2013

Water Utility Resource Report:

A Look at Indiana's Water Supply & Resource Needs

Prepared by the

Indiana Utility Regulatory Commission

Acknowledgements

The Indiana Utility Regulatory Commission would like to thank all of the state's water utilities and the following organizations for their participation and assistance:

- Layne Christensen Company
- Indiana Department of Natural Resources
- Indiana Department of Environmental Management
- Indiana Geological Survey
- Indiana Chapter of American Water Works Association
- Indiana Chamber of Commerce
- Indiana Rural Water Association
- Alliance of Indiana Rural Water
- Indiana Association of Cities and Towns
- Indiana Office of Utility Consumer Counselor

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Executive Summary & Recommendations

In 2012, the General Assembly enacted Senate Enrolled Act (SEA) 132 (codified as IC 8-1-30.5), which requires the Indiana Utility Regulatory Commission (IURC) to gather information about the state's water resources. This new statute, coupled with the 2012 drought, heightens the importance of the data collected from both Indiana's water utilities and state agencies and helps us better understand the strengths and challenges facing this industry.

For each calendar year, SEA 132 requires all water utilities, even those not regulated by the IURC, to provide information about the following: water resources used, operational and maintenance costs, utility plant in service, number of customers, service territory, and the amount and types of funding received.

Out of 555 water utilities, 487 utilities responded to the IURC's request for information; however, only 374 submissions were deemed complete. Although the statute requires utilities to participate, there are no consequences in the statute for non-compliance. Significant public outreach was conducted by the IURC to educate utility managers and staff about the requirement. Outside organizations also assisted by reaching out to their members on behalf of the IURC. Although the number of participating utilities is still lower than desired, the IURC believes outreach by these organizations was instrumental in getting so many non-jurisdictional utilities to participate and is grateful for the assistance provided.

In accordance with statute, this report presents information about the industry as a whole, provides data analysis, and makes specific recommendations. The report also identifies general findings, which are detailed below:

- *Very little research has been conducted on the nexus between water and economic development;*
- *Better coordination is needed at the state level among the various agencies so that water issues can be explored on a broader scale; and*
- *Strategic planning is lacking for many medium and small utilities.*

Recommendations

Based on the information gathered, the IURC has the following recommendations:

Develop rules or laws to establish procedures for additional significant withdrawals from aquifers, surface waters or interbasin transfers. The Indiana Department of Natural Resources (IDNR) collects information on Significant Water Withdrawal Facilities (SWWF) capable of withdrawing over 100,000 gal/day. Current law grants IDNR the authority to investigate and remedy any adverse impacts a SWWF may have on a non-SWWF (typically small residential wells); however, it is after withdrawal has occurred. Without a procedure in place to proactively assess the impacts of withdrawals on stream flows and groundwater levels, the water resources cannot be sustainably managed nor can the occurrence of water-use conflicts be minimized, especially during droughts. If a SWWF desires to withdraw water from an aquifer, surface water supply, or another basin, rules or laws should be enacted to enable IDNR to require that the SWWF show that other users will not be adversely affected. [To read more, see pg. 14]

Begin Integrated Water Resources Management. Typically water management only focuses on water-supply development without consideration of ecosystems or social impacts. An alternative to this traditional method is Integrated Water Resources Management (IWRM). IWRM is "a process that promotes the coordinated development and management of water, land, and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment."[1] The energy industry has a similar process in place, referred to as integrated resource planning (170 IAC 4-7).

The American Water Resources Association[2] (AWRA) identifies and defines the four key concepts of IWRM as: (1) manage water sustainably; (2) require coordination for integration; (3) encourage participation; and (4) understand that resources are connected. Indiana can be put on the path to integrated water resource management by exploring, as a starting point, the following structures and group functions:

- Form a separate institution similar to the State Utility Forecasting Group (SUFG) to focus on water and perform water research studies, as directed by the Legislature. This format currently works for the energy sector, whereby the SUFG uses modeling to analyze and forecast the supply, demand, and price of electricity.

- Establish the Integrated Water Resource Management Coordinating Committee. The proposed Integrated Water Resource Management Coordinating Committee would capitalize and leverage existing agency strengths and be composed of the following state agencies: Indiana Economic Development Corporation (IEDC), IDNR, Indiana Department of Environmental Management (IDEM), Indiana Finance Authority (IFA), Homeland Security (IDHS), Indiana Geological Survey (IGS), Office of Utility Consumer Counselor (OUCC), and IURC. This group would focus on planning, water resource management, and economic development related thereto. It would meet at least quarterly to discuss water resource issues and formulate plans to put Indiana on the path to using IWRM.

- Reactivate the Water Shortage Task Force and give the group new direction and purpose. [To read more, see pg. 68]

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[1] Global Water Partnership. 2012. What is IWRM? http://www.gwp.org/The-Challenge/What-is-IWRM/

[2] American Water Resources Association. 2012. Case Studies in Integrated Water Resources Management: From Local Stewardship to National Vision. http://www.awra.org/committees/AWRA-Case-Studies-IWRM.pdf

Promote efficiency, sound management and best practices for water utilities by:

- Encouraging the use of water purchase agreements among water utilities.
- Encouraging the shared ownership of treatment and production facilities.
- Requiring minimum educational criteria for clerk-treasurers and training for the decision makers of water utilities.
- Encouraging the reduction of lost or unaccounted for water.
- Encouraging savings based upon economies of scale through purchasing cooperatives or mergers where it makes sense.
  [To read more, see pg. 53]

Require drought planning by water utilities. All drinking water utilities need to establish practical and effective drought plans to protect their users. The drought plan should identify response measures for different stages of drought to reduce demand and identify alternative sources of supply that would be used to satisfy high priority uses during the drought. State agencies should also prepare and coordinate on messaging to ensure consistency and a unified approach to response efforts. [To read more, see pg. 61]

Improve the managerial, financial, and technical requirements for forming water and wastewater utilities. Establish more stringent guidelines and protections in the formation of new water and wastewater utilities to prevent the proliferation of small, troubled utilities. Additional checks also should be established to determine financial solvency. [To read more, see pg. 55]

Evaluate the adequacy of existing monitoring. IDNR and the United States Geological Survey (USGS) operate and monitor a network of 36 continuous record monitoring wells in Indiana. Currently USGS is assessing whether the size of the network is an adequate representation of all the aquifers, watersheds, ecosystems, and climatic regions in the state, because over time the network has been reduced from 90 wells to 36 wells. The USGS is currently also conducting regional groundwater availability studies, including one on the Glacial Aquifer System, which underlies 25 states and two-thirds of Indiana. Like the USGS, state agencies should further refine monitoring efforts for water supply, demand, and quality, prioritizing the most heavily used aquifers and streams. [To read more, see pg. 59]

Conduct a cost-benefit analysis to determine if the benefits of obtaining more precise water supply data exceed the cost. Anecdotal evidence suggests Indiana is blessed with adequate water supplies and is well positioned to use this resource as an economic advantage compared to states lacking water. However, studies have not been completed that would more precisely measure the amount of water we have or how long it might last at current rates of consumption. [To read more, see pg. 58]

Use existing and underutilized water resources in southern Indiana. Water utility resource plans should maximize use of currently under-utilized state-financed reservoirs and evaluate the state-owned Charlestown groundwater supply for use as a resource. [To read more, see pg. 65]

Conduct a water symposium. State agencies should partner with water utilities and trade associations to host a public water symposium to address issues related to summer preparedness, utility finances, master planning, and rate structures. [To read more, see pg. 62]

Evaluate the scope of the existing law. SEA 132 should be refined based on the quality and value of data gathered this year. [To read more, see pg. 31]

These recommendations include those that can be implemented in the near term; however, there are others that will require additional research and planning. For example, it is difficult to show trending or to provide long-term analysis when only one year's worth of data is available. Therefore, it is advisable that the water utilities' reporting requirement continue for comparison purposes until the Legislature is satisfied with the information obtained.

Section I: Introduction

By enacting SEA 132, the Indiana Legislature has taken the first steps to address the state's long-term water resource and water utility infrastructure needs. Under this statute, the IURC has been charged with the vital task of conducting a yearly survey of each water utility in the state, summarizing the data and information received in an annual report to both the Legislative Council and the Regulatory Flexibility Committee, and most importantly, making credible, actionable recommendations.

To begin, SEA 132 required the IURC to gather the following information from each utility:

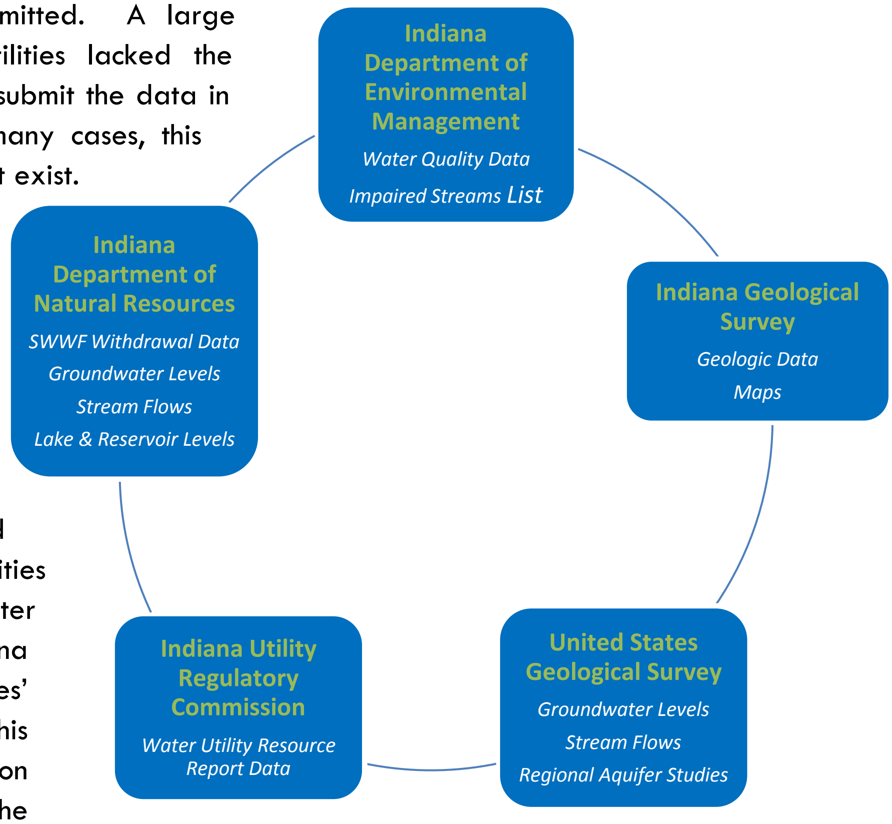
- Operations and maintenance costs;
- The number of Indiana customers served by the water utility;
- A description of the water utility's service territory in Indiana;
- The total utility plant in service with respect to the water utility's Indiana customers;
- The amount and location of the water resources used by the water utility to provide water service to the water utility's Indiana customers;
- The availability and location of additional water resources that could be used, if necessary, by the water utility to provide water service to Indiana customers; and
- The amount of funding received, including the purpose of the funding, from the following sources:
    - A state revolving loan program under IC 13-18;
    - The Office of Community and Rural Affairs established by IC 4-4-9.7-4;
    - United States Department of Agriculture rural development loans and grants;
    - The Indiana Bond Bank; and
    - The issuance of any debt instruments for the purpose of raising capital to fund infrastructure projects.

In addition to summarizing the data and information, the IURC was asked to include recommendations concerning the following:

- The efficient use of financial resources by water utilities;
- Necessary infrastructure investments by water utilities; and
- Actions designed to minimize impacts on the rates and charges imposed on water and wastewater customers.

