the dams into compliance. As part of this process, Dam Safety staff conduct engineering and design studies for construction upgrades and/or devise plans to mitigate risk downstream. DOW is currently working on seven State-Owned Dam Repair (SODR) projects with project milestones and status being tracked.

State-Owned Dam Repair Project Milestones



DOW is working with the Federal Emergency Management Agency (FEMA) and Division of Emergency Management to explore the use the State-Owned Dam Repair program funds to leverage federal FEMA mitigation funds to address other high-hazard dam upgrades or mitigation activities needed in Kentucky where substantial benefit/cost ratios can be demonstrated.

FEMA has awarded the state of Kentucky \$1,215,000 to characterize and assess risks and develop mitigation strategies for approximately 200 state and local community-owned, low, moderate, and high hazard class dams. The project will include an outreach and education component for state and local governments and citizens regarding the potential for dam failure, ramifications of dam failure on quality of life, and strategies to properly manage the risk due to dam failure.



The graph above highlights the number of inspectors on staff versus number of dams inspected. Since 2008, the performance of dam inspections has declined along with the decline in the number of engineers on staff in the Dam Safety office. The backlog of dam inspections has increased and is proportional with the decline in the number of engineers who perform the inspections. In 2010, no Low-Hazard Class A dams were inspected.

Innovative Fox Creek Dam Upgrade Completed

A \$4 million rehabilitation of Fox Creek Multiple Purpose Structure No. 4 in Fleming County has transformed the former earthen barrier into an innovative stepped concrete structure designed to meet high-hazard dam safety requirements and extend its life into the next century. DOW Dam Safety staff worked closely with the contractor and the county and federal agencies involved to approve, monitor and inspect the project.



The most obvious feature of the new dam is the series of five steps stretching the width of the dam and measuring 4 feet high and 10 feet wide. The steps are designed to dissipate energy by slowing down the water as it flows over the dam and into a settling pool'

Another innovative aspect of the project was the use of roller-compacted concrete, or RCC, which has the strength and durability of conventional concrete but costs much less and drier much faster. It also has high resistance to the harmful effects of freezing and thawing.

The dam provides flood protection and recreation at the 75-acre Fox Valley Lake, which it impounds. DOW performed its final inspection June 14, 2012, after which date the lake was restored to its recreational level.



Watershed Management Branch

The Watershed Management Branch (WMB) coordinates the implementation of the watershed framework and watershed basin planning. It also implements groundwater management programs, administers the water withdrawal permitting program and coordinates the development of Geographic Information Systems (GIS) and quality assurance resources to meet the needs of the Division of Water.

Groundwater Section

The five staff members and supervisor of the Groundwater Section work to manage and protect the groundwater of the Commonwealth through implementation of the Certified Well Drillers' Program, the Ambient Groundwater Quality Monitoring Network and Groundwater Protection Plans. Section staff also regularly provide technical assistance to citizens and industry as well as to local, state and federal agencies.

Certified Well Drillers' Program

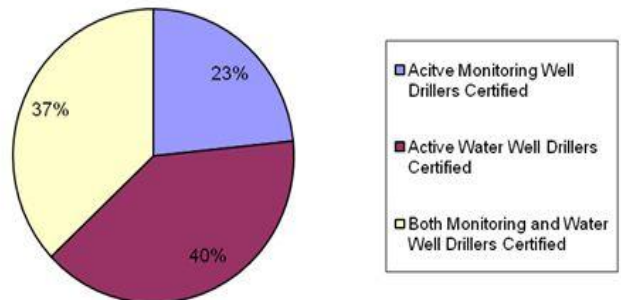
DOW provides technical assistance about wells to drillers, consultants and the public to ensure groundwater is protected and well construction standards are met. During SFY2012, the Groundwater Section responded to 66 complaints that involved water well and monitoring well drilling, installation, construction, maintenance and water quality issues. More than 60 percent of the responses resulted in the collection of groundwater samples for water quality analysis. DOW staff process recertification applications for drillers of water wells, monitoring wells and combined water and monitoring wells. During SFY2012, DOW issued 154 licenses to certified drillers, including 61 for water wells, 37 for monitoring wells and 57 as dual licenses.

The total of 1,300 wells drilled and officially reported in SFY2012 can be broadly classified into five categories:

- Agriculture** - 13 wells drilled
- Domestic** - 18 wells drilled
- Monitoring and Remediation** - 1,343 wells drilled
- Public** - 4 wells drilled
- Other** - 21 wells drilled for injection, mining, misc.

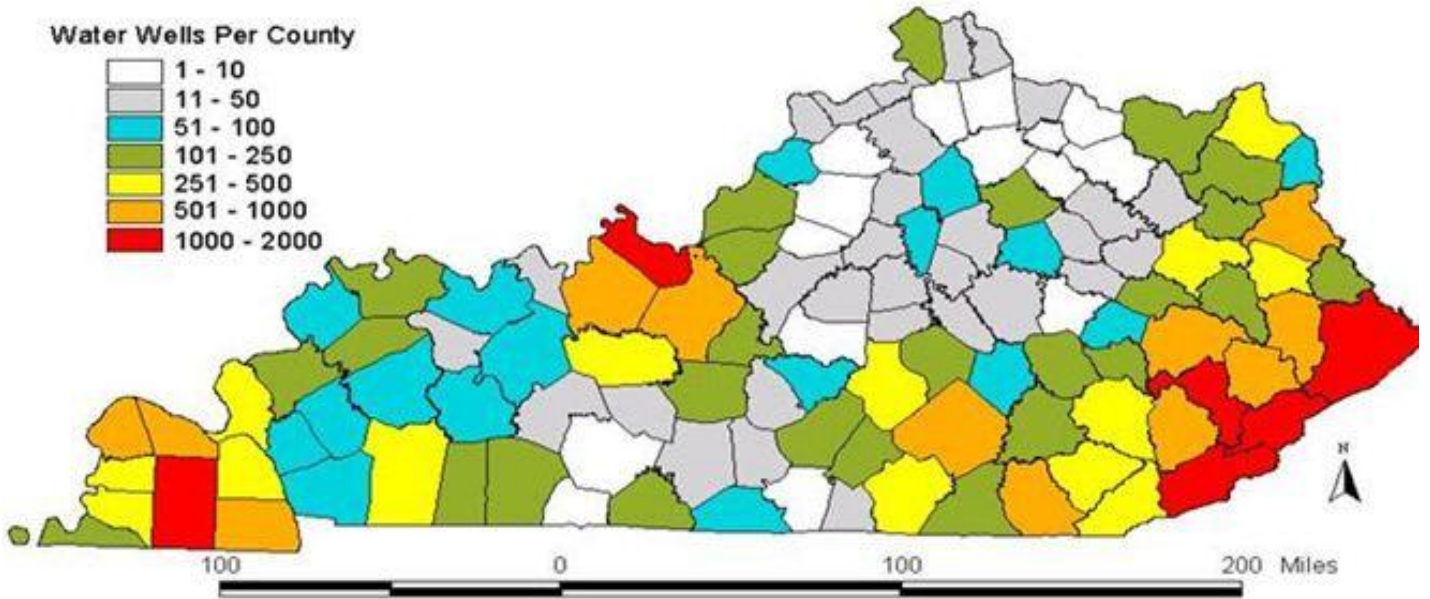
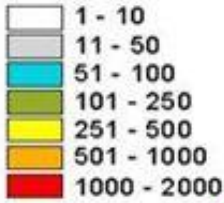


Certified Drillers for Kentucky by Type
Fiscal Year 2012



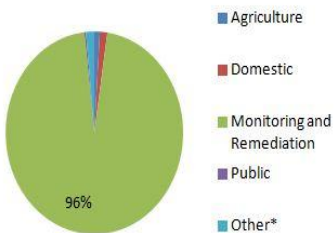
Number of Water Wells by County

Water Wells Per County

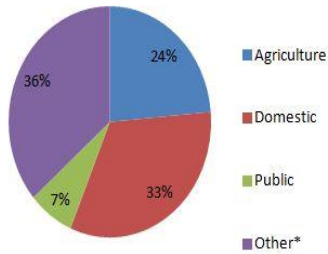


Wells Drilled Fiscal Year 2012

All Wells

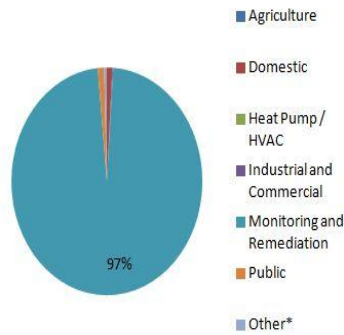


Wells Other Than Monitoring *(Injection, Mining, Unused, Unknown)

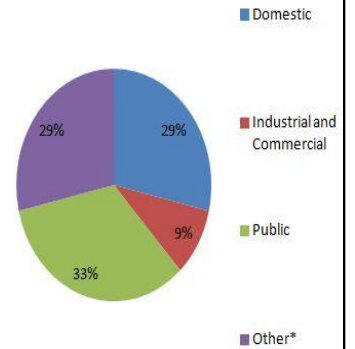


Wells Plugged Fiscal Year 2012

All Wells



Wells Other Than Monitoring *(Injection, Mining, Unused, Unknown)



Ambient Groundwater Monitoring Network

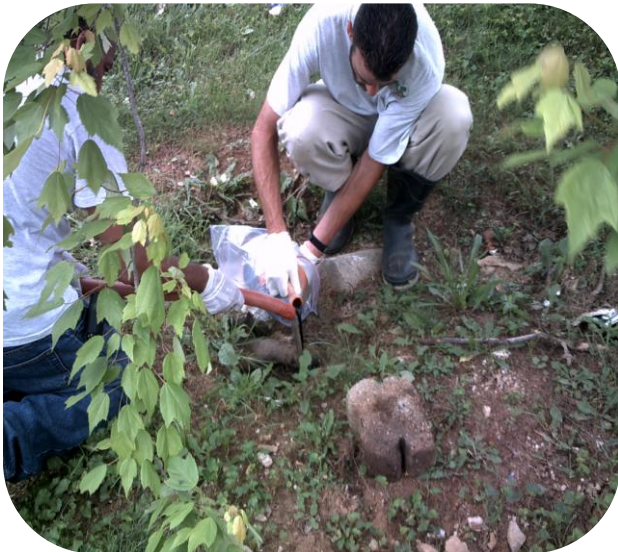
The statewide Ambient Groundwater Monitoring Program provides baseline groundwater data on aquifer characterization, ambient groundwater quality and nonpoint source pollution. Groundwater, including public water supplies and private-sector wells and springs, are sampled quarterly and analyzed for hundreds of parameters, including metals, nutrients, pesticides and volatile organic compounds.

This fiscal year, Groundwater Section staff collected 114 samples from 55 sites (28 wells and 27 springs) across the state. Groundwater quality data were provided to numerous individuals through information requests. Data were also included in statistical analyses for regional and watershed-based groundwater assessments.

Using dye trace data and wellhead delineation areas derived from groundwater flow modeling, it is estimated that DOW has assessed 335 square miles of drainage area through its monitoring programs. Exact area numbers are difficult to ascertain due to the complexities resulting from Kentucky karst, unknown cave miles and the presence of granular and fracture flow aquifers. Therefore the estimate of stream miles assessed is a unit of measurement of the area assessed as determined by recharge areas for each site.