The IURC began this process by launching an extensive outreach effort to various stakeholders, with the goal of engaging in dialogue and education regarding the purpose and intent of SEA 132. By the fall of 2012, the IURC had devised a model survey instrument that reflected the statutory guidelines and specific questions prescribed by SEA 132. This survey was vetted with numerous utilities, the American Water Works Association (AWWA) Indiana Chapter, industry groups, IDNR, and IDEM in order to ensure that the survey was as understandable and user-friendly as possible.

The survey was deployed online in January 2013. Utilities were asked to respond by March 2013 and were strongly encouraged to use the online form to submit the data electronically. Throughout the process, IURC staff was available to answer questions and provide technical support. Despite these efforts, and as detailed in Section VII of this report, the Commission was faced with numerous challenges in working with the data that many of the smaller, unregulated utilities submitted. A large percentage of these utilities lacked the resources to gather and submit the data in a useable format. In many cases, this information simply did not exist.



As directed by the Legislature, this report focuses on the various ways in which the utilities use water resources, and the operations and maintenance costs the utilities incurred in providing water service to Indiana customers. The utilities' data is central to this analysis. As the legislation clearly prescribed the information to be requested, the IURC did not request data regarding the utilities' rates and charges or internal policies, with the exception of water conservation and curtailment. The IURC did, however, request and report data on planned rate increases for the next five years, and planned infrastructure improvements. The methodology that the IURC used in analyzing the data is discussed in further detail in Section VII.

In order to present the broader water resource issues in context, the IURC relied upon data provided by IDNR, Layne Christensen, IDEM, and numerous other resources as noted in the report. The IURC wishes to acknowledge and thank all contributors, including the many utilities that participated, for their valued assistance.

Section II: Indiana's Economy and Water Resources

Indiana's economy is diversified and boasts agriculture, manufacturing, mining, health care, life sciences, biomedical, and education industries. Indiana is also fortunate to have an extensive rail, road, and waterway transportation system that carries many of the products throughout the United States and ultimately oversees. Water is at the foundation of Indiana's economy because agriculture, electric power, and manufacturing use large volumes of this resource.

The distribution of water resources is not uniform across the state, and, at any time, areas of Indiana can experience drought or flooding. Additional research is needed to understand the link between water resources and economic development, and there is no comprehensive study on the relationship between Indiana's economy and its water resources. However, the U.S. Environmental Protection Agency (U.S. EPA) is completing a comprehensive federal study on water resources and economic development.[3] At this time, a background report has been prepared with seven expert papers that examine various aspects of water use in the U.S. economy.

FINDING: No comprehensive studies have been completed on the relationship between Indiana's economy and water resources.

According to the U.S. EPA Background Report[4], it "is a literature review and general analysis of U.S. economic and water resource statistics. The purpose of the report is to provide a consistent set of conceptual and statistical information on key sectors of the U.S. economy, and to provide a foundation for evaluating cross-cutting themes. It also helped to inform Part 2 of the study, identifying broad focal areas for the solicitation of proposals for further research." Following the general outline of the U.S. EPA Background Report, the IURC has provided highlights and examples of the impact Indiana's water resources can have on agriculture, commercial fishing, commercial navigation, electric power generation, manufacturing, mining and energy resource extraction, recreation and tourism.

Great Lakes

Indiana borders Lake Michigan, the second largest of the Great Lakes. Together, the five Great Lakes hold six quadrillion gallons of freshwater – enough water to spread a foot-deep layer across North America, South America, and Africa.[5] The Great Lakes support manufacturing, tourism and recreation, shipping, agriculture, science and engineering, utilities, and mining. However, this water-rich region is not immune to shortages. As such, water withdrawal from the Great Lakes is governed by the Great Lakes Compact, which limits any future increase in withdrawals within the Great Lakes watershed. According to the IDNR, the Great Lakes Compact will "play a critical role in the preservation of existing businesses and the creation of new jobs."

[3] *See*, http://water.epa.gov/action/importanceofwater/study.cfm
[4] *See*, The Importance of Water to the U.S. Economy Part 1: Background Report, Office of Water U.S. Environmental Protection Agency, September 2012.
[5] Growing Blue, 2013

A 2011 study by the University of Michigan, using 2009 employment data, estimated that 1.5 million jobs have some connection to the Great Lakes, which translates to $62 billon in wages.[6] In Indiana, 54,397 jobs depend on the lakes. A recent study on Indiana Dunes National Lakeshore Park indicated that visitor spending contributed approximately $65 million to the local economy in 2011.[7]

Agriculture

According to the Indiana Business Research Center, in 2010, the two most valuable agricultural products in Indiana in terms of revenue were grains ($16.4 billion) and livestock ($1.7 billion), both intensive water users.[8] For example, Fair Oaks Farms in northwestern Indiana has approximately 32,000 cows.[9] On average, a dairy cow requires about 23.6 gallons of water per day, which is just over 755,000 gallons per day total.[10] The 2012 drought revealed the economic impact of a water shortage. Fortunately, for Indiana farmers, crop insurance provided $900 million in payments for corn losses and $138 million for soybean losses.[11] To prepare for future drought events, Indiana farmers increased the use of irrigation and drilled more wells.[12]

If not properly monitored, the increasing use of fertilizers and pesticides as a means of expanding agriculture production, along with the expansion of confined animal feeding operations, may damage surface and groundwater supplies, which will ultimately increase the cost of water.

Manufacturing

Indiana's manufacturing sector is dominated by three major industries: transportation equipment, chemicals, and primary metals. To better manage costs, many manufacturers do not rely on a utility to provide water for manufacturing activities. Indiana continues to rank among the highest industrial self-supplied water users in the U.S., using 2,300 million gallons per day (mgd).[13]

The steel industry grew in northwest Indiana primarily because of Lake Michigan. The lake provided not only a transportation route but also a large, reliable water source. Steel mills consume a phenomenal amount of water; for every one ton of steel produced, between 13,000 and 23,000 gallons of water are used.[14]

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6 Vaccaro and Read, 2011

7 Indiana Dune National Lakeshore: Economic Impact Report and Recommendations, Allison Holton, Kristen Roadman, and Mary Freeney, University of Illinois at Chicago, 2012.

8 Cultivating Trade: The Economic Impact of Indiana's Agricultural Exports, Indiana Business Research Center, Kelley School of Business, April 2012.

9 Correspondence with Fair Oaks Farms

10 Water Use on Ohio Dairy Farms, Mike Brugger, The Ohio State University Extension, 2007.

11 http://www.purdue.edu/newsroom/releases/2013/Q1/indiana-crop-insurance-payouts-top-1-billion--a-state-record.html

12 http://www.trust.org/item/?map=insight-us-farmers-hit-paydirt-with-irrigation-in-arid-spring

13 http://www.iwrrc.org/index.html#

14 Ellis et al., n.d.

While the steel industry has been in Indiana for many years, new industries are making Indiana home due to our water resources. For example, Nestle Waters specifically cited an excellent water supply as a reason for locating a plant in Greenwood.[15] Also, Indiana is home to one of the largest pharmaceutical companies in the world, Eli Lilly and Company (Lilly). Like many manufacturing companies, Lilly is trying to use water resources more efficiently. In 2007, Lilly was using approximately 5 billion gallons of water a year. After various efforts to reduce water intake, such as identifying and repairing leaks, improving purified water production efficiency, and treating and reusing water in cooling tower systems, water intake was reduced to 3.5 billion gallons by 2010.[16]

Mining and Energy Resource Extraction

Indiana is home to many valuable resources such as limestone, coal, and corn.[17] For example, bituminous coal has become one of Indiana's most valuable natural resources since its discovery along the banks of the Wabash River in 1736. Approximately 36 million tons of coal are extracted every year from Indiana coal mines.[18] Because of the state's vast corn crop, Indiana has 11 operating ethanol plants, which require large supplies of water.[19]

As in many states, Indiana gas and oil well drillers are using hydraulic fracturing to extract oil and natural gas. Between 2005 and 2010, as much as 23% of the new oil and gas wells drilled in Indiana used hydraulic fracturing.[20] To protect the state's groundwater, the state Legislature passed HEA 1107 which requires oil and gas well operators that use hydraulic fracturing to report to IDNR the materials and the volume of chemicals used in the fracturing fluid. This disclosure law is necessary as there is ongoing controversy concerning the possibility that these fracturing fluids could leak into water aquifers.

Electric Power Generation

The majority of the power plants producing electricity are coal-fired units, which rely on water as a cooling agent. Much of the cooling water is surface water, such as the Wabash River. In 2012, the drought reduced the levels of the Wabash River and increased its temperature so much as to cause outages at two power plants.[21] Power plants have permits from IDEM that limit the temperature of the discharge water; when there is little water and the water is already hot, the utility may have to curtail output in whole or part to stay within its permit conditions.

Indiana utilities participate in regional wholesale markets through entities such as the Pennsylvania, Jersey, Maryland Power Pool (PJM) and Midcontinent Independent Transmission System Operator, Inc. (MISO.) By coordinating electricity over a multi-state footprint, PJM and

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[15] http://www.insideindianabusiness.com/newsitem.asp?id=25251&ts=true (May 16, 2003)
[16] http://www.lilly.com/Responsibility/environmental-sustainability/Pages/performance-in-operations.aspx
[17] http://igs.indiana.edu/MineralResources/
[18] http://igs.indiana.edu/MineralResources/
[19] Indiana State Department of Agriculture FY 2014-2015 Biennial Budget Transmittal Letter
[20] http://indianapublicmedia.org/news/indiana-dnr-mandates-companies-report-fracking-chemicals-36023/
[21] 2013 Summer Reliability Duke Energy Indiana, May 15, 2013.

MISO minimize the potential impact of individual utility outages like these. However, generation using in-state resources was hampered by the most recent drought which ultimately affects the market as a whole.

Commercial Fishing

Most of Indiana's commercial fishing takes place in Lake Michigan. The amount of commercial fishing has diminished as the fish population in Lake Michigan has decreased due to a combination of factors including habitat, infectious diseases, pollution, and changes in the food chain due to invasive species.

Commercial Navigation[22]

The state of Indiana ships about 70 million tons of cargo by water each year, which ranks it 14th among all U.S. states. Indiana has direct access to two major freight transportation arteries: the Great Lakes/St. Lawrence Seaway (via Lake Michigan at Burns Harbor) and the Inland Waterway System (via the Ohio River at Jeffersonville and Mount Vernon). These three ports handle about $1.89 billion in cargo shipments per year, which includes grain, coal, steel, fertilizer, limestone and miscellaneous heavy lift project cargo. The Ports of Indiana agency's website indicates the economic impact of Indiana's three ports shows an annual contribution to the state's economy of $5.4 billion - up from $1.5 billion in 1999.

Recreation and Tourism

Indiana has many water-related recreation areas from Lake Michigan to the north, the Ohio River to the south, the Wabash River (which bisects the state) and large reservoirs (Geist, Eagle Creek, Morse, Patoka, Brookville, and Monroe), as well as many lakes. These recreation areas add to the overall quality of life in Indiana, employ thousands of people, and are anchors to campgrounds, hotels and restaurants serving tourists. The Outdoor Industry Association reports that, in Indiana, residents and visitors spent $9.4 billion on outdoor recreation, supporting 106,200 Indiana jobs, generating $2.7 billion in wages, and producing $705 million in state and local tax revenue based on data from 2011 and 2012.[23] However, the report did not differentiate between water and non-water recreation.

[22] All material was taken from http://portsofindiana.com/.

[23] http://outdoorindustry.org/advocacy/recreation/resources.php

Section III: Water Law in Indiana

The rules governing surface water and groundwater use in Indiana originate in riparian common-law property doctrine, which means that a landowner with property adjacent to a waterway may use as much water as needed as long as they do not harm their neighbors. However, Indiana's water rules are considered "regulated" domestic beneficial riparianism, because state law has categorized water into specific uses, which affects ownership and use.[24]

***Def: Riparian* (ri·par·i·an)**
adjective- relating to or living on or located on the bank of a natural watercourse (as a river) or sometimes of a lake or tidewater

In Indiana, water law gives priority to domestic uses. Surface water withdrawn for domestic purposes may be withdrawn without regard to the effects on other riparian landowners.[25] Domestic use is defined as water used for household purposes and drinking water for livestock, poultry, and domestic animals. Uses other than domestic fall within the definition of reasonable beneficial use, which is considered necessary for economic and efficient utilization and must be reasonable and consistent with the public interest.[26] Beneficial uses other than domestic use are not prioritized, but are as follows: agricultural, commercial, domestic, energy conversion, fish, industrial, irrigation, navigation, power generation, public water supply, recreational, waste assimilation and wildlife.

Although a landowner may use as much surface water as needed, no person or facility may withdraw water from a navigable waterway[27] without a permit, unless it is a public or municipal water utility.[28] These permits are evaluated for the withdrawals' impact on navigability, the environment, and safety to life or property. However, there are no criteria for evaluating the impact of withdrawals on stream flows, in-stream uses or other withdrawers. In-stream uses include swimming, fishing, and aesthetics. There is no permit or evaluation process for new withdrawals from streams that are not labeled as navigable.

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[24] For an in-depth discussion of Indiana's water rights, see Lucas, Stephen, Indiana, Water and Water Rights. Ref. 4-3/2013 Pub.60748
[25] Ind. Code §14-25-1-3
[26] Ind. Code §14-25-7-6
[27] A navigable waterway is defined in 312 IAC 1-1-24 as a waterway that has been declared to be navigable or a public highway by one or more of the following: a court, the Indiana general assembly, the United States Army Corps of Engineers, the Federal Energy Regulatory Commission, a board of county commissioners under IC §14-29-1-2, or the commission following a completed proceeding under IC §4-21.5. Navigable waterways by county: http://www.in.gov/nrc/2393.htm
[28] Ind. Code §14-29-1-8

Water Use Conflicts

In Indiana, there is no defined procedure in place to assess the impact a new well or surface water intake will have on the supply source or other users. However, a new well or surface water intake that is able to withdraw more than 100,000 gallons of groundwater, surface water, or a combination of both in one day, must register with IDNR as a SWWF. Also, a water user wanting to remove water from a navigable waterway, regardless of whether that water will be used for domestic or non-domestic purposes, must obtain a permit from IDNR, unless it is a public or municipal water supplier. Without a procedure in place to assess the impacts of withdrawals on stream flows and groundwater levels, the water resources cannot be sustainably managed nor can the occurrence of water-use conflicts be minimized, especially during droughts. Rules or laws should be developed to establish procedures for additional significant withdrawals from aquifers, surface waters or interbasin transfers.

Recommendation

Develop rules or laws to establish procedures for additional significant withdrawals from aquifers, surface waters or interbasin transfers

The Emergency Groundwater Rights Act[29] provides assistance to non-SWWFs whose water supply is damaged by a SWWF. IDNR has investigated water conflicts in almost every county in the state. In 2012, IDNR conducted approximately 200 water rights investigations, which is almost twice as many as the annual average. Approximately 45 of the investigations were determined to be domestic wells impacted by a SWWF. Resolution of these conflicts usually involves the SWWF reimbursing the impacted well owner for expenses associated with restoring the water supply or the impacted well owner connecting to a nearby water system. There is no procedure in place to investigate situations involving a SWWF impacting another SWWF's wells.

FINDING: In Indiana, there is no defined procedure in place to assess the impact a new well or surface water intake will have on the supply source or other users.

During the 1988 drought, IDNR recorded several conflicts regarding stream withdrawals. The conflicts occurred throughout the state, but a significant number were in central Indiana. Indiana's existing stream program does not address potential withdrawal conflicts. Although a permit is required to withdraw from a navigable waterway, the impact of that withdrawal on other withdrawers and in-stream uses is not evaluated.

[29] Ind. Code §14-25-4

Water Shortage Management

In its Water Shortage Plan, the Water Shortage Task Force recommended that water allocation priorities, established in 312 IAC 6.3-4-1, be implemented in the event of a water shortage. These priorities are identified below:

- **Priority 1 –** Domestic purposes (described in IC 14-25-1-3)
- **Priority 2 –** Health and safety
- **Priority 3 –** Power productions that meet the contingency planning provisions of the drought alerts (described in 312 IAC 6.3-5.2)
- **Priority 4 –** Industry and agriculture that meet the contingency planning provisions of the drought alerts (described in 312 IAC 6.3-5.2)
- **Priority 5 –** Power production, industry, and agriculture that do not meet the contingency planning provisions (described in 312 IAC 6.3-5.2)
- **Priority 6 –** Any other purpose

Section IV: Physical Groundwater and Surface Water Supply

Water availability varies throughout the state, reflecting the local and regional geography. Water availability is also affected by both short and long-term seasonal patterns. The amount of groundwater and surface water available is a combination of natural and man-made influences. This section focuses on the natural influence of geology and climate.

In Indiana, water is supplied by groundwater and by surface water from streams, rivers, lakes, and reservoirs. Groundwater is the water between pore spaces and fractures in the subsurface soils and rocks that form aquifers. Some characteristics of groundwater include:

- Availability in a given area depends on the extent and thickness of the aquifer, the aquifer material's porosity and permeability, and the aquifer's recharge rate.[30]
- Sand and gravel deposits overlaid by a low-permeable material like clay will receive less recharge than deposits close to the surface with no overlying clay.
- Levels are at their highest during the spring wet season and decline in the summer and fall because of reduced recharge, increased evaporation from soil and plants, and increased withdrawals.[31]
- During droughts, groundwater levels drop even more because of decreased recharge and increased pumping to meet greater demands. The most productive aquifers in Indiana are the sand and gravel deposits adjacent to and under major streams.

Groundwater and surface water are hydraulically connected and interact in two primary ways: streams gain water from groundwater that enters through the streambed (referred to as base flow[32]), and groundwater is recharged by streams when the aquifer water level is below the water level in the stream. Groundwater discharges from aquifers into streams and lakes, sustaining a stream's base flow or a lake's water level. Rivers underlain by extensive outwash deposits have a high degree of base flow that sustains stream flow. However, rivers and streams that are not directly underlain by sand and gravel but rather clay, silt, or bedrock have a poor groundwater connection. During dry periods, flow in these streams is reduced substantially or stops. In central and southern Indiana, many of the small and medium

[30] Recharge is the downward movement of water through pores in the soil and fractures in rocks into the subsurface. The rate at which an aquifer recharges depends on the surficial geology, climate, land use, depth to water table, and vegetation.
[31] IDNR. 2002. Ground-water resources in the White and West Fork White River Basin, Indiana. Division of Water. Water Resource Assessment 2002-6.
[32] Base flow is the water flow in a stream during low-flow conditions and is present on a more or less continual basis.

streams are underlain by clay or bedrock and have a poor groundwater connection. Streams in northern Indiana have good connections with groundwater which is an indication of higher, more dependable sustained flows than streams in groundwater-poor areas.

What is an aquifer?

An aquifer is a body of permeable rock that contains and transmits water. The amount of water than can be stored and transmitted depends on the following:

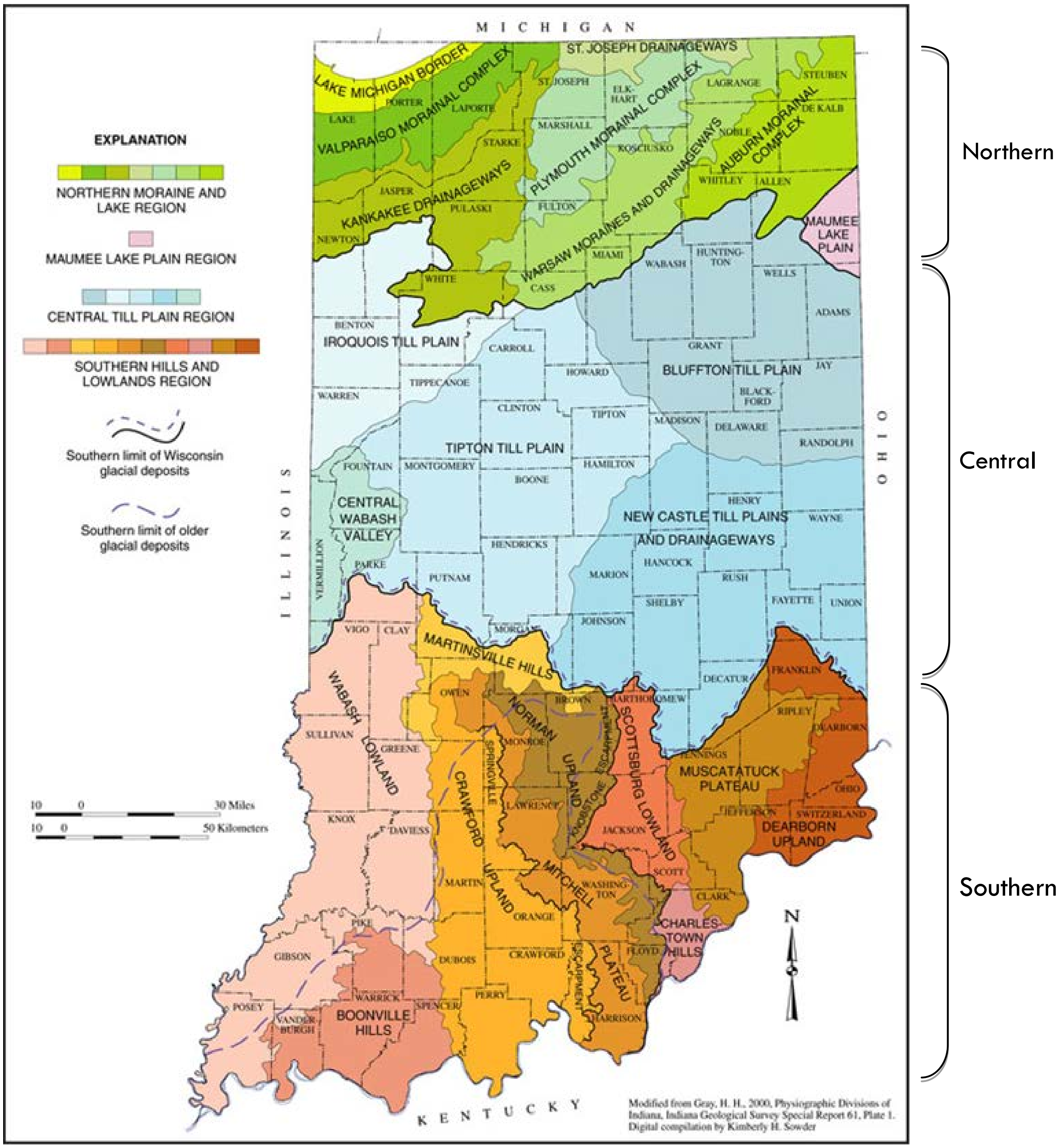
1) Porosity: amount of pore space between soil particles or within fractured rock. The more porous the material, the more water can be stored.