DOW geologists prepare groundwater samples to test for the presence of fecal coliform, which could indicate the presence of sewage in the groundwater.



DOW geologists pour easily detectable fluorescent dye into a swallow hole. Dye tracing is an effective tool for aquifer characterization and protection and for providing remediation strategies in karst areas.

As part of the Pesticide Memorandum of Agreement with the Department of Agriculture (DA) four permanent sampling sites (one well and three springs) in western Kentucky are tested for the presence of pesticides in ambient groundwater and the results submitted to the DA.

**Statewide Ambient Groundwater Monitoring Network
 Kentucky Division of Water
 Watershed Management Branch
 Groundwater Section**

2011

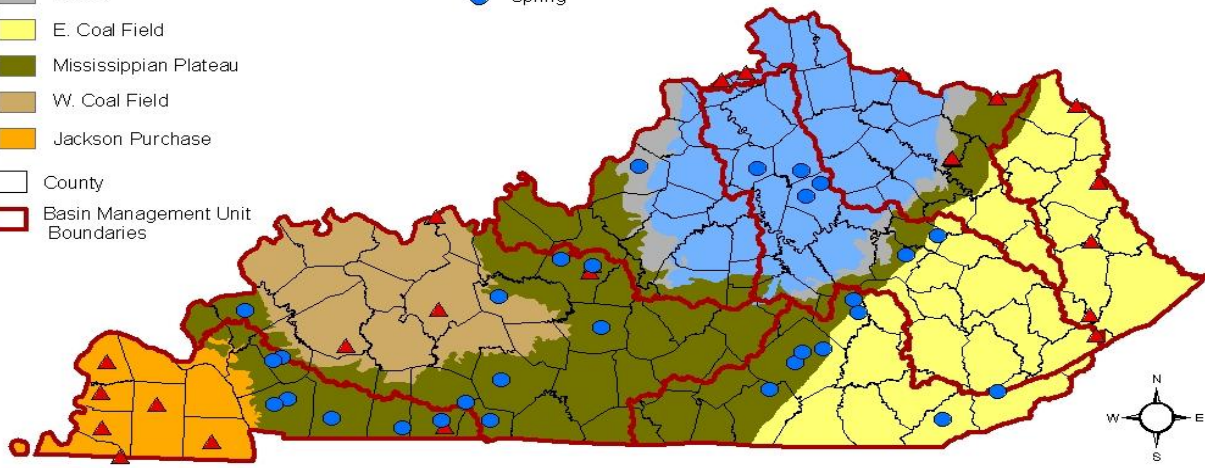
Physiographic Regions (KGS)

- Bluegrass
- Knobs
- E. Coal Field
- Mississippian Plateau
- W. Coal Field
- Jackson Purchase

- County
- Basin Management Unit Boundaries

Active Monitoring Sites

- Water Well
- Spring



Region	# Sites	Basin Management Unit	# Sites
Bluegrass*	9	1 – Kentucky	6
Ohio River Alluvium	10	2 – Salt & Licking	10
E. Coalfield	8	3 – Green & Tradewater	16
Mississippian Plateau	24	4 – Four Rivers, Upper & Lower Cumberland	22
W. Coalfield	2	5 – Big and Little Sandy, & Tygarts	5
Jackson Purchase	6		

*Bluegrass Region includes Inner and Outer Bluegrass and Knobs

This table lists the spatial distribution of permanent groundwater sampling locations based on physiographic regions and basin management units.

Groundwater Protection Plan Program

Activities that have the potential to pollute groundwater may require the development of a Groundwater Protection Plan (GPP). Some of the activities that would require GPPs involve the storage, handling or application of pesticides, fertilizers, hazardous and solid wastes; transmission through pipelines of raw materials (such as gasoline), installation or operation of on-site sewage disposal systems; mining and associated activities; installation or abandonment of wells; and commercial or industrial transfer of raw materials in bulk.



DOW staff help develop and review the GPPs and perform on-site inspections to ensure the plans include employee training and record-keeping. In SFY2012, DOW staff reviewed 76 GPPs.

Education and outreach have been a major focus for the program this fiscal year to raise public awareness of the importance of developing and maintaining a groundwater protection plans. For example, the GPP provided generic GPPs for residential septic systems for distribution to residences within wellhead protection areas in the state.

DOW groundwater specialists Pat Keefe, middle, and Brenda Taylor advise a citizen about how to prepare a groundwater protection plan.



Education and outreach have been a major focus for the program this fiscal year to raise public awareness of the importance of developing and maintaining a groundwater protection plans. For example, the GPP provided generic GPPs for residential septic systems for distribution to residences within wellhead protection areas in the state.

A change in the Kentucky No-Discharge Operational Permit (KNDOP) requiring applicants to develop a groundwater protection plan has put new teeth into the Groundwater Protection Plan Program. The Groundwater Section is working with other state agencies to ensure the permit applicants develop the GPPs for activities involving point source discharges and the land application of solid wastes.

A guidance document is also being prepared to assist geothermal drillers in developing a GPP in association with the installation of closed-loop vertical boreholes.

Groundwater Assessments -- Nonpoint Source Pollution Projects

Integrated Surface Water and Groundwater Assessment of Large Springs in the Green River Basin involved the year-long monitoring of 10 large springs in the Mississippian Plateau region through groundwater quality monitoring and tracer tests in association with data collected for the Integrated Report.

Groundwater Quality Assessment in Sinking Creek and Beargrass Creek watersheds to assess the impacts of nutrients, pesticides and bacteria associated with groundwater infiltration of the sanitary sewer system in the Beargrass Creek Watershed. Presentations have been made at water resource conferences and a community watershed group.

Elkhorn Creek Sub-Basin Groundwater Study focuses on assessing groundwater quality of domestic-use wells along Elkhorn Creek in southeastern Pike and northeastern Letcher counties to sample for total coliform and *E. coli*.

West Pennyrite Karst Study began in 2008 and continues currently with dye tracer tests in Livingston, Crittenden, Caldwell, Lyon and Trigg counties to help delineate karst groundwater basins. Following completion of the tracer tests and delineation of several karst groundwater basins, monitoring sites will be chosen. Aspects of monitoring for this project will incorporate the integrated surface and groundwater assessment approach.

Statewide Pathogens Study focuses on the occurrence of pathogens in groundwater, particularly water wells and springs providing domestic water supplies. Samples will be taken from approximately 200 sites across Kentucky and tested for total coliform, *E. coli*, iron-related bacteria, sulfate-reducing bacteria, slime-forming bacteria and caffeine. Priority will be given to those areas with the highest domestic groundwater use, specifically the Eastern Coal Field and Jackson Purchase regions.

South Central Karst Study will focus on expanding karst groundwater mapping efforts south of Lake Cumberland. The study area includes portions of Clinton, Wayne and McCreary counties. Following completion of the tracer tests and delineation of several karst groundwater basins, monitoring sites will be chosen. Aspects of monitoring for this project will incorporate the integrated surface and groundwater assessment approach.

Groundwater Monitoring in Kentucky – Funding for this project has recently been made available and evaluation of the proposed study has begun.

GIS & Data Analysis Section

The GIS & Data Analysis Section (GDA) consists of six employees with backgrounds in hydrogeology, biology, statistics, geospatial technology, computer programming and technical data management. The section provides support and programmatic direction to the division in the areas discussed below.

Geographic Information Systems

GIS is a computer system for integrating, displaying and manipulating data related to positions on the Earth's surface. DOW is using computerized GIS to better understand how to manage Kentucky's water resources. GIS can be a powerful tool for assessing water quality, determining water availability, predicting and mitigating flooding, understanding the natural environment and managing water resources. GIS applications are used to reveal patterns, relationships and trends not readily apparent in spreadsheets or statistical packages. GIS applications can help DOW make better decisions; save money, time and resources; and communicate more effectively through geospatial visualization.

Data Analysis

Drinking Water Cancer Rate Study – GDA staff provided data analyses for the professional paper “Potential for Levels of Arsenic and Chromium in Drinking Water to Contribute to the Higher Cancer Rates for Eastern Kentucky Citizens as Compared to the Rest of the State.”

Nonpoint Source 319 Projects – GDA staff provided initial data analyses to the Groundwater Section for the 319 project “Groundwater Assessment for Impacts from Mining and Other Impacts,” as well as “Groundwater Assessment and Spring Basin Delineation within the Salt and Licking River Basins.”

Pesticide Data Analyses – Staff provided the annual data analyses of Pesticide MOA data to the Division of Pesticides.

Integrated Report Assessment Automation – GDA staff helped streamline the assessment process by automating the creation of assessment sheets from both KPDES discharge monitoring reports and drinking water monthly operating reports. Staff also automated the creation of the 303(d) List of Surface Waters.

Coal Monitoring Data – GDA staff continue to develop a temporary database to house incoming coal monitoring data submitted in spreadsheet format.

K-WADE – GDA staff are working on this new data management system that will house all surface water, groundwater and biological data, making data analysis more seamless and data management more efficient and reproducible.

Groundwater Database – GDA staff merged 17,245 water quality results and 6,698 field measurements from 21 years of well inspections by the Kentucky Geological Survey to consolidate groundwater data

Interagency Cooperation – GDA is working closely with the Kentucky Infrastructure Authority and Kentucky Geological Survey to upgrade and streamline how data are collected and aggregated for information relevant to agency databases in order to save time and allow data consumers access to information updated in near-real-time rather than semi-annually.

Support of Certified Drillers Program

GDA staff are responsible for the receipt, review and processing of all monitoring and water well records, well inspection forms and spring inventory forms. Of the 1,056 well installation records received, 269 (25 percent) were submitted to DOW from drillers via eForm during SFY2012 while 15 of the 247 water well installation records (6 percent) were submitted electronically.

Well and Spring Record Processing					
	Monitoring Wells (Install / Plug)		Water Wells (Install / Plug)		Springs
Received	1,056	743	247	14	9
Processed	4,142	1,055	252	43	57
Prepared for Scan	5,099		674		6
Archived	2,971		524		18

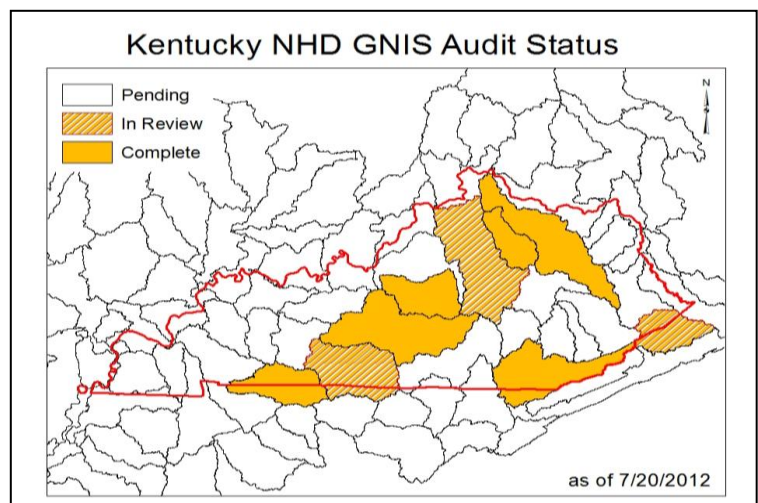
Processing of monitoring well record and plugging record processing is now current, while water well records have been processed through July 2010. GDA staff continue to scan and archive historic records.