2) Permeability: the connectedness of the pores. The higher the permeability, the more liquid can pass through.

Regional Availability and Characteristics

To describe Indiana's water resources, we have divided the state into its three primary physiographic regions: north, central, and south, as shown on the following page. These three broad-scale regions are distinguished on the basis of terrain, rock type, and geologic structure and history. These three regions also align with the state's groundwater resources.

Figure 1. Indiana's three physiographic regions. Note: for this report, the Maumee Lake Plain Region is grouped with the Northern Moraine and Lake Region.



The single largest influence on Indiana's topography and geology has been glaciation. Four glaciers advanced into Indiana, with the most recent glacier event, the Wisconsin glacial, occurring 70,000 years ago and covering two thirds of the state. This glacier scoured the state's landscape shaping the geology, forming the soil, and cutting drainage courses which, in return, influenced the location and quantity of groundwater and surface water seen today.

As the glacier advanced south from Canada, it accumulated debris and sediment that were then deposited during its melt and subsequent retreat. The Wisconsin glacier's retreat left the southern third of the state unglaciated. Consequently, the geology and water resources of the northern and central regions are quite different from the southern region.

Northern Region

Northern Indiana's groundwater resources are considered good to excellent.[33] Thick sand and gravel deposits are found primarily along major rivers such as the St. Joseph, Elkhart, Pigeon, Fawn, Eel, Kankakee, and Tippecanoe rivers. There is only one bedrock aquifer in northern Indiana used for water supply: the Silurian Devonian system. This aquifer system is used primarily in the Kankakee River Basin, Lake Michigan Basin, and Maumee River Basin. The bedrock aquifers yield less water than the sand and gravel aquifers and are generally used for irrigation, not public water supply.

Northwest Indiana relies more heavily on surface water than groundwater because of the proximity of Lake Michigan and because the rivers have more reliable flows. The surface water resources include Lake Michigan; the Little and Grand Calumet, Kankakee, Yellow, Iroquois, St. Joseph, Pigeon, Fawn, Little Elkhart, Galena, and Maumee rivers; Trail, Turkey and Solomon creeks; an extensive tributary network; and natural and man-made lakes, ditches, and wetlands.[34]

Lakes and wetlands are present throughout the northern region and are used for a wide range of recreational activities. However, most are not considered significant supply sources because of their limited storage capacity and regulatory, economic, and environmental constraints.[35]

Central Region

The Central region is the transition zone between groundwater-rich northern Indiana and groundwater-poor southern Indiana.[36] The groundwater resources of this region are rated as fair to good with the most productive aquifers adjacent to and under major streams. These sand and gravel aquifers are limited to a narrow band along the White, Whitewater, and

[33] Clark, D. E. (Ed.). 1980. The Indiana Water Resource: Availability, Uses, and Needs. Governor's Water Resource Study Commission, State of Indiana.
[34] IDNR. 1994. Water Resource Availability in the Lake Michigan Region, Indiana – Executive Summary.
[35] IDNR, Division of Water. 1987. Water Resource Availability in the St. Joseph River Basin, Indiana – Executive Summary.
[36] Governor's Water Resource Study Commission. 1980. The Indiana Water Resource: Recommendations for the Future. Indiana Department of Natural Resources, Indianapolis.

Tippecanoe rivers and Wildcat and Sugar creeks. Bedrock aquifers in central Indiana yield less water than sand and gravel aquifers. Low yields limit their use for public supply. However, they are used for other purposes, such as irrigation and domestic use. Many rivers and creeks run through central Indiana: Wabash, Eel, Mississinewa, Salamonie, Big Blue, White, and Tippecanoe rivers and Sugar, Wildcat, Big Raccoon, Fall, and Eagle creeks. However, many of the streams are not reliable water sources because adequate flows for withdrawals are not sustained throughout the year. The West Fork of the White River and the Wabash River support the largest number of high-capacity withdrawals in central Indiana. In Marion County, during low flows, Fall and Cicero creeks, which eventually flow into the White River, can be regulated by Geist and Morse Reservoirs, respectively, and Eagle Creek can be regulated by the Eagle Creek Reservoir. There are many reservoirs in central Indiana, but only the four largest (Geist, Eagle Creek, Morse, and Prairie Creek) are used for water supply and recreation. Others, such as Mississinewa and Salamonie reservoirs, were built mainly for flood control.

Southern Region

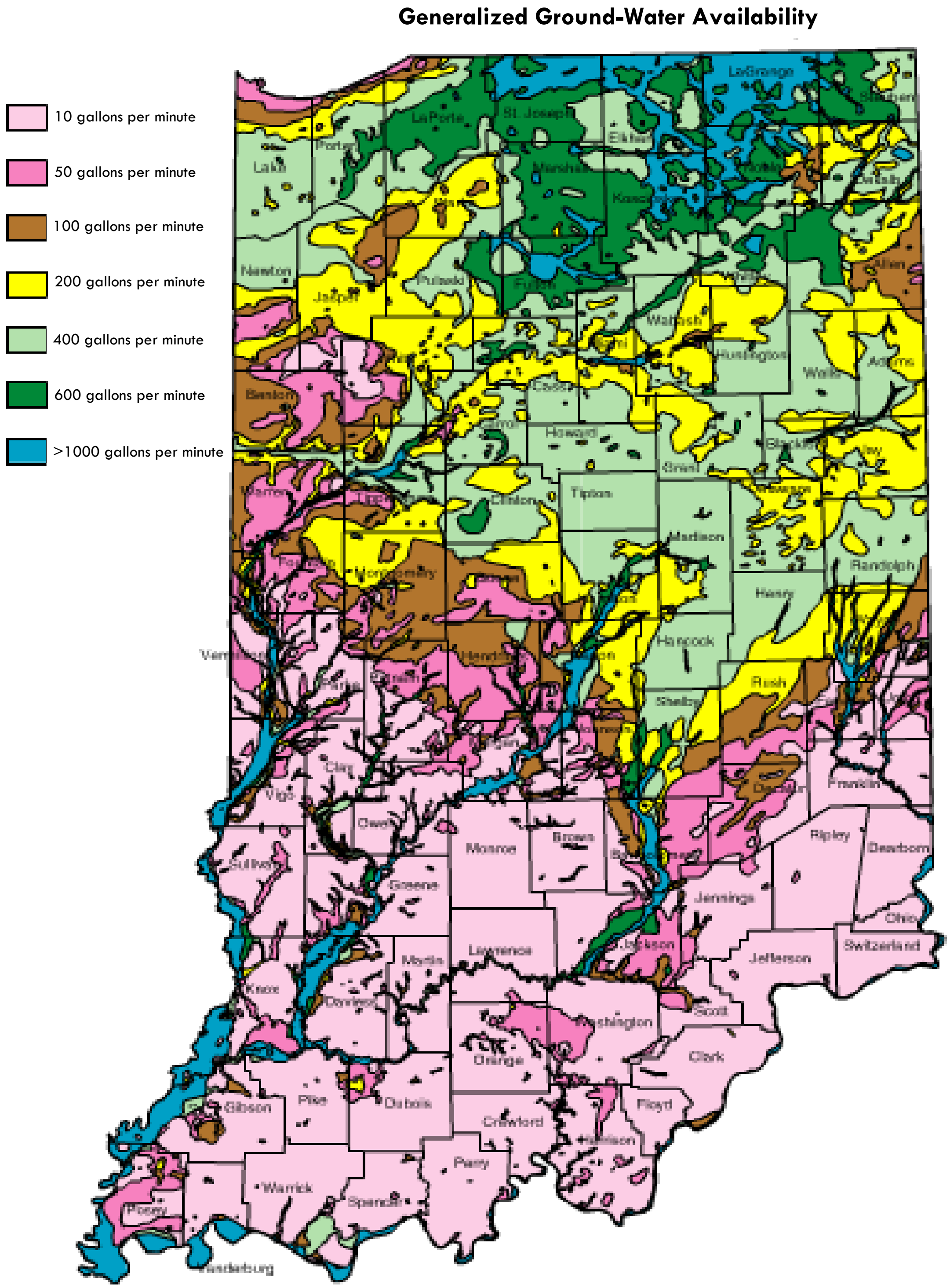
Many areas in southern Indiana either lack or have a limited supply of groundwater. The thickest sand and gravel deposits, and consequently highest-yielding aquifers, are found in the stream valleys of the Ohio, Eel, Wabash, and Whitewater rivers, the East and West forks of the White River, and the main stem of the White River. Outside the stream valleys, water supply is limited and sufficient for domestic use only. The poorest water-bearing bedrock formations in the state are in southern Indiana.[37] Most bedrock formations are only suitable for domestic purposes because of poor yield and poor water quality with depth.

The Ohio, Wabash, and Whitewater rivers and the East and West forks of the White River have reliable year-round stream flow. Although numerous streams flow through southern Indiana, most small and medium-sized streams do not have a hydraulic connection to groundwater. As a result, flow is either variable or non-existent during dry periods.

The state of Indiana owns three water-supply reservoirs in central and southern Indiana: Patoka, Monroe, and Brookville reservoirs. Currently, the drinking water supplies from these reservoirs are not fully allocated (see Options for Future Supplies for a discussion about these reservoirs on page 66). At this time they are primarily used for flood control and recreation.

[37] Clark, D. E. (Ed.). 1980. The Indiana Water Resource: Availability, Uses, and Needs. Governor's Water Resource Study Commission, State of Indiana.

Figure 2. Generalized groundwater availability in Indiana. Blue and green areas in central and southern Indiana delineate stream channels.



Section V: Demand for Water

In Indiana, the amount of water withdrawn varies throughout the state-over time, by the type of use, and by source. However, the general drivers are the same: economic factors (e.g. population), conservation and weather.

1. Economic factors drive total withdrawals for industry; as industrial output increases or decreases so do total annual withdrawals. The health of the economy will also influence withdrawals by public suppliers and energy producers. As population increases or decreases, water use generally follows the same trend. However, population's influence on water use is most clearly seen in public supply withdrawals.

2. Conservation practices also play a role in these long-term trends by decreasing per capita use or decreasing the amount of water needed for industrial processes, and thus allowing population and economic growth while maintaining or only slowly increasing overall water demands. This conservation trend is generally seen most clearly in the public supply sector.

3. The biggest factor in year-to-year variations in water withdrawals for all users, with the exception of industrial uses, is weather. While water withdrawals can vary throughout the year, for most users, except industrial, water use changes monthly due to precipitation patterns and temperature with summer withdrawals the highest. For public water suppliers, increases in withdrawals are typically due to landscape and irrigation use. Energy production withdrawals are highest in the summer because of increased demands for electricity used for cooling.

Water Use Classification

While the Water Utility Resource Report aims to understand the amount and type of water withdrawn for public supply, these withdrawals must be understood within the context of water withdrawals by all users in Indiana. The IDNR gathers monthly withdrawals on an annual basis from all SWWFs. Each SWWF withdrawal is assigned to one of six categories:

- Energy Production – Power generation, cooling water, coal mining, geothermal, oil recovery

- Industry – Process water, cooling water, mineral extraction (except coal), quarry dewatering, waste assimilation

- Irrigation/Agriculture – Crop and golf course irrigation, farm field drainage, agricultural services except livestock and fisheries

- Miscellaneous – Fire protection, amusement parks, construction dewatering, dust control, pollution abatement, hydrostatic testing, recreational field drainage
- Public Supply – Public water supply, drinking water/sanitary facilities
- Rural Use – Livestock, fisheries

IDNR also classifies each SWWF according to the source of water withdrawn as either surface water (intake) or groundwater (well). It further delineates the aquifer type (limestone, sand and gravel, shale, etc.) and the water body name for surface water sources. In this section of the report, use was also divided by geographic region.