GDA staff provide regular technical support to drillers, the public, private industry, and other state government employees on monitoring and water well issues such as casing requirements based on lithology, drilling methods, setback requirements, maintenance and plugging requirements per the applicable regulations; and assistance is given to the public on such topics as safe drinking water levels in public consumption wells, treatment options and alternative drinking water sources.

NHD Stewardship

Kentucky Karst Atlas Integration -- GDA continues to participate in pilot project begun in 2010 to integrate the Kentucky Karst Atlas, a database depicting mapped karst dye trace studies across Kentucky, into the National Hydrography Dataset (NHD). The focus of this year's project was the Upper Green River sub-basin, an area encompassing Mammoth Cave National Park. The primary mapping for the project is complete and undergoing final quality assurance evaluation.

Stormwater Data Integration -- This project is an ongoing effort to incorporate stormwater data provided by local and regional sanitation districts into the NHD. Requests for digital stormwater pipeline and drainage ditch data were made to various cities and sanitation districts through the MS4 program.



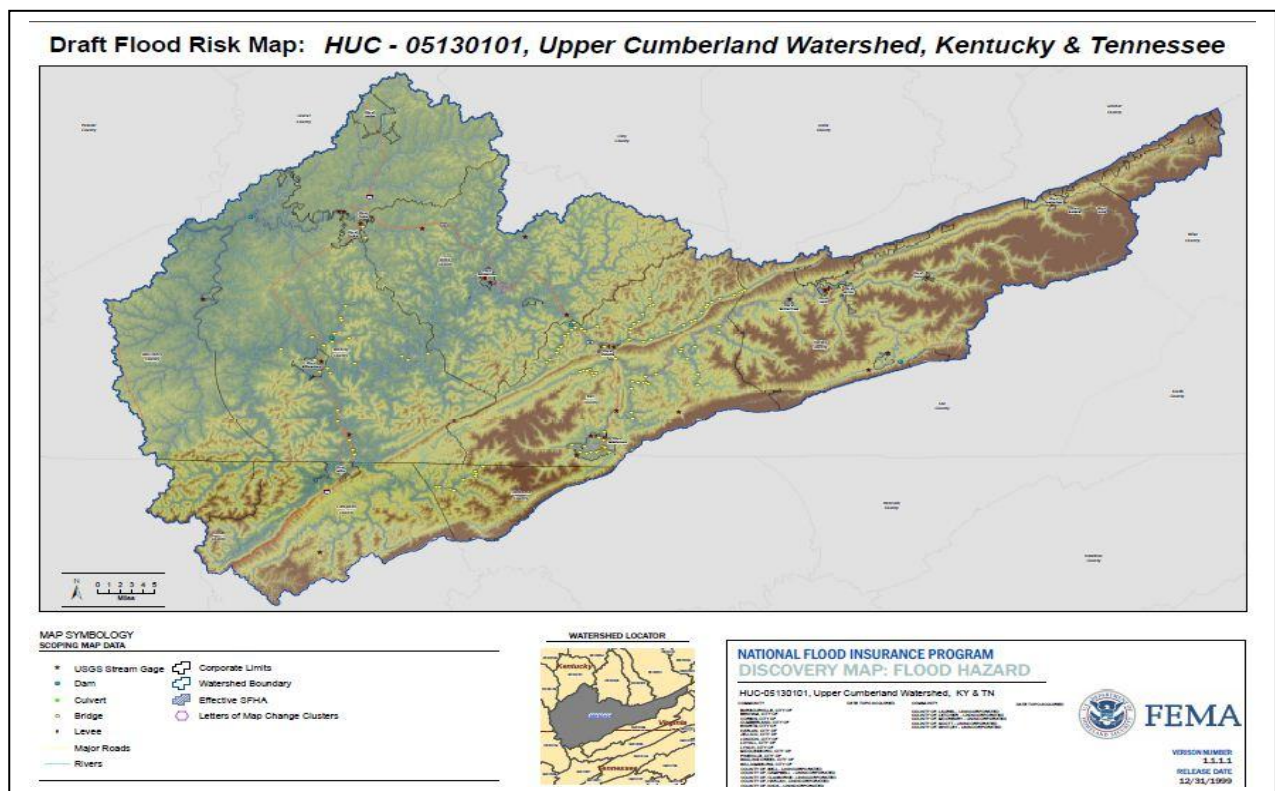


The Kentucky RiskMAP is a FEMA-sponsored resource that provides information about FEMA's various activities in Kentucky, including floodplain and mapping issues, project status and links to other agency partners for audiences interested in all aspects of natural hazards.

RiskMAP takes a broad approach, emphasizing the delivery of accurate maps but also working with communities to understand the causes of flooding and help with mitigation strategies. RiskMAP is characterized by a full alignment of FEMA's programs – from discovering local needs, mapping with better base data, working with community representatives in assessing risk and vulnerability – with planning and mitigation considerations throughout.

DOW's RiskMAP outreach specialist conducted a variety of initiatives throughout the fiscal year, including attendance at conferences and community meetings. RiskMAP has also created many materials to education constituents, including videos published on social media channels, PowerPoint presentations, fact sheets and maps.

Preparation of the Upper Cumberland Watershed Discovery Report will pave the way for four additional discovery reports in the next year. The 150-page report documents the historical flooding issues of all the communities within the watershed, including the structural and nonstructural steps that have been taken to mitigate flooding hazards. It also provides an overview of communities' floodplain management programs and documents future needs for flood hazard identification and mitigation actions that will lead to a reduction of flood risk in the watershed.



Nonpoint Source Pollution Program

The Nonpoint Source and Basin Team Section (NPSBTS) mission is to protect Kentucky's surface and groundwater from nonpoint source pollution, to abate pollution threats and to restore degraded waters to the extent that water quality standards are met and beneficial uses are supported. The section works with federal, state, local and private partners to promote complementary, regulatory and non-regulatory pollution control initiatives at both statewide and watershed levels.

The section administers and implements the DOW's 319(h) federal grant program. Each year, the USEPA awards DOW with grant funds for the purpose of addressing problems associated with nonpoint source pollution. All projects that receive funding are required to provide a 40-percent nonfederal match to support the project. Priority is given to projects involving watershed-based plan development and implementation in impaired waters, as well as protection of Special Use Waters with identified threats.

This year, 11 communities and organizations shared \$2.7 million in federal grants to develop watershed plans and implement nonpoint source pollution controls. DOW continues to work with the awardees to ensure that the projects are conducted and completed in accordance with all applicable requirements.

NPS projects selected this year for funding include the following:

Watershed Watch in Kentucky: Volunteer Training Upgrades and Support

Develop and implement a training program to standardize proper sampling techniques for water sampling by volunteers throughout Kentucky. Grant recipient: Watershed Watch in Kentucky Inc.

Franklin County Judicial Center Green Streets Demonstration Project

Treat and control storm water generated at the new judicial center in Frankfort using environmentally sustainable methods and conduct education and outreach on green infrastructure practices. Grant recipient: Franklin County Fiscal Court.

Chautauqua Park's Green Solution to Pollution

Implement best management practices at an Owensboro park to improve water quality and educate the community. Grant recipient: Regional Water Resource Agency.

Lost River Cave Wetland and Valley

Improve general public awareness of the sources, transport, fate, management and prevention of nonpoint source pollution and encourage changes in attitude about personal responsibility for a healthy environment. Grant recipient: Friends of the Lost River Inc.

Kentucky Stream Restoration Manual

Develop a stream restoration manual based on existing restoration design methods that address the characteristics of Kentucky. Grant recipient: University of Louisville Research Foundation.

Implement Best Management Practices on Timber Harvests in Kentucky

Evaluate the timber harvesting industry for compliance with the Forest Conservation Act and use the information to make improvements to logger and ranger training. Grant recipient: Kentucky Division of Forestry.

Hinkston Creek Watershed-Based Plan Implementation Project Install targeted best management practices to address water quality issues and provide public education on ways to improve water quality in the watershed. Grant recipient: Tetra Tech Inc.

Agricultural Best Management Practices in the Hanging Fork and Clark's Run Watersheds

Address water quality concerns within the Dix River Watershed by implementing the approved Clarks Run and Hanging Fork watershed plans by installing agricultural best management practices in targeted areas of the watersheds. Grant recipient: Lincoln County Conservation District.

Sinking Creek Water Quality Sediment and Habitat Investigation

Develop a watershed data analysis report for Sinking Creek that will provide a scientific foundation for a watershed-based plan that protects existing high-quality habitat in the watershed and improves the impaired reaches. Grant recipient: Cumberland Valley RD&D Council.

Coarse Sediment Assessment and Stream Restoration Design for Upper Kinniconick Creek

Develop a sediment-focused watershed plan for Kinniconick Creek and stream restoration conceptual design for the impacted stream reach, which will restore local and downstream aquatic habitat and provide landowners with opportunities to implement sustainable land-use practices. Grant recipient: Kentucky State Nature Preserves Commission.

Little Laurel River Watershed – Watershed Plan Implementation

Continue implementation of the approved Corbin City Reservoir watershed-based plan. Grant recipient: City of London, Kentucky.

Watershed Watch in Kentucky gets a makeover

DOW this year awarded Watershed Watch in Kentucky (WWKY) a \$440,000 319(h) nonpoint source pollution control grant to update training materials and retrain its volunteers to more effectively test and interpret water quality in the Commonwealth. More than 500 volunteers participated in workshops this spring, with many more to be trained by project's end in November 2013.

For this project, DOW staff rewrote the Watershed Watch sampling and assessment procedures to more closely follow DOW procedures. They also created easy-to-use flipbooks that summarize procedures and instructions, created new forms for volunteers to record their collected information, and create new training presentations that mirror the other new materials.

Volunteers in the program receive free training on how to take a qualified water sample that will be analyzed by a professional laboratory. They are also trained to perform basic water quality field tests for dissolved oxygen, pH, temperature and conductivity. On designated weekends, volunteers collect samples that are delivered to laboratories for analysis to detect pesticides, *E. coli* bacteria and heavy metals and nutrients, depending on the basin and the time of year.



Watershed Planning

NPS program staff members continue to provide technical assistance to watershed groups for the development of 14 watershed plans. NPS program staff conducted reviews of five draft watershed plans during SFY2012 and were able to accept three for implementation (Curry's Fork, Cane Run Creek, and Hinkston Creek watershed plans located in Oldham, Fayette/Scott, and Montgomery counties, respectively). Watershed plan reviews continue to be coordinated through the Kentucky Inter-branch Watershed Implementation Workgroup (KIWIW). Currently, 14 watershed plans have been accepted for full or partial implementation with CWA Section 319(h) funding.

Water Education and Outreach

The Nonpoint Source and Basin Team Section (NPS & BT Section) provides environmental education and outreach activities across the state. During SFY2012, the section taught about the importance of water resources, watersheds, nonpoint source pollution and sustainable water management at multiple community events, governor's initiatives, organizational conferences, school programs, and continuing education courses.



The section, with assistance from other Watershed Management Branch staff, supported nearly 30 educational/outreach events and reached a total audience of 4,141 persons during SFY2012. Events included the Floodplain Management Association Conference, Kentucky Association of Mitigation Mangers Conference, and the Governor's Conference on Energy and the Environment. Basin team coordinators played a central role in the education and outreach efforts through field days to demonstrate how to install a rain barrel to working with elementary and junior high students at an environmental camp.

DOW took on the role of lead sponsor for Project WET, an interdisciplinary water science and education program for formal and non-formal educators of students in kindergarten through grade 12 and adults. The national program was previously sponsored by the Kentucky Environmental Education Council (KEEC). The goal of Project WET, an acronym for Water Education for Teachers, is to provide scientifically accurate and educationally sound water resources education materials, training courses and networking services to individuals, organizations, governments and corporations. The activities are grounded in science and are cross-curricular in nature, addressing the chemistry of water, functionality of watersheds, and such contemporary issues as water systems, resource management, water quality, water conservation, land-use planning and wetlands.

River Basin Team Coordination (RBTC) Program

The goal of the RBTC program is to engage citizens and local governments, along with other interested agencies and entities, in education activities and projects that have a positive impact on water quality in their watershed. The basin coordinators (BCs) provide a unique interface between DOW and the public that enhances communication, understanding and cooperation in addressing watershed issues and meeting the goals of the Clean Water Act.

The river basin coordinators continue to implement DOW's watershed management initiatives with cooperating agencies, local governments and citizens across the state. This involvement takes place through participation in basin team meetings, watershed groups' organizational and planning meetings, various citizen groups' activities and efforts, as well as other watershed-related events.

Additionally, the Licking, Kentucky, Green/Tradewater, and Four Rivers basin coordinators all received the updated Watershed Watch "Train-the-Trainer" instruction utilizing the new sampling protocols. The basin coordinators continue to conduct regular Watershed Watch Volunteer Sampler training events.



The basin coordinators continue to provide education on watershed-related topics to a variety of audiences. During SFY2012, BCs have conducted and participated in rain barrel and rain garden workshops and school environmental field days. They have given presentations to conservation district annual meetings, local government and planning meetings, school groups and community groups. A series of rain barrel workshops has been undertaken by the Green River BC in partnership with the Barren County Cooperative Extension Service, Western Kentucky University and the cities of Glasgow, Bowling Green and Campbellsville.

Basin coordinators in the Green/Tradewater, Four Rivers, Kentucky and Licking River basins held a total of 13 river basin team meetings. The basin team meetings are a DOW-sponsored forum for bringing together local citizens, nongovernmental organizations and DOW staff to discuss water issues in their respective river basins.

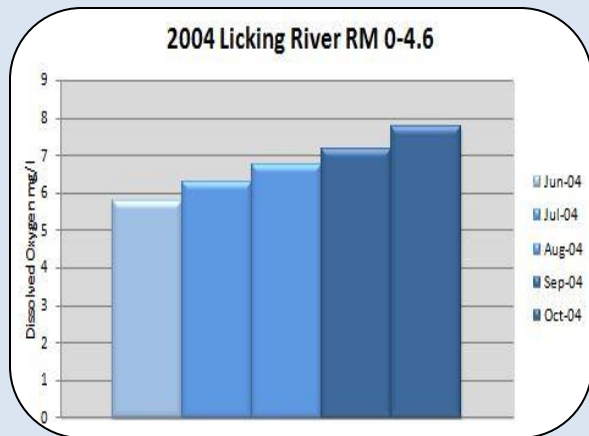
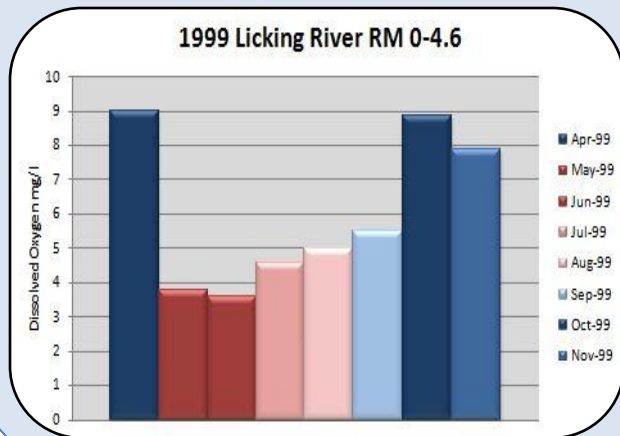
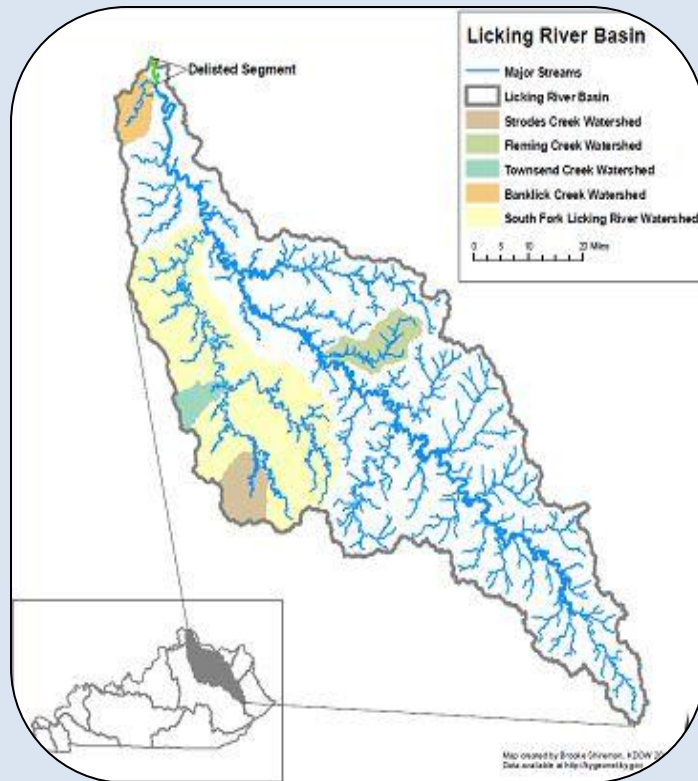
The DOW makes available a large supply of environmental educational equipment that allows teachers and other professionals to use a variety of equipment for educational events. This equipment can be viewed and reserved through the Division's Water Watch Program website, and picked up at the Division's Frankfort Central Office. The website was announced to the public in March 2011 and since the announcement, more than 25 educators have utilized the educational equipment loan program.



Watershed Projects Improve Water Quality in Licking River Basin

The Licking River drains roughly 3,600 square miles that includes rolling farmland, urban/industrial areas and rural towns. Data collected in 1999 revealed the presence of organic enrichment and low dissolved oxygen levels caused, most likely, from combined sewer overflows, urban runoff and storm sewers and that the lowermost portion of the river only partially supported aquatic life.

From 1999 to 2006, Kentucky invested 319(h) nonpoint source funding into four watersheds throughout the Licking River Basin to target these pollution sources. Studies now show that as a result of these management measures, the lowermost segment of the Licking River as it empties into the Ohio River now fully supports aquatic life. Below are highlights of this multi-year effort.





Quality Assurance Program

Assuring the quality of Division of Water internal and external programs continued to be an emphasis during SFY2012. The Quality Assurance Team works on formalizing standard operating procedures to ensure consistency of operation and data analysis. This year, the team accomplished the following:

- Performed 45 laboratory audits under the Drinking Water Laboratory Certification Program.
- Performed 11 Performance Audit Inspections related to coal mining permits.
- Reviewed 63 quality assurance project plans for adherence to DOW standards.
- Performed 240 testing studies for laboratories performing analysis for compliance with drinking water and wastewater regulations.
- Worked with the Nonpoint Source Program to develop SOPs for volunteer water quality sampling

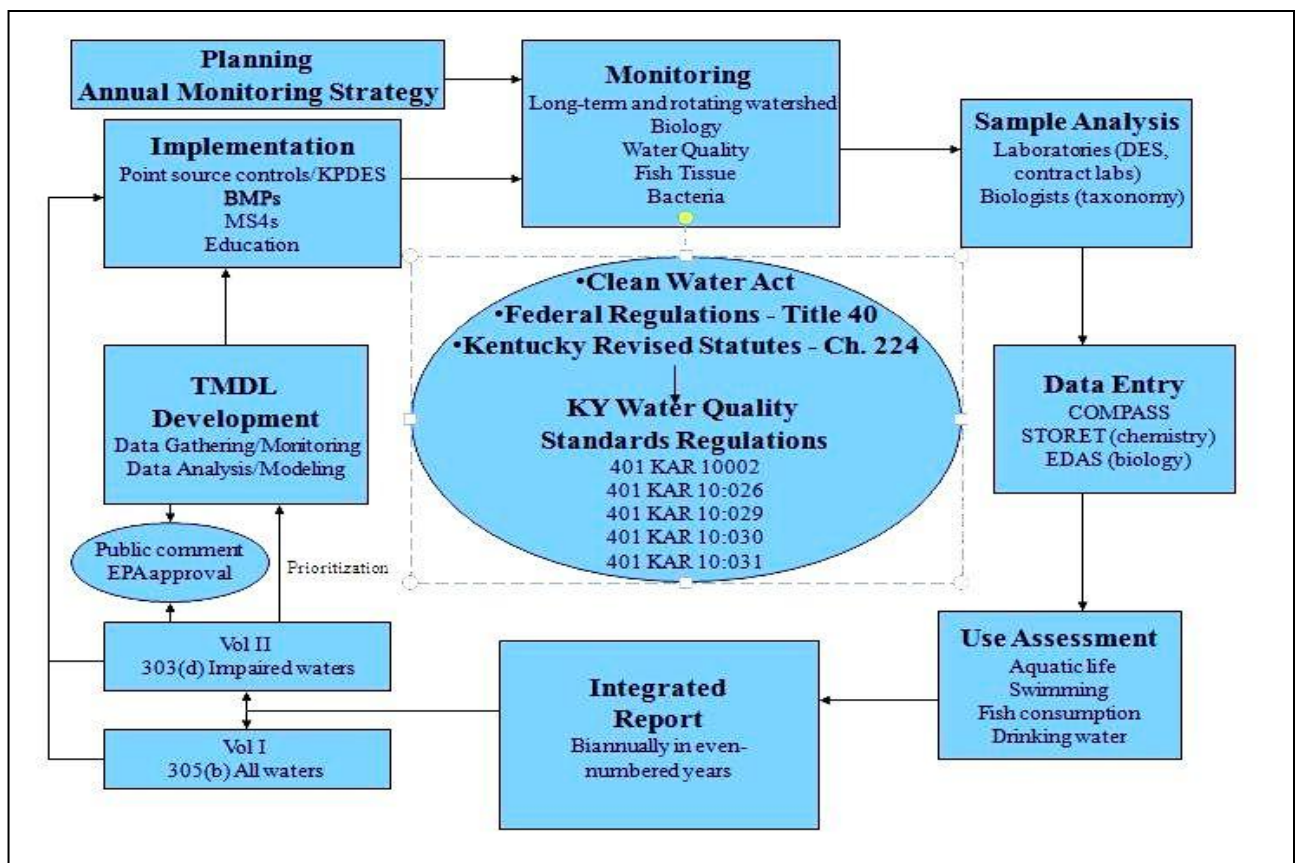
Water Quality Branch

The Water Quality Branch (WQB) collects and analyzes physiochemical and biological data for rivers, streams, lakes wetlands to evaluate the health of Kentucky's waterways. Water quality standards are the tools used to assess whether the quality of Kentucky's rivers and lakes are adequate for public consumption, recreation, agriculture, industry and aquatic life. Programs in the WQB include the Water Quality Certification program and the Wild Rivers Program. Designation and classification of Exceptional Waters, Outstanding States Resource Waters and Outstanding National Resource Waters enable the protection of Kentucky's highest quality waters. Impaired waters are restored through the Total Maximum Daily Load (TMDL) Program.