Did you know?

Generally, there are three types of users within the "Energy Production" category: open-loop cooling systems for thermoelectric generation, closed-loop cooling systems for thermoelectric generation, and coal extraction. Open-loop cooling systems for thermoelectric generation were generally built before 1970. These plants withdraw large amounts of water but return about 99% of water withdrawn to the surface water source. Closed-loop cooling systems, usually installed after the mid-1970s, withdraw less than 5% of the water withdrawn by the open-loop systems, but almost all of the water withdrawn is consumed because it is lost to evaporation. For coal extraction, water is used for coal cutting and dust suppression and all water withdrawn is consumed.

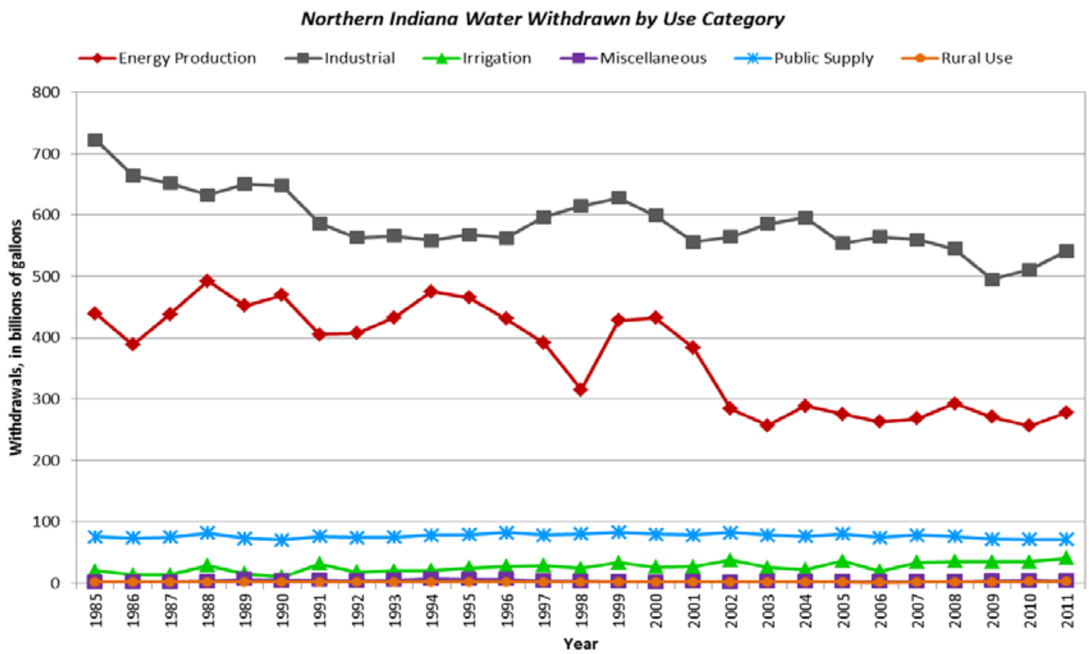
Northern Region

Northern Indiana shows a decreasing trend in total water withdrawn from 1985 to 2011, going from 1,261 billion gallons (3,454 mgd) to 937 billion gallons (2,568 mgd). This general trend is driven mostly by decreases in withdrawals by energy production and industrial users. [38] In recent years, these two uses have made up approximately 90% of the water withdrawals in this region. In 2011, industrial users withdrew 541 billion gallons (1,482 mgd) and energy production withdrew 278 billion gallons (762 mgd). Public water supply withdrawals generally remained steady throughout 1985 to 2011. In 2011, these withdrawals made up 8% of the total use, and the users withdrew 71 billion gallons (195 mgd). In addition to type of use, the source of the water withdrawn is important. In this

[38] Reserved for this section – include hyperlink to document if possible.

region, surface water withdrawals make up more than 90% of the water withdrawn but have decreased over time.

Figure 3. Water withdrawn by different user categories from 1985 to 2011 in northern Indiana. Source: Indiana Department of Natural Resources.



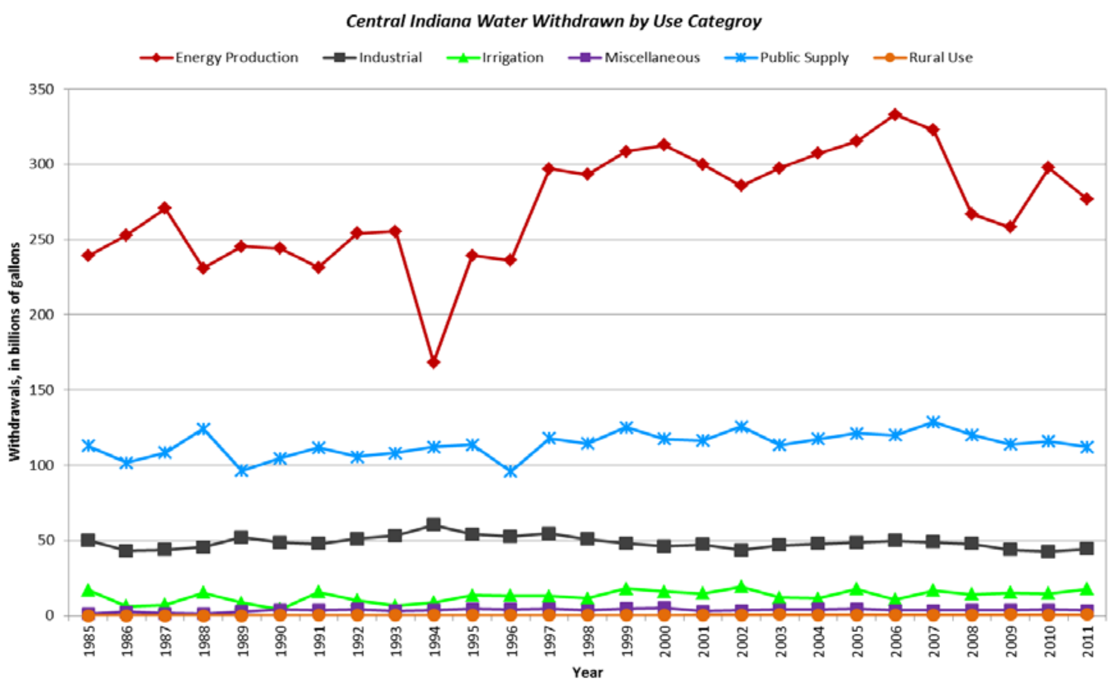
Central Region

From 1985 to 2011, central Indiana withdrawals have ranged from a low of 354 billion gallons (969 mgd) in 1994 to a high of 521 billion gallons (1,427 mgd) in 2007. In central Indiana, energy production accounts for approximately 60% of the total withdrawals. For example, in 2011 277 billion gallons (758 mgd) were withdrawn for energy production. Public supply, the second largest withdrawal use, accounts for approximately 25% of withdrawals and, in 2011, this equaled 112 billion gallons (307 mgd). The vast majority of withdrawals are from surface water sources. These withdrawals generally increased through 2007 and have since decreased to 361 billion gallons (990 mgd) in 2011. Groundwater withdrawals were 94 billion gallons (256 mgd) in 2011. The percent of withdrawals from the two sources has little variance from 1985 to 2011. When evaluating specific use categories, 99% of energy production withdrawals, 65% of industrial withdrawals, and 60% of irrigation withdrawals for 1985 to 2011 came from surface water. Public suppliers withdrew more than 55% of their water from groundwater sources.

Central Indiana has groundwater systems that are currently used by industry, energy, irrigation and municipal suppliers. On the northside of Indianapolis, the City of Westfield, Citizens Water, the City of Carmel, Martin Marietta (sand and gravel) and Indiana American all use and pump water from the alluvial (water stored in sand and gravel deposits) aquifers.

Water in area streams and reservoirs and in the adjacent aquifers is being withdrawn at an ever-increasing rate as the cities in Hamilton County grow. Because the alluvial aquifer does not extend over a large area in Hamilton County and the hydraulic connection to the White River is interrupted by clay layers, groundwater resources are limited. The same is true south of Indianapolis in Johnson County. Multiple public utilities and some industrial users extract water from a limited aquifer system. Without coordinated and active management, communities that rely on groundwater for their supply will face increasing competition for water resources.

Figure 4. Water withdrawn by different user categories from 1985 to 2011 in central Indiana. Source: Indiana Department of Natural Resources.



In the growing metropolitan area of central Indiana, existing surface water supplies are approximately equal to demand during peak use. As long as supplies exceeded demand, there have been few reasons to consider efficiency. It is clear that additional supplies and resources are limited but while there are many users with very different needs and capabilities, there is no "water management plan" for the regional water resources. The fact that water utility services are independently managed makes it difficult to properly monitor usage of the area's limited groundwater resources, especially during drought. This area should receive highest priority for evaluation.

Southern Region

Southern Indiana withdrawal amounts have remained relatively steady from 1985 to 2011, ranging from 1,570 billion gallons (4,303 mgd) in 1992 to 1,979 billion gallons (5,421 mgd) in 2000. Energy production users withdrew the largest amounts of water and accounted for approximately 85% of the total withdrawals from 1985 to 2011. In 2011 energy production users withdrew 1,399 billion gallons (3,833 mgd).

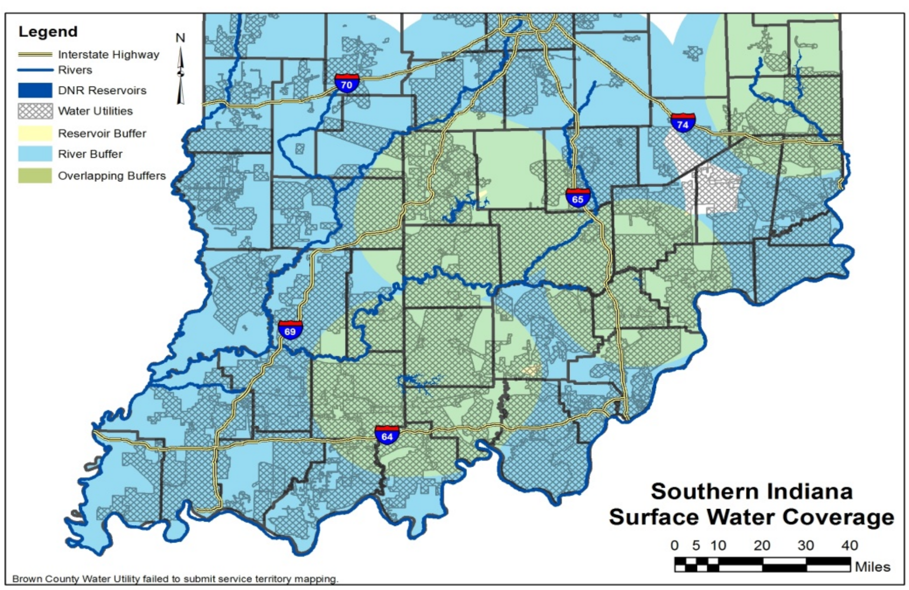
Surface water is the dominant withdrawal source, which is mostly due to lower groundwater yields in this part of the state. In 2011 surface water withdrawals were 1,623 billion gallons (4,446 mgd) and groundwater withdrawals were 64 billion gallons (177 mgd).