Nutrient pollution has become a national issue with very significant local impacts. The WQB is developing the first Kentucky Nutrient Reduction Strategy (KNRS) incorporating watershed-based plans and TMDLs as well as possible statewide nutrient numeric criteria.

Branch staff also apply their expertise as advisors on issues related to KPDES permitting, spill response, sampling/training protocols, watershed-based planning and all issues related to aquatic sciences, as well as public education and outreach activities.

Water Quality Assessment Cycle



Triennial Review of Water Quality Standards

Section 303(c) of the Federal Pollution Control Act of 1972 requires states to review, adopt or develop and revise their water quality standards every three years. The current triennial review began informally in mid-2010 with the development of topics and revisions that would be put forward in the 2012 triennial review. Most of this effort will center on updating criteria to reflect current national criteria.

- Revisions to the narrative nutrient standard to clarify DOW's interpretation and application of the standard, including a clarification of the definition of "eutrophication" to specify that nutrients shall not be elevated in a surface water to a level that results in adverse impacts to the aquatic community due to excessive eutrophication. (Eutrophication is the process whereby water bodies receive excessive nutrients that stimulate excessive plant growth.)
- Clarification of the dissolved oxygen standard that applies to the main stem of the Ohio River to specify that the dissolved oxygen standard is an in-stream standard that is achieved after mixing with the receiving water.
- Addition of 14 stream segments as Exceptional Waters.
- Addition of 26 stream segments as Outstanding State Resource Waters.

Wild Rivers Program

Portions of nine rivers and streams of exceptional quality and aesthetic character have been designated as Kentucky Wild Rivers in accordance with KRS 146:200-360. The protected segments include portions of the Cumberland River, Red River, Rockcastle River, Green River, Big South Fork of the Cumberland River, Little South Fork of the Cumberland River, Martin's Fork of the Cumberland River, Rock Creek and Bad Branch of Poor Fork of the Cumberland River.

Each Wild River is actually a linear corridor encompassing all visible land on each side of the river up to a distance of 2,000 feet. The nine Wild River corridors comprise a total of 114 river miles and 26,382 acres of land. Since August 2009, the Wild Rivers Program has acquired an additional 1,400 acres of land, including seven miles of river frontage, along the Little South Fork and Green rivers. An additional three tracts totaling approximately 1,700 acres are scheduled for purchase by the end of 2013.

DOW management of the nearly 3,800-acre Wild Rivers inventory includes eradication of invasive species, monitoring of illegal activities and maintenance of property boundaries. Management activities also include quarterly water quality monitoring in each Wild River corridor, periodic monitoring of high traffic areas and an annual aerial land use survey.

Kentucky's Wild Rivers will gain celebrity status when crews with the Public Broadcasting Service (PBS) station at Western Kentucky University complete visits to Wild Rivers properties throughout the state. Filming began in March and is expected to finish in 2013. The one-hour special is expected to air on PBS stations throughout the state.

Burnett Property Adds 1,000 Acres to Wild Rivers Inventory

The acquisition in January 2012 of 998 contiguous acres in Wayne and McCreary counties will help protect the exceptional quality and aesthetic character of the Cumberland River's Little South Fork (pictured below) – a portion of which is designated a Kentucky Wild River. The \$1.77 million purchase, known as the Burnett property for the former owners, was made possible through an award from the Heritage Land Conservation Fund, which is funded from the sale of nature license plates and the collection of un-mined mineral taxes and environmental fines.

These funds may be used to purchase natural areas with rare habitats and endangered species; areas important to migratory birds; areas that perform important natural functions that are subject to alteration or loss; and areas to be preserved in their natural state for public use, outdoor recreation and education.

The Burnett property met all these criteria. The landscape is varied, with evergreen and deciduous forests, grasslands and a 600-foot-high sandstone-capped knob known as The Pilot. The property includes nearly 2.5 miles of frontage on the Little South Fork Wild Rivers Corridor, which is known to contain a diverse assemblage of mussels and fish. One of these fish, the palezone shiner, is listed as a federally endangered species. The palezone shiner thrives in this stretch of the river due to its flowing water with clear, clean water and rocky, sandy bottoms.

Land-use restrictions associated with the property's listing on the Wild Rivers Inventory will protect the property and its waterway in its natural state for future generations.



Former property owner Karen Burnett, left, and Zach Couch, coordinator of the DOW Wild Rivers Program, converse during his visit last winter to the property located in Wayne and McCreary counties.



The Little South Fork of the Cumberland River flows through the Burnett property. The clear water is home to the endangered palezone shiner fish, which thrives in flowing streams with clear, clean water and rocky, sandy bottoms.

Integrated Report to Congress on the Condition of Water Resources in Kentucky



For more than 20 years, DOW has monitored the quality of Kentucky's rivers, streams, lakes and reservoirs. For many of those years, rivers and streams monitoring consisted of a statewide network of only 45 stations. However, since the implementation of the five-year rotating basin management unit (BMU) approach in 1998, more intensive monitoring has been achieved.

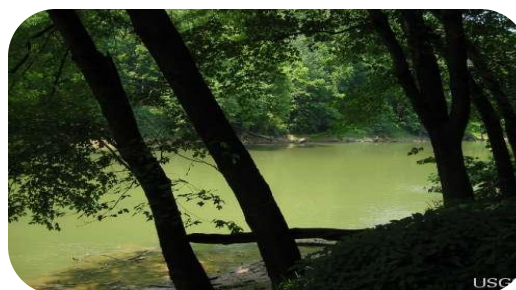
There are now 70 fixed, long-term, water quality monitoring stations throughout the Commonwealth, and an additional 20 to 25 rotating watershed monitoring sites that provide more intensive scrutiny of water quality conditions per BMU. Monitoring of lakes has remained fairly consistent since it began in 1981. The emphasis in this program is to determine the long-term water quality conditions in these reservoirs/lakes.

Every two years, DOW prepares a report on the quality of the state's water resources for the USEPA, which in turn shares the information with the U.S. Congress. The information provided in the "Integrated Report to Congress on the Condition of Water Resources in Kentucky" may be considered as a tool for rule making, budget appropriations and program evaluation by federal legislators. The report is "integrated" because it combines the requirements of Clean Water Act Sections 305(b) and 303(d), which mandate states to report on the general condition of waters and those not meeting water quality standards, resulting in a list known as the Impaired Waters List.

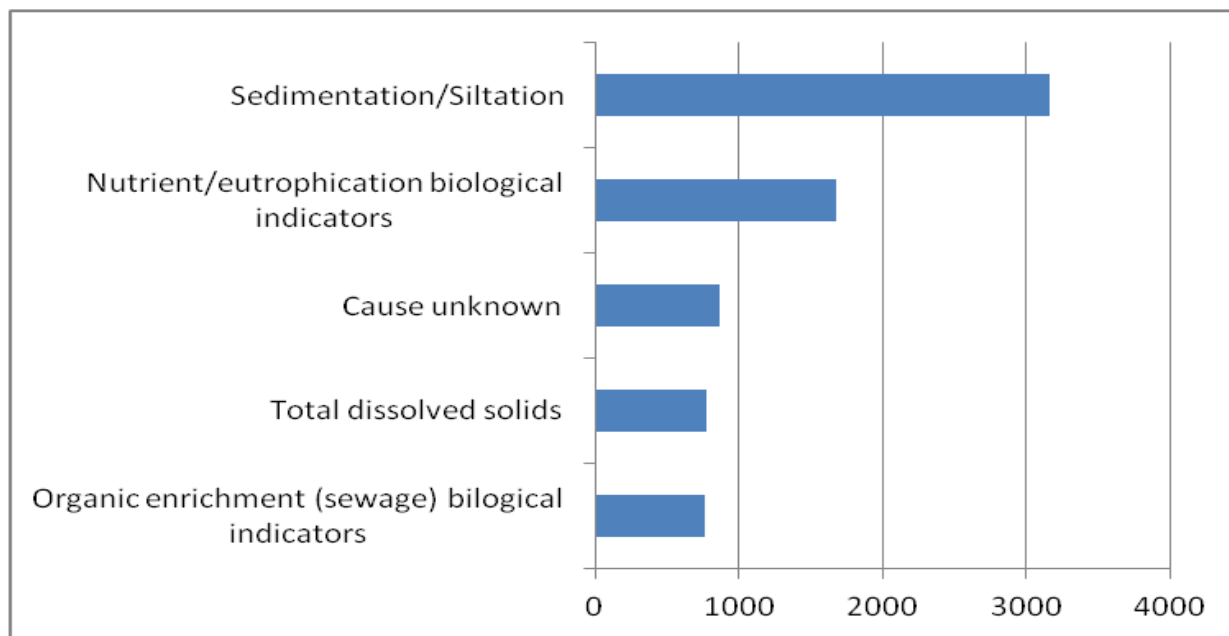
In Kentucky, there are five primary designated uses and one state-defined designated use applied to water bodies. These include aquatic habitat (coldwater and warmwater aquatic habitat), primary contact recreation, secondary contact recreation and domestic water supply (potable water), and outstanding state resource water. Fish consumption is often referred to as a designated use, but it is not specifically defined in Kentucky regulations. It is, however, considered a beneficial use that is strongly implied in water quality regulations.

The 2012 Integrated Report focused on the Salt River/Licking River basin management unit (BMU) and the Upper Cumberland River BMU. Some highlights from this report are discussed below, including:

Major Pollutants Statewide
Warmwater and Coldwater Aquatic Habitat Use
Primary Contact Recreation
Domestic Drinking Water Supply
Fish Consumption
Monitoring
Ambient Water Quality



Major Pollutants Statewide Quantified in Miles



Sediments

Sediments provide habitat and important structure for benthic organisms (organisms that are bottom-dwellers). Excessive and suspended sediment, however, can be harmful to fish and fish habitat.

DOW monitors the quality of stream sediments to gain an overall understanding of the background conditions of sediments in wadeable streams and identify areas where concentrations of pollutants in sediments are elevated from background or historic records. Monitoring of sediments in Kentucky is conducted at the fixed stations within the watershed network framework. Sampling follows the guidelines of the U.S. Geological Survey's [National Water Quality Assessment Program](#). Variables monitored include metals, nutrients and pesticides. Sediment monitoring is usually conducted in the fall when stream levels are lowest.

Sediment monitoring results are accessible through STORET at <http://www.epa.gov/storet/>.

Nutrients

Pollution from excessive nutrients, such as phosphorus and nitrogen, is one of the most prevalent causes of water quality impairment in the United States and in the Commonwealth. Decaying organic matter, human and animal waste, chemicals and fertilizers are often deposited in Kentucky's waterbodies through stormwater runoff. DOW is developing the first Kentucky Nutrient Reduction Strategy based on criteria targets for watershed-based plans and TMDLs as well as possible statewide nutrient numeric criteria.



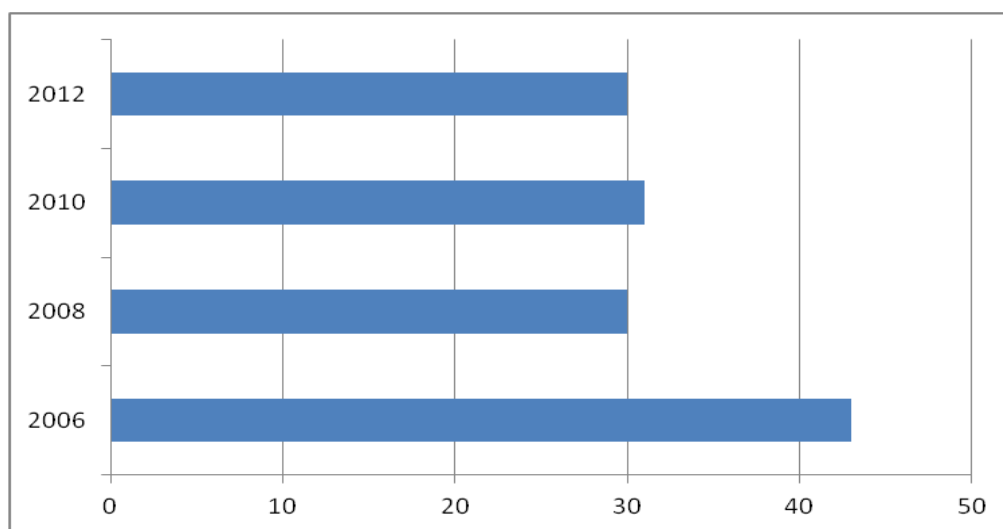
Warmwater and Coldwater Aquatic Habitat Use Support -- Streams

Kentucky possesses nearly 91,000 miles of streams, approximately 850 miles of which are small, first- and second-order intermittent or perennial streams to the great rivers of the Ohio and the Mississippi. Of the 91,000 miles of streams, 10,256 miles (11.3 percent) are assessed for coldwater and warmwater aquatic habitat designated uses (collectively referred to as aquatic life use). Of assessed miles with in-stream data, 5,138 miles of streams, or 50 percent, fully support these designated uses, with the remaining 5,118 assessed miles not supporting these designated uses.



Primary Contact Recreation Use -- Streams

The goal of the criteria applied to primary contact recreation use, or swimming, is to protect people from pathogens that may cause gastric illness if water is ingested while swimming. There are nearly 5,070 stream miles assessed for this designated use with 70 percent of those stream miles not supporting the use and 30 percent fully supporting. This compares with 4,762 stream miles assessed for the 2010 Integrated Report (IR) with 3,268 stream miles, or 69 percent not supporting the use. Compared with data in the 2008 IR, the percentage of stream miles not supporting is the same, at 70 percent: there were 4,493 stream miles assessed and 43 percent of 3,773 assessed stream miles reported in the 2006 IR.

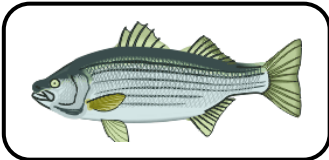


Percentages of assessed stream miles statewide supporting primary contact recreation between 2006 and 2012



Domestic Drinking Water Supply

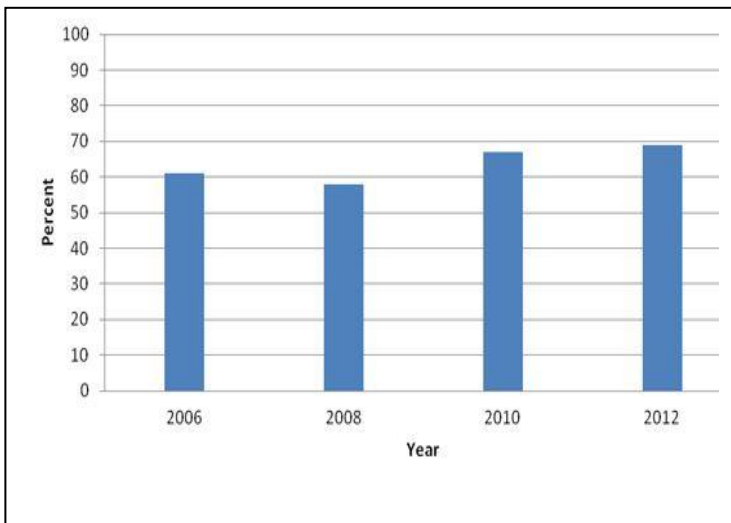
All stream miles fully support domestic drinking water supply use. Where this designated use has been implemented, an associated 689.5 stream miles have been assessed.



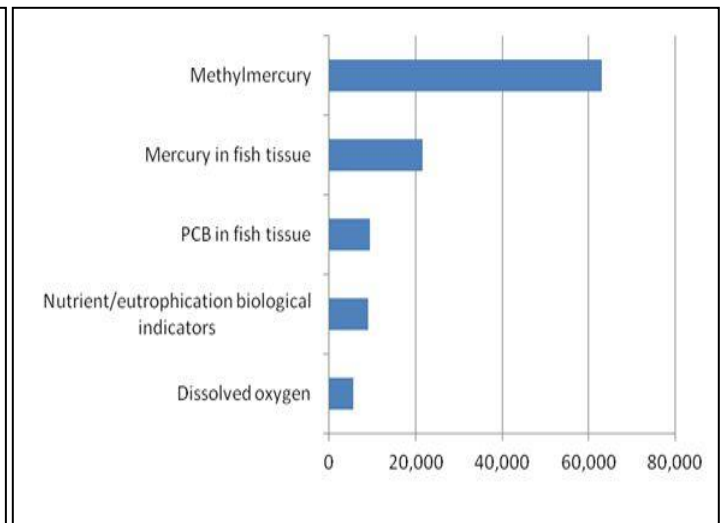
Fish Consumption

This use is not a designated use in Kentucky, but it is implied as one in water quality standards (401 KAR 10:031 Section 2). Like contact recreation uses, this use is based on criteria to protect human health. Fish tissue is analyzed for possible residue of contaminants; the two of primary concern are methylmercury and polychlorinated biphenyl (PCB) chemicals. There have been 1,140 stream miles assessed for fish consumption with 695 stream miles (61 percent) fully supporting and 447 miles not supporting (39 percent). Since preparation of the 2010 IR, this represents a decrease of one percent and four percent, respectively. However, current support has increased by 10 percent as compared to the 2006 IR.

A fish consumption advisory issued in April 2011 remains in effect for the entire state due to low levels of mercury found in fish statewide. The advisory is a precautionary alert for those sensitive populations (children six years and younger and women of childbearing age) to consider limiting their consumption of fish to no more than one meal (a meal is considered eight ounces) per week.



Percentages of monitored and assessed lakes statewide that fully support all assessed use, 2006



Five leading pollutants identified as affecting lakes, ponds and reservoirs statewide in 2012.

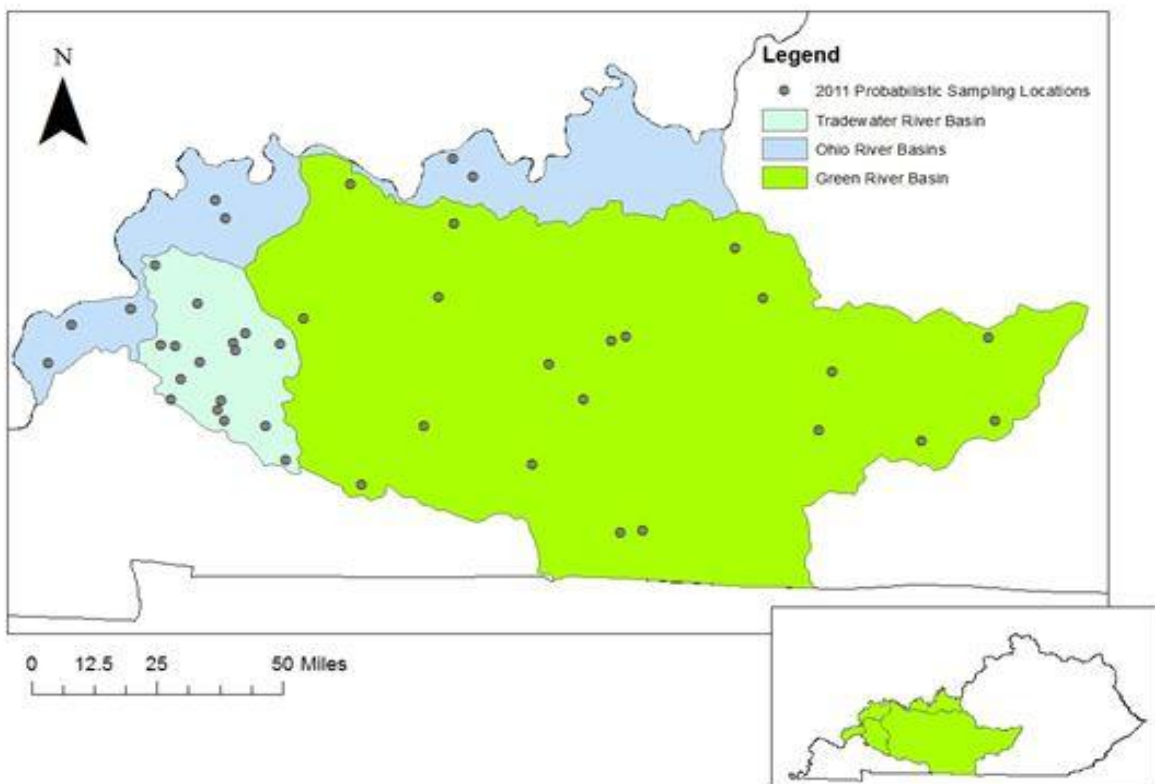


Monitoring

The assessment of water resources under Section 305(b) has broad-reaching implications, as it sets the course on how the division implements many of its programs and provides a foundation to report on water quality trends under appropriate monitoring programs. An annual monitoring strategy is developed and implemented throughout the year. During calendar year 2011, DOW staff focused on the Green River Basin Management Unit (BMU). Monitoring activities included probabilistic stream monitoring, reference reach monitoring, fish tissue collection, lake and large river monitoring, sampling for Chlorophyll a in rivers and testing for ambient water quality. The data will be included in the 2014 IR.

Probabilistic monitoring is the use of random biosurveys of streams to project the level of aquatic life use support in a basin or region. The program uses insects and other invertebrates as the indicator community to determine the overall health of streams in the Commonwealth. The probabilistic approach is useful because it provides data that can be statistically applied to all waters in a basin of similar type, it provides comparable and unbiased data and it is the only means by which thousands of stream miles can be assessed. Sampling in 2011 for the probabilistic monitoring program was conducted in the Green River BMU. Of the 50 randomly selected targeted sites, 44 were sampled. Site assessments were conducted from the beginning of March through late-September in compliance with established index periods for biological assessment of fish and macroinvertebrate communities.