Southern Indiana and Opportunities for Economic Development

There are a number of areas of concern about water availability in southern Indiana. One relates to the general lack of groundwater across the entire region, and another relates to a concern that water will not be available to support economic development resulting from the I-69 extension. In order to evaluate these concerns, a map was created that displays a twenty-mile buffer from surface water supplies, which includes rivers and state-owned water storage in Patoka, Monroe, Hardy and Brookville Lakes. Areas within twenty miles of a river are shaded blue; areas within twenty miles of a reservoir are yellow; and the green areas represent areas within twenty miles of both. The hatched areas represent service territories of existing water utilities.

This analysis shows that water is generally accessible to most of the southern Indiana region. While an area in southeastern Indiana that encompasses portions of Decatur, Ripley and Jennings counties appears to lack water, the map shows that utility service is being provided to this area. However, the possibility exists that these utilities may face challenges in obtaining sufficient water supplies as the economy grows. Therefore, additional research may be warranted.

Figure 5. Southern Indiana surface water coverage.



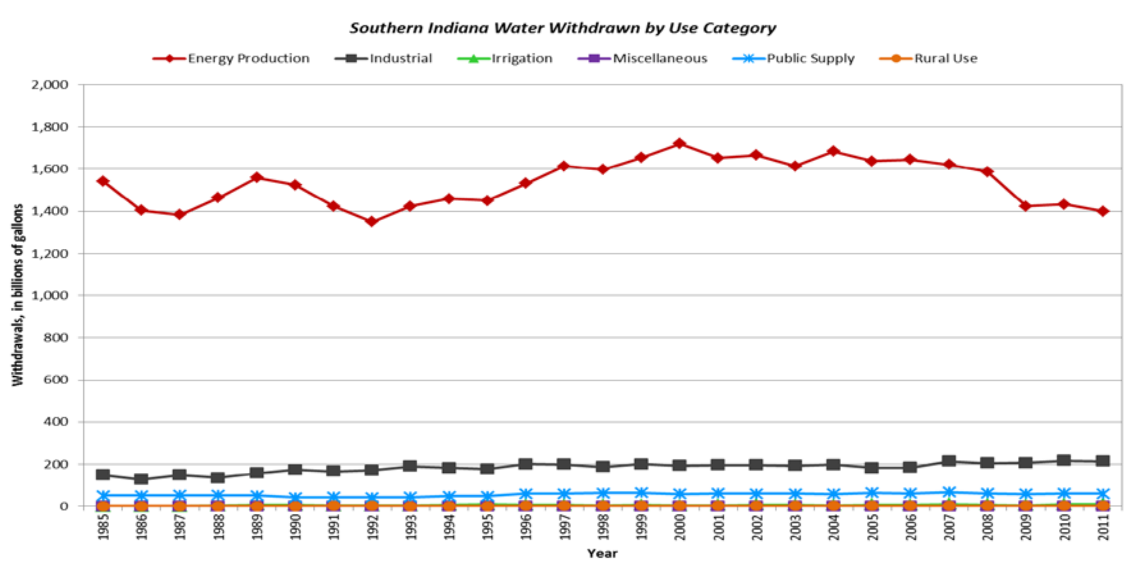
The most obvious void is along the county line between Greene and Daviess Counties. The map also shows that utilities serving along this route should have access to surface water supplies, and although not shown, groundwater along the White River.

While this analysis should alleviate some of the concerns about water availability in southern Indiana, it should be noted that groundwater is generally preferred over surface water. This is because stricter regulations and treatment of surface water often results in higher costs. This analysis also recognizes that in some areas water may need to be transported up to twenty miles. While this distance is manageable and performed on a routine basis, it can be costly to install the infrastructure to do so.

This analysis indicates that utilities already exist and are providing service to areas along the route of the I-69 extension. Although gaps exist, it appears that the existing utilities should be able to expand their service areas to fill these voids.

This analysis excludes groundwater, which may be available in substantial amounts, although this availability is limited to locations along the Ohio, Wabash and White Rivers and in Bartholomew and Jackson counties. Finally, an observation of the water utility service territory map (Figure 9) shows that where water supplies are needed, utilities have developed and grown to meet those needs. A large portion of southern Indiana is served by water utilities, while utility service in the northern half is primarily limited to densely populated areas. This utility development is most likely the result of need. Where groundwater supplies are more readily available in the northern half of the state, property owners in rural areas simply drill their own wells. Thus, there has been less need for utility service in the north. It is likely that water utilities will continue to meet water supply needs as they develop, though the costs to obtain incremental supplies will likely be higher.

Figure 6. Water withdrawn by different user categories from 1985 to 2011 in southern Indiana. Note: Rural Use, Miscellaneous and Irrigation withdrawal quantities are so similar they lie on top of one another in this graph. Source: Indiana Department of Natural Resources.



Water Basin Analysis

While understanding supply and demand on a regional level is useful, a more detailed analysis of individual basins can provide additional insight. The 1983 Water Resources Management Act (IC 13-2-6.1) mandated that the Natural Resources Commission (NRC) conduct a continuing assessment of water resource availability, conduct and maintain an inventory of significant groundwater and surface water withdrawals, and plan for the development and conservation of water resources for beneficial uses.

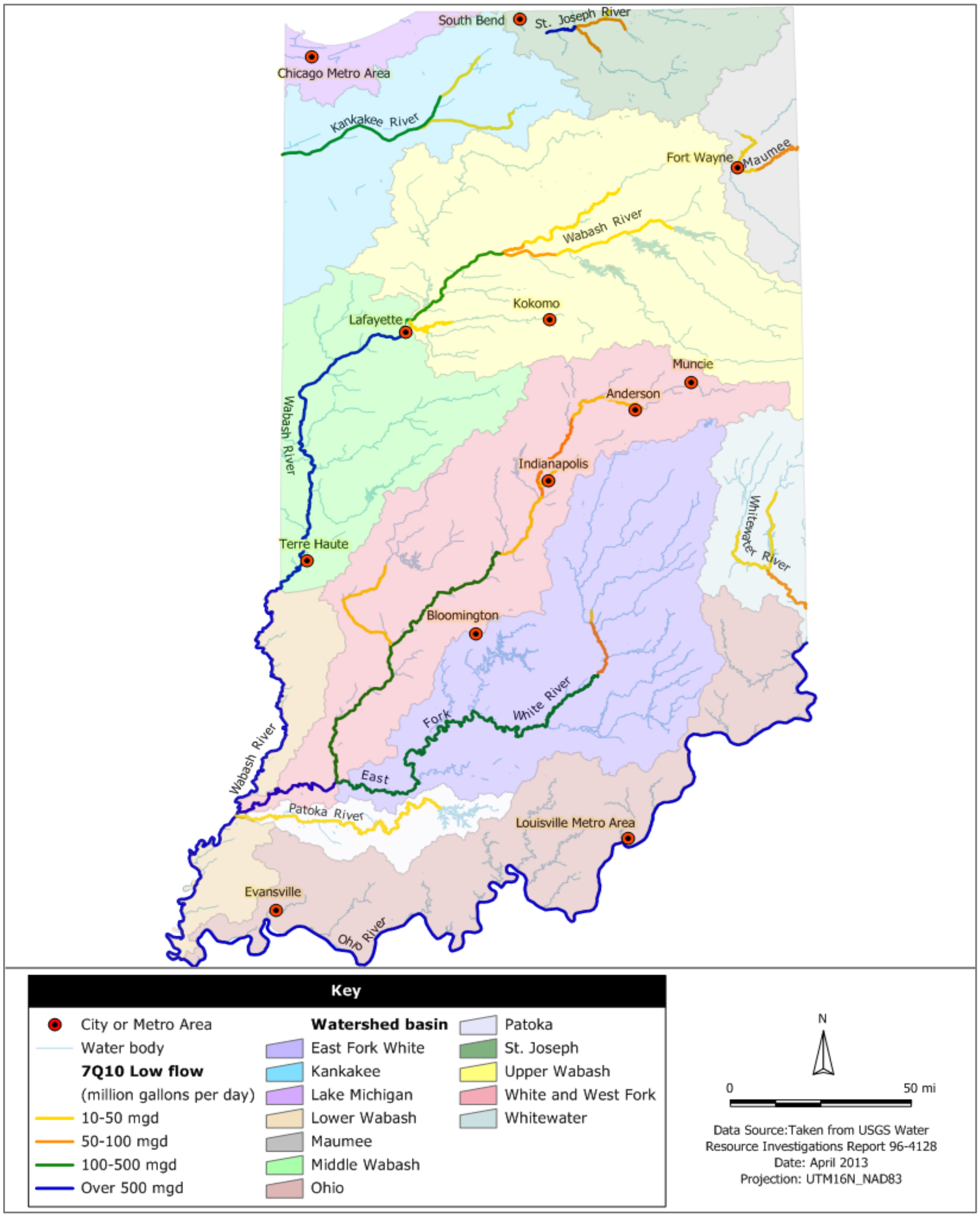
The NRC designated 12 water management basins within the state, and between 1987 and 2002, IDNR's Division of Water completed comprehensive reports on 6 of the 12 basins (as shown in Figure 7): Lake Michigan, St. Joseph, Kankakee, Maumee, White, West Fork White, and Whitewater. The purpose of these investigations was to provide socioeconomic, physical environment, and hydrologic information for managing and developing each basin's water resources.[39] They examine various aspects of water resource development, such as supply and demand.

These reports contain information on relevant topics such as:

- Socioeconomic setting
- Geologic framework
- Climatic features
- Surface-water hydrology and quality flow duration curves and frequency analyses
- Ground-water hydrology and quality potentiometric, transmissivity, and recharge maps
- Current and projected water use
- Potential for water-use conflicts
- Charts, graphs, and maps text, tables, figures, and color plates

[39] The complete reports are available at http://www.in.gov/dnr/water/4083.htm

Figure 7. The 12 major basins as defined by IDNR and the low-flow estimates of select rivers in Indiana. Source: USGS and IDNR.



Section VI: Analysis of Indiana Water Utilities Data

As directed by SEA 132 (IC 8-1-30.5), the IURC notified all utilities in the state that it was to collect certain data for the year 2012. The IURC received responses from 487 water systems; however, many of the responses contained contradictory or incomplete information, or were never formally submitted. The IURC staff worked with the utilities to resolve as many of the issues as possible and ultimately deemed 374 of the responses to be complete enough to be included in this analysis. For purposes of this analysis, the term water system is used because one of the water utilities has 22 water systems throughout the state that are not interconnected. For purposes of looking at water supply, these water systems resemble stand-alone water utilities even though they are owned by and do financial reporting as one entity.

The survey asked the utilities about the amount of water they sold and number of customers they served in 2012, what they used as a primary water source, and their options for additional water sources. It also included questions about the utility's operation and maintenance costs, funding sources, needed infrastructure improvements, and water shortage and conservation plans. Each question asked related directly to SEA 132, and the results of the survey are summarized below.

Water Utilities and Service Territories

The Water Utility Resource Report began by asking utilities to provide basic information, such as ownership type. In Indiana there are six types of water utilities as specified by SEA 132:

- Municipal – These utilities are owned and operated by a municipal government and managed by public employees. As part of local government, they are not-for-profit.
- Investor-owned – These utilities are privately owned by one or more investors. They are regulated by the IURC with some exceptions.
- Conservancy District – These are typically a taxing district with the authority to plan, develop, and operate a water utility. Conservancy Districts are established through a local court and the IDNR.
- Cooperative – Every customer of a cooperative is a member and owner. Profits are reinvested into infrastructure or distributed to the members.
- Not-for-profit – The utilities are privately owned and profits are reinvested back into the utility.
- Regional Water District – These utilities are established by the IDEM and also operate on a not-for-profit basis.

Of those that responded, 69% are municipal utilities (Figure 8). Not-for-profit and investor-owned utilities made up 17% and 11% of respondents, respectively. Conservancy districts, cooperatives, and regional water districts are less common and combined made up less than 4% of respondents.

Despite numerous follow-ups, the utility response rate was lower and of less quality than desired. The initial list of utilities utilized by the Commission was derived from IDEM data and is based on the establishment of a Public Water Supply Identification Number (PWSID). That list was then refined as utilities were properly identified, dropped, or consolidated based upon our information regarding the nature of their operation and whether there had been name changes or acquisitions. Of the initial 555 utilities contacted, 487 (88%) submitted a report. The Commission established quality control protocol that evaluated the reported data for completeness and obvious errors. However, this process did not rise to the level of an audit and could not in any way verify that the data provided was absolutely valid. Upon successful application of the quality control checks, the applications were formally "accepted" by the Commission. Of the 487 utilities that filed, 374 (77% of reports filed or 67% of the total population) were accepted by the Commission.

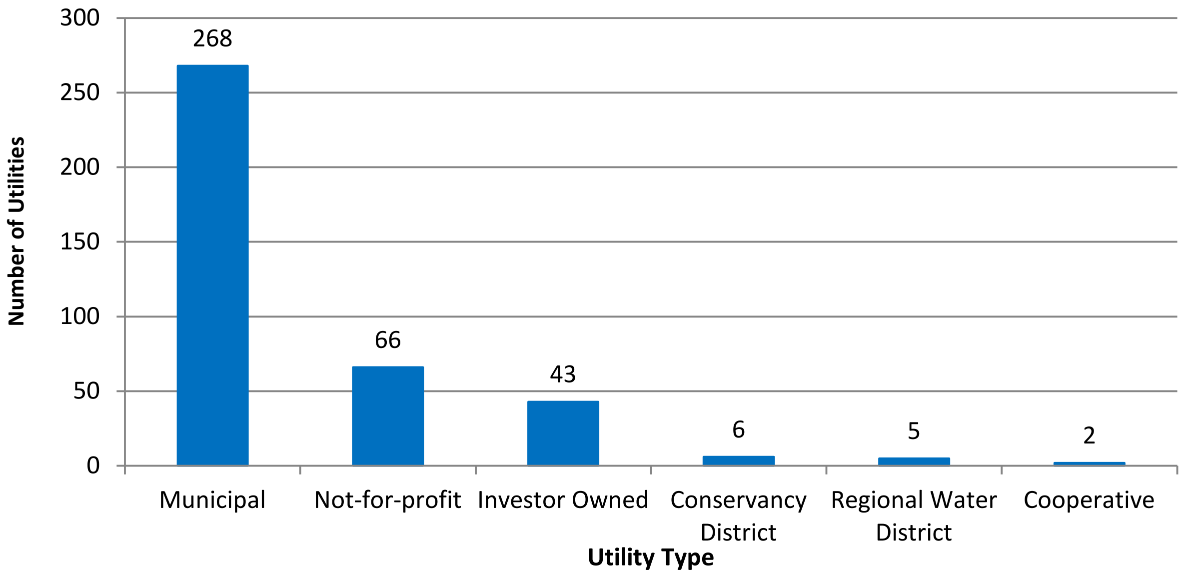
Service territories were provided by all utilities that were "accepted" through the Commission's quality control process. In situations where larger utilities did not file, staff sought out mapping through other sources such as case records, certificate of territorial authority (CTA) files, or internet inquires. Any service territory that could be obtained was utilized as being the best available data. Staff recognized at the outset that each entity would have different definitions of what service territory means.

Recommendation

Evaluate the scope of the existing law based on the quality of data gathered this year

The Commission evaluated all other data that was submitted. Reported values such as water produced, water sold and utility plant in service were further scrutinized for reasonableness. Those reported values deemed to be unreasonable were specifically removed from the analysis rather than triggering a rejection of the entire report. Given the fluidity, known errors and limitations of the datasets, gaps are acknowledged and totals/percentages will not always precisely balance. Therefore, SEA 132 should be reviewed to refine reporting requirements and reporting frequency in relation to the quality of data received. It is also advisable that the reporting requirement continue for the state's water utilities until the Legislature is satisfied with the information obtained.

Figure 8. The different utility types of ownership represented by respondents.



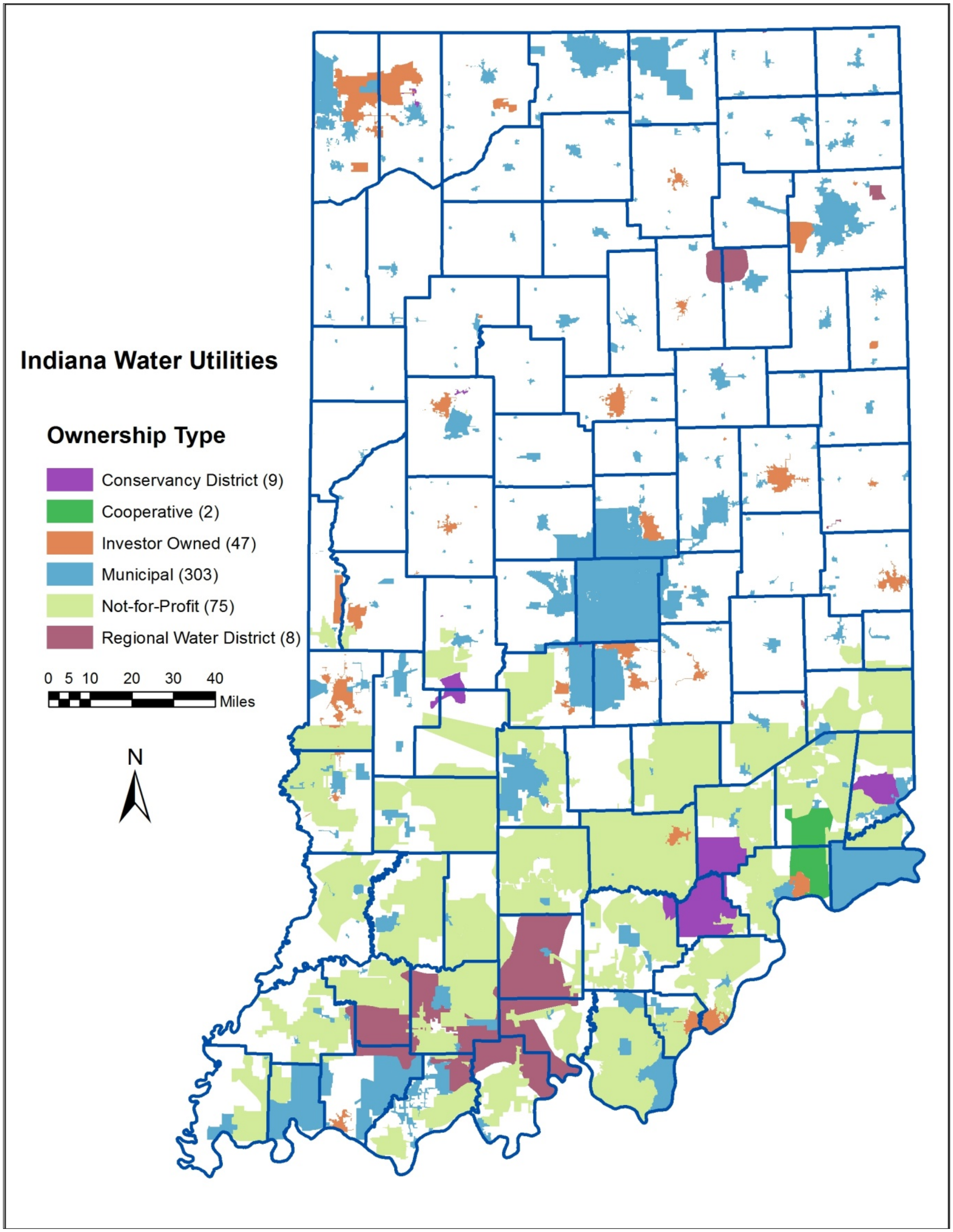
As part of the Water Utility Resource Report, utilities were asked to provide a copy of their current service territory map. Figure 9 shows the service territories of 444 utilities. Although the map does not include all the utilities in the state, it does provide insight into the distribution of the state's utilities.

> Groundwater supplies are not as readily available in southern Indiana. Therefore, more people rely on water utilities for water supply rather than wells.

In northern and central Indiana, municipal and investor owned utilities are the most common ownership types with only a few regional water districts. In southern Indiana, not-for-profit utilities are the most common, but there is also a greater variety of other ownership types than in the upper two thirds of the state.

The service territories in southern Indiana are closer together and larger than in northern and central Indiana. The territories in the north tend to be smaller, with exception of those found in the northwest corner. The difference likely has to do with groundwater availability. The shallow groundwater supplies in northern and central Indiana make it easy for homeowners to use a well rather than purchase water from a utility. Groundwater supplies are not as easily available in southern Indiana, and more people rely on a utility to provide water than on their own well.

Figure 9. The service territories of responding utilities differentiated by ownership. Note: This figure reflects the service territories of 444 utilities. It is not inclusive of all utilities in Indiana.



The utilities were asked for the total number of customers they served and the number served within specific customer classes in 2012. The customer classes are: residential, commercial, industrial, resale, which is water sold to another utility, and other, which identifies water that is taken from hydrants to fill tankers, vacuum trucks, hydro-excavators, or spraying equipment. Some of the highlights include:

- One water use not included in this list is agriculture as farmers typically have their own wells for irrigation and do not rely on water utilities.
- Over 1.5 million customers throughout Indiana are served by the utilities highlighted in this report. Ninety-one percent of these customers are residential (Table 1).
- Only 217 utilities serve industrial customers, and this class makes up less than 1% of total customers.
- 73 water utilities sell water to other utilities. Of these utilities, 44% sell to just one resale customer. Municipal utilities serve the largest number of resale customers followed by investor owned. The largest provider of resale water is a municipal utility that sells to 28 other utilities.

Table 1. The number of customers based on utility ownership and customer class for 2012.

Ownership Type	Number of Customers					
	Residential	Commercial	Industrial	Resale	Other	Total
Municipal	1,021,052	83,785	7,190	156	19,921	1,132,104
Investor Owned	278,260	28,390	741	88	4,873	312,352
Not-For-Profit	124,607	2,620	223	38	976	128,464
Conservancy District	11,736	128	8	6	136	12,014
Regional Water District	6,981	354	15	23	167	7,540
Cooperative	1,661	31	-	-	-	1,692
Total	1,444,297	115,308	8,177	311	26,073	1,594,166

In addition to number of customers, the utilities provided the volume of finished water sold to each customer class in 2012 (Table 2). 25 water utilities either do not meter any customers or meter only non-residential customers. Instead of basing a bill on meter readings, these 25 utilities charge a flat rate per month and the customer pays the same amount of money per month regardless of the amount of water used. Some of the unmetered utilities did provide a volume for total water sold. Consequently, the sum of volume sold by customer class does not equal the volume sold by ownership type.

Table 2. Volume of total finished water sold in 2012.

Ownership Type	Customer Class (volumes shown in thousands of gallons)					
	Residential	Commercial	Industrial	Resale	Other	Total
Municipal	124,979,525	38,621,399	17,556,299	17,888,332	20,958,421	220,948,012
Investor Owned	16,242,320	9,225,525	4,972,841	1,806,015	4,472,479	36,719,180
Not-For-Profit	15,063,668	2,135,667	444,173	1,037,322	1,122,454	19,803,287
Conservancy District	687,770	39,725	2,993	315,658	674,981	1,721,129
Regional Water District	278,822	91,182	15,394	2,144,161	28,975	2,558,536
Cooperative	104,323	2,200	-	-	-	106,523
Total	157,356,429	50,115,699	22,991,703	23,191,489	27,257,310	281,856,669

Types of Water Resources Used by Utilities

The Water Utility Resource Report also asked utilities about their water resources, whether they used groundwater, streams, lakes, reservoirs, or purchased water, and how much they used from each source. The results are summarized below.