2011 Green and Tradewater Probabilistic Sampling Locations



Reference Reach waters are representatives of the least-impacted streams within a bioregion that serve as chemical, physical and biological models from which to determine impairments to similar streams in other regions. Of 25 Reference Reach streams in the Green River BMU planned for biology sampling, 16 stations were sampled.

Fish tissue sampling in the Green River BMU included 41 specimens from 15 water bodies for analysis, to include testing for methylmercury. Fish tissue samples are collected from many sites across the Commonwealth to help determine if the fish are safe for human consumption. Fish are analyzed for metals, including mercury, PCBs, chlordane, and pesticides and herbicides. Results are used to determine if there are potential problems with contaminants in fish tissue that require further sampling. The data from this analysis is then provided to state and local officials so consumption advisories may be issued when warranted. If results are not elevated, no further fish tissue sampling is conducted in that stream reach.

Lake and reservoir sampling in the Green River BMU included testing for water chemistry and Chlorophyll a data in 23 lakes. Chlorophyll a is being monitored on Kentucky's boatable rivers by testing for nutrients and physio-chemical parameters. These tests will be used to (1) establish baseline data for Chlorophyll a, (2) determine whether correlations exist between nutrient levels and Chlorophyll a in rivers, (3) examine the variability of primary producers in differing river systems and (4) provide data from which to design future, more focused, studies of nutrients and primary production in rivers. During the 2011 sampling season, 129 Chlorophyll a samples were collected at 29 sites.

Large River Monitoring protocols developed by EPA were used to sample ten sites in the Green/Tradewater BMU.

The Kentucky Ambient/Watershed Monitoring Assessment program assesses the status and trends in the quality of Kentucky's surface water resources and to develop an understanding of the major factors that affect water-quality conditions and use attainment. During this reporting cycle, a total of 815 water quality samples were collected in the Green River BMU as part of the ambient water quality program. These included 197 samples from 18 primary sites; 311 samples from 28 rotating sites and 307 samples from 133 nonbasin primary sites. All samples are taken on a monthly basis.



DOW biologist Aric Payne holds a muskie shocked into submission for the purpose of monitoring the fish in large rivers.



DOW biologist Mark Vogel studies bug samples under a microscope at the DOW laboratory in Frankfort.



DOW biologists collect fish samples in Highland Creek.

Total Maximum Daily Loads

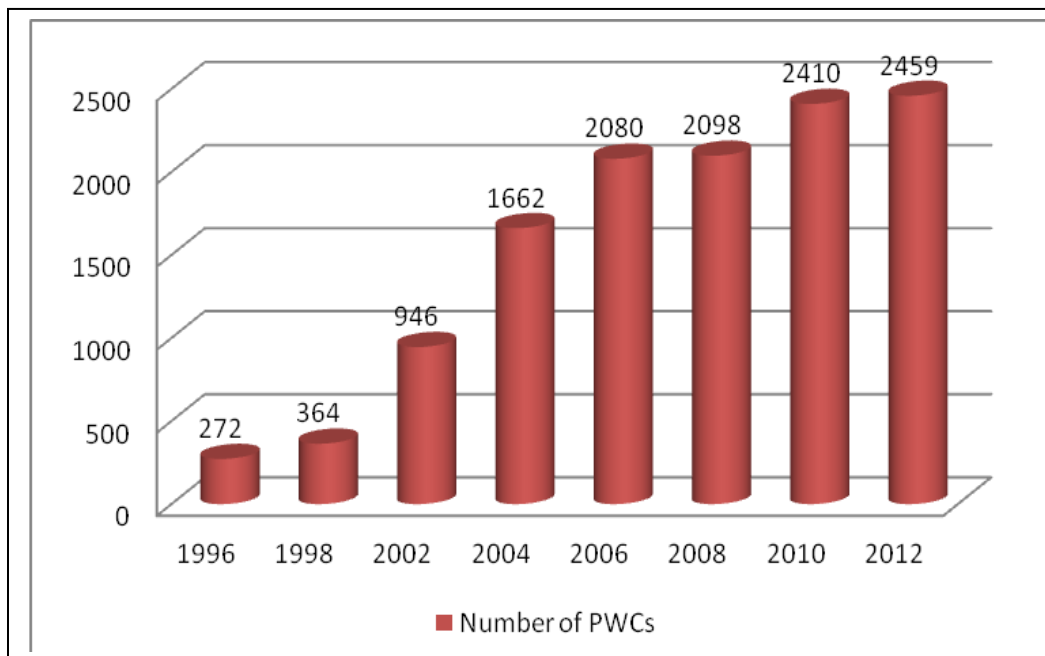
Section 303(d) of the Clean Water Act (CWA) requires states to identify water bodies within their boundaries that have been assessed and are not meeting their designated uses. The Act also requires the development of a Total Maximum Daily Load (TMDL) for these water bodies.

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can naturally assimilate and still maintain its designated use(s). The TMDL calculation, usually expressed in units of mass/unit time, is also termed the "loading capacity." A TMDL must be calculated for each pollutant impairing a lake, spring, pond or specific reach of stream. States then establish a priority ranking for such waters, taking into account their intended uses and the severity of the pollutant. Section 303(d) also requires that states provide a list of this information called the 303(d) list of impaired waters.

The TMDL Section and other programs of the DOW continue to assess waterbodies as a result of the ongoing collection of monitoring data. As a result, the number 303(d) listed streams has increased dramatically over the years. Volume 2 of the draft 2012 Integrated Report contains 2,459 pollutant/waterbody combinations (PWCs). EPA requires that each PWC have an approved TMDL within 13 to 15 years from the initial listing.

In many cases, the TMDL analysis is the trigger for determining the sources of pollutants. The findings may prompt more stringent permit limits for point sources, which can be applied at the time of NPDES permit renewal. If the TMDL identifies nonpoint sources of pollutants, 319(h) nonpoint source pollution grants may be used to fund programs for source assessment and control as well as for individual pollution abatement projects.

Pollutant/Waterbody Combinations



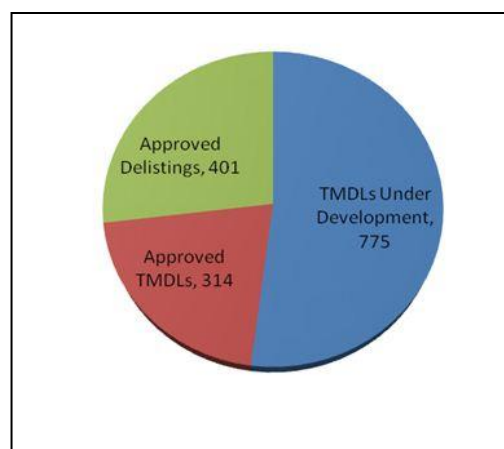
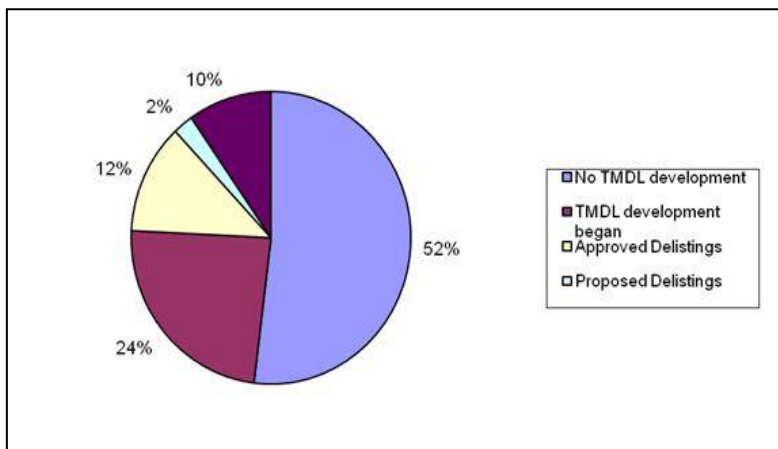
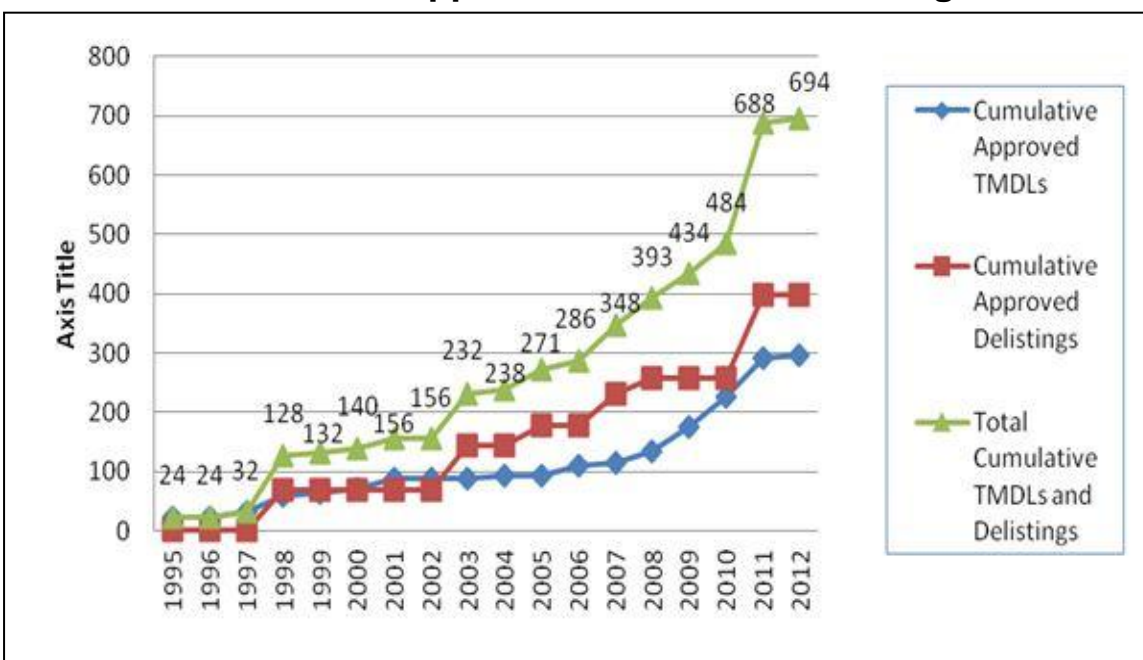
Delisting of streams from the 303(d) list

Streams may be delisted from the impaired waters list when they have an approved TMDL or some other pollution control, or when the state determines that water quality has sufficiently improved.

For Kentucky in 2012, EPA has formally approved TMDLs for a total of 313 PWCs and has approved delisting requests for 431 PWCs. DOW has also requested delistings for an additional 76 PWCs based on the 2012 Integrated Report.

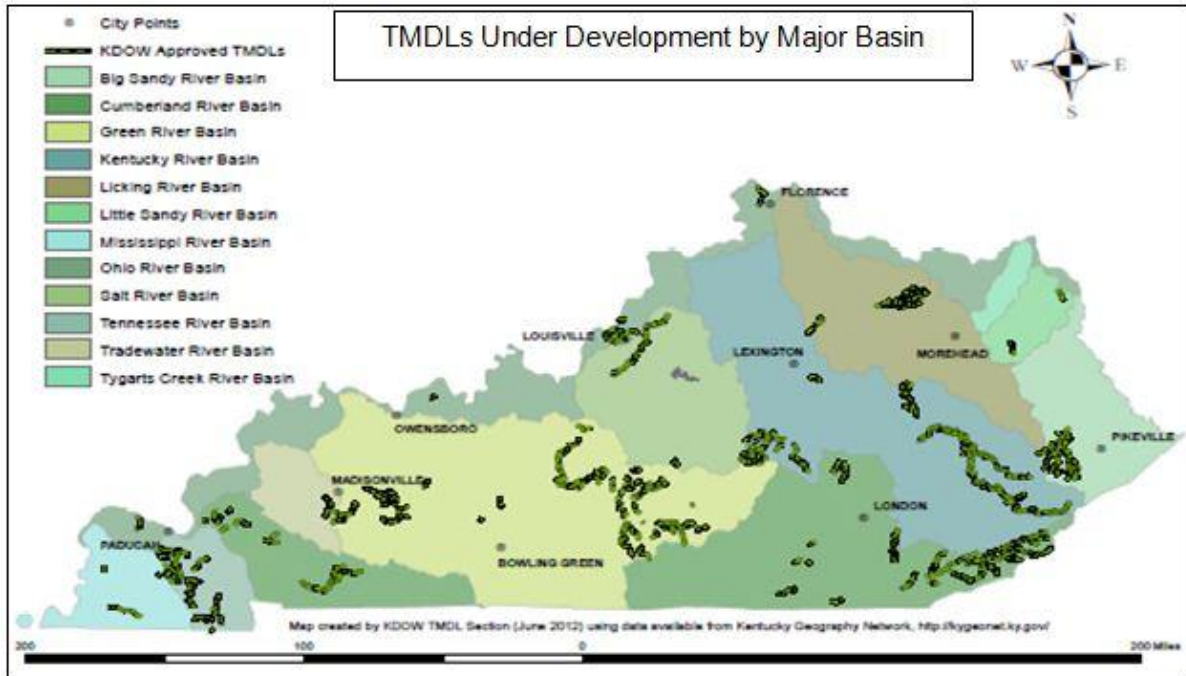
The approved TMDLs can be found at <http://water.ky.gov/waterquality/Pages/ApprovedTMDLs.aspx>.

Cumulative Approved TMDLs and Delistings

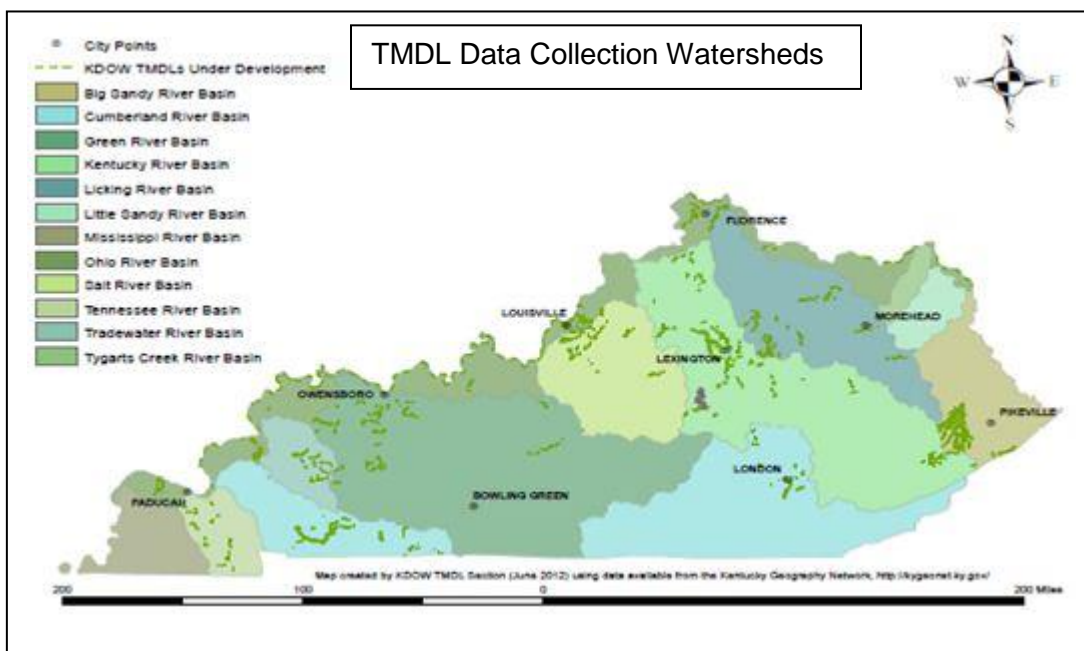


Monitoring and Document Writing for TMDL Development

There are over 700 PWCs for which a TMDL is currently under development. While DOW is responsible for submitting TMDLs to USEPA, many are being developed by third parties, including USEPA, universities and consultants. TMDL development begins with the monitoring of the impaired stream segments.



During SFY2012, TMDL monitoring staff collected samples from 64 chemical, 20 biological and 46 bacteriological sites located within the five watersheds. Most chemical sites are visited on a monthly basis for one year. Bacteriological sites are visited at least 10 times during the summer primary contact recreation season. For SFY2012, the monitoring staff collected 607 chemical, 257 bacteriological and 20 biological samples. The map below shows the watersheds in which TMDL monitoring data was collected in SFY2012.



TMDL writers utilize the data collected by the monitoring staff to calculate the TMDL for each pollutant/waterbody combination. Once the data are analyzed, a report is written. The TMDL reports must undergo internal DOW review (preliminary review), a 30-day public comment period (proposed review) and must be approved by USEPA (final review). The TMDL reports contain limits for both point and nonpoint sources of the pollutant such that a waterbody can be brought back to full support of its designated uses.

The TMDL Section had committed to USEPA to obtain approval for 57 TMDLs for FFY2012, which ends Sept. 30. The TMDL Section has written and received formal EPA approval for six bacteria TMDLs in the Beargrass Creek Watershed and one bacteria revision in Brush and Crooked Creeks. Eleven bacteria TMDLs in the South Elkhorn Watershed went to public notice in December 2011. Seven bacteria TMDLs in the Cane Run Watershed are at public notice until Sept. 4, 2012.

Data Quality Assessment

The TMDL Section is improving the defensibility of TMDLs and their supporting data by writing, implementing and revising Standard Operating Procedures (SOPs) and Quality Assurance Project Plans (QAPPs). An individual monitoring QAPP is updated annually and includes all watersheds that are being monitored that year. In addition, the section has an approved SOP for pathogen TMDL development (including a Standard Work document), a QAPP for TMDL Data Analysis, and a Standard Work document for TMDL writing and formatting. The TMDL Section revised the TMDL Data Analysis QAPP this year.

Education and Outreach

The Total Maximum Daily Load (TMDL) Section publishes pre- and post-monitoring reports that seek to educate people about the Clean Water Act and relay scientific information. If a stream is selected for TMDL development, the watershed is assessed to understand the potential sources of pollution and determine where the study sites will be located. This pre-monitoring process is described in the Initial Watershed Report.

The **Initial Watershed Reports** describe why the watershed is being monitored, where the impaired streams are within the watershed and where the TMDL Section will monitor the watershed. Once the year-long study is complete, the data is used to determine the current state of the watershed. This post-monitoring process is described in the Watershed Health Report, which not only highlights where improvement is needed within the watershed, but also highlights the strengths of the watershed in hopes of protecting areas that are not yet impaired.

In the **Watershed Health Reports**, both signs of water quality and signs of biological health receive a letter grade of A through F based on numeric criteria or ecologically significant values. These grades are then averaged to achieve an overarching watershed grade to demonstrate the overall health of the system.

The Health Reports can be found at <http://water.ky.gov/waterquality/Pages/TMDLHealthReports.aspx>.



Water Quality Certification

The Water Quality Certification (WQC) Section administers water quality certifications through the Clean Water Act Section 401 and administers grants relating to wetland assessment. The WQC issued by the section certifies that any federal permit involving a discharge to waters of the Commonwealth does not violate water quality standards. Water quality certifications also address mitigation measures when waters are proposed to be altered/affected from their natural functioning.

The USACE Section 404 dredge and fill permit is the most common permit certified. Licenses from the Federal Energy Regulatory Commission and civil projects through the U.S. Army Corps of Engineers are also among certifications issued.

In March 2012, the section recertified the new USACE Nationwide Permits to decrease wetland impacts to 0.5 acre and exclude permanently-protected mitigation sites. A provision was also added whereby an individual WQC may be required if a project is likely to have a significant adverse effect on water quality.

Examples of activities that may require a Section 401 water quality certification include filling of wetlands, stream relocations, construction of bridges and culverts, and restorations of streams and wetlands.



The restoration of Wilson Stream in the Bernheim Forest will help ensure the stream's future ability to purify water and maintain good habitat. The project was funded by a 319(h) nonpoint source pollution grant administered by DOW.

Action	Number
Issued individual certifications	75
Wetland assessments	40
Conducted site visits	256
Participated on interagency review team	21 site visits to in-lieu fee and private bank projects

Water Quality Certification Activities

Water Quality Certification Section takes the lead in assessing wetlands

Under the Clean Water Act, states are required to monitor and report on the quality of all their waters, including wetlands. It is DOW's goal to raise the quantity and quality of wetlands in the state of Kentucky.

The WQC Section was the lead agency for Kentucky in the 2011 USEPA National Wetland Condition Assessment. The nationwide study assessed over 1,000 wetlands; Kentucky had 12 of those sites. Wetland assessment methodology skills gained from participation in this study have benefited Kentucky's ambient wetland assessment program. The development of an ambient wetland assessment program will establish a baseline of ambient wetland conditions, track trends and assist in the development of wetland water quality standards.



Ballard Wildlife Management Area



Lincoln County stream and wetland



DOW biologist Barbara Scott and contractor/ botanist Jeremy Schewe mount a vegetation sample taken from a wetland area.



DOW biologist Chloe Tewksbury color-matches a wetlands soil sample.



Rapid Assessment Targets Wetlands

The Water Quality Certification Section received a \$700,000 Wetland Program Development Grant in early 2010 to develop and biologically validate a rapid wetland assessment method specifically for Kentucky. This method is critically needed to assess the condition and functions of wetlands under the jurisdiction of the Section 404/401 permitting process. This regulatory tool will enable the USACE and the WQC Section to scientifically assess wetland impacts so they can be avoided, reduced and/or properly mitigated.

Researchers will use the method to evaluate potential dredge and fill impacts, assess mitigation and restoration success, assist in watershed planning and support the development of regulations protecting unique or high-quality wetlands. The focus will be on the primary wetland types found within the Lower Tennessee and Upper Cumberland regions.

A multi-agency technical advisory committee was formed in January; by May 2011 the group had produced a draft rapid wetland assessment method. Currently, Eastern Kentucky University is field testing the method in the Upper Cumberland Basin and will present their results to the technical advisory workgroup at their fall meeting.



DOW biologists Chloe Tewksbury and Barbara Scott obtain and record soil samples at a Kentucky wetland.



DOW biologists Barbara Scott and Lisa Hicks explore a Kentucky wetland.

Division of Water Organizational Chart