Groundwater

Groundwater is used by 288 of the responding utilities. The total well count for these utilities is 1,095 with 24 utilities having between 10 and 72 wells. Utilities reported that 60% of peak pumping days occurred in June and July. The largest amount pumped in a single day in June was a combined total of 7.4 million gallons per day (mgd) by 8 utilities on the 19^{th} and in July the combined total was 11.8 mgd by 4 utilities on the 13^{th}. Total annual production for 256 reporting utilities was 99,805 mg for 2012.

Streams

Fifteen utilities identify 11 streams and rivers as their water source (Table 3). Of the rivers identified, six have multiple intakes at different locations. Only one utility reported having intakes on multiple rivers. Peak withdrawals occurred between June and August with the majority occurring in June.

Table 3. The number of intakes and total volumes withdrawn from stream water sources in 2012.

River Name	Number of Intakes	2012 Volume Withdrawn *(million gallons)*	River Name	Number of Intakes	2012 Volume Withdrawn *(million gallons)*
White River	6	26,420	**Flatrock River**	1	550
St. Joseph River	1	12,181	**Big Eagle Creek**	1	486
Ohio River	2	10,790	**Muscatatuck River**	2	457
Fall Creek	2	5,847	**Sand Creek**	1	76
Eel River	1	836	**Wildcat Creek**	4	NR
Patoka River	2	696	--	--	--

NR = Not Reported

Table 4. Peak water use from streams and rivers in 2012.

Date	Number of Intakes	Volume Withdrawn (mgd)
6/20/2012	1	35.5
6/27/2012	1	3.95
6/28/2012	1	176.22
6/29/2012	3	49.53
7/18/2012	2	5.461
7/28/2012	1	2.634
7/30/2012	1	1.8
8/17/2012	2	2.592

Note: 10 utilities did not include their peak production day or volume

Lakes

Lakes are natural features created by geologic processes. Only one lake was identified as a water source - Lake Michigan. Three utilities in Indiana use the lake as a water supply. These utilities have 12 intakes, nine of which belong to one utility. One utility did not report its withdrawals.

Reservoirs

Reservoirs are man-made lakes used for flood control and water storage and supply. Fourteen utilities withdrew water from one or more reservoirs. Two of the 19 reservoirs identified by the utilities are quarries (Table 5). Four utilities use more than one reservoir for their supply. Eagle Creek and Middle Fork reservoirs and a private quarry are the only sources identified that are not located in southern Indiana.[40] In southern Indiana, five of the reservoirs are in Ripley County and two are in Gibson, Washington, and Decatur counties. Peak pumping days in 2012 occurred between June and August. Peak rates ranged from 0.14 mgd to 26 mgd, with the highest one day pumping occurring in July. The largest annual withdrawals came from Lake Monroe (Table 5).

[40] Reservoirs such as Geist, Morse, and Prairie Creek are located in central Indiana, but are used to regulate flows in the White River. They are not used directly by utilities as a water supply.

Table 5. The location and 2012 withdrawal volume for reservoirs used as a supply source.

Reservoir Name	Location	2012 Volume Withdrawn *(million gallons)*
Bischoff Reservoir (Batesville or Morris Reservoir)	Ripley County	246
Brush Creek Reservoir	Jennings County	50
Eagle Creek Reservoir	Marion County	3,943
Hahn Reservoir	Ripley County	20
Huntingburg Lake	Dubois County	197
John Hay Lake	Washington County	727
Lake Monroe	Monroe County	5,948
Lake Santee	Decatur and Franklin counties	20
Middle Fork Reservoir	Wayne County	NR
Mollenkramer Reservoir	Ripley County	81
New Lake	Gibson County	NR
North Quarry	Ripley County	229
Old Lake	Gibson County	0.33
Oser Reservoir	Ripley County	22
Patoka Lake	Dubois, Crawford, and Orange counties	2,662
Private Quarry	Madison County	NR
Salinda Lake	Washington County	NR
Scottsburg Lake	Scott County	225
Upper Lake	Decatur County	44

NR = Not Reported

Purchases from Other Utilities

One hundred and thirteen utilities purchase water from another utility; 16 of these utilities purchase water from more than one utility. The 113 utilities identified 80 different utilities from which they buy water, one of which is located in Illinois. Twenty nine of these utilities sell to multiple respondents. Of the utilities reporting the number of interconnects, 58% have just one interconnect with the utility from which it purchases water; 42% have between 2 and 7 interconnects. Benefits of wholesale interconnects are discussed in the Water Utility Efficiency section.

One hundred and five utilities reported their total annual volume of purchased water. The total purchased water for these utilities was 202,684 million gallons. Peak pumping occurred in June (32%) and July (37%) in 2012. During these two months, peak day pumping rates ranged from 0.1 mgd to 35.94 mgd.

Additional Water Sources

The water utilities were asked whether they had additional water sources that could be used if necessary, such as during a water shortage, if the primary water source becomes contaminated, or if there is a water emergency. Five questions were asked in regard to additional water supplies (Table 6). Only utilities that answered "yes" to Question A were asked questions B through E. Responses from the utilities indicate that the majority have not taken additional steps to secure emergency water supplies.

Table 6. Questions regarding additional water resources.

Questions	Number of Responses	
	Yes	No
A. Do you have additional water resources that could be used if necessary?	187*	203
B. In regards to Question A, have you purchased land?	54	133
C. In regards to Question A, have you conducted a feasibility study to bring the source on line?	68	119
D. In regards to Question A, have you obtained any permits?	31	156
E. In regards to Question A, are there any restrictions, such as contracts, that limit the utility's ability to procure additional resources?	20	167

*This number includes multiple "yes" responses from 31 utilities that identified more than one source.

Question A was answered by 136 utilities that identified 187 additional water resources (31 utilities identified more than one additional water supply source). They were then asked the source of their additional resources. The majority of additional resources come from water purchased from another utility or from a well. Miscellaneous sources include purchasing water from a disaster relief agency or retailer, using emergency interconnects, or using purchased land to develop a source. Water purchases and surface waters can become unreliable during prolonged drought. Surface waters are affected earlier during a drought than groundwater, and if the source of the purchased water is a stream or reservoir, not only may the availability of water decrease, but there also will be increased demand from customers of the utility providing the water.

Table 7. The surface water sources listed as additional resources.

Reservoirs	Streams
Expand Ireland Trail Reservoir	Central Canal
Geist Reservoir	East Fork White River
Hardy Lake	Montgomery Creek
Hurshtown Reservoir	White River
New Lake	--
Old Lake	--
Quarry	--
Salem Quarry	--

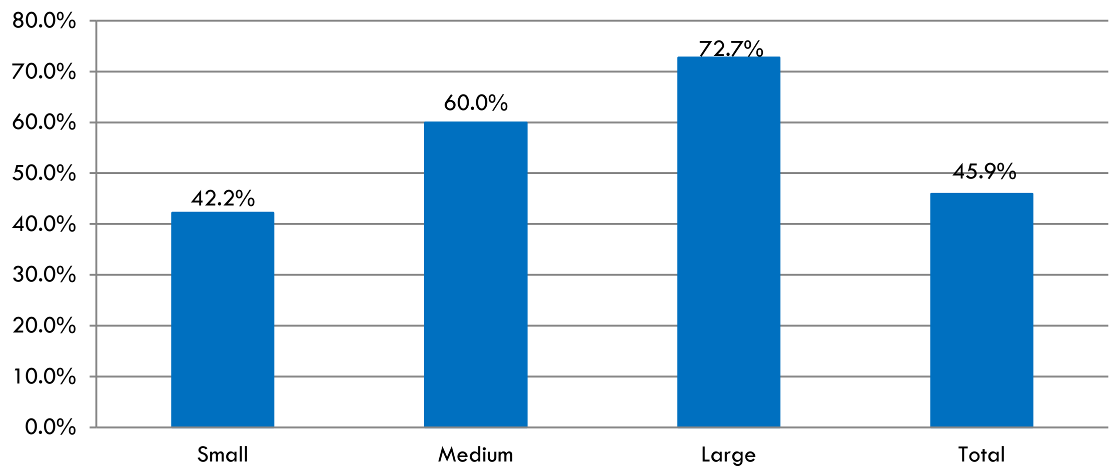
In addition to the name of the resources, the utilities were asked the estimated capacity of the additional resources and the estimated build out capital costs. Fifty nine utilities answered with capacities ranging from 0.004 to 44 mgd. Thirty one utilities were unsure or did not answer the question, and one utility stated its water resources were unlimited. The estimated build-out cost for a utility ranges from $100 to $77,000,000 (this total is for multiple sources); average cost is $4,490,965. The average estimated build out capital costs by resource type ranges from $175,565 for purchased water to over $8 million for reservoirs.

Conservation, Curtailment Plans, and Water Shortage

The Water Utility Resource Report asked utilities to report if they have general conservation plans that promote wise water usage among their customers, a curtailment plan in the event of a water shortage, and a plan for additional resources in the event of a water shortage.

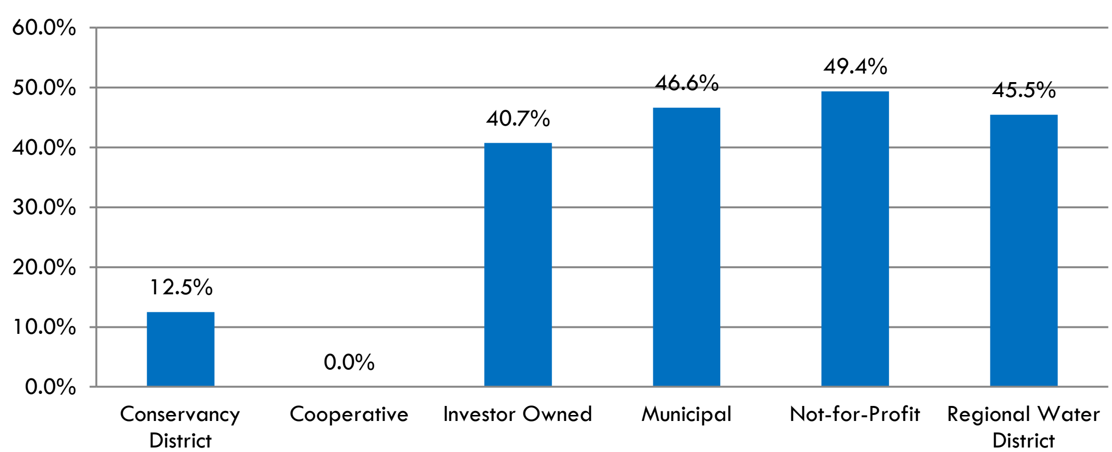
The following figure shows the percentage of utilities that currently have a wise water usage conservation plan, based on utility size. Utilities are categorized as small, medium and large utilities based upon a customer size of 1 to 3,300; 3,301 to 10,000; and greater than 10,000, respectively. Approximately 46% of all utilities that reported have implemented wise water usage conservation plans. This indicates that the majority of utilities are not actively promoting a wise water usage conservation plan. Of those that have such plans, it appears that large and medium size utilities have higher participation rates at 73% and 60%, respectively. Less than half of all small utilities have implemented plans.

Figure 10. Utilities With a Conservation Plan for Wise Water Use
Based on Utility Size



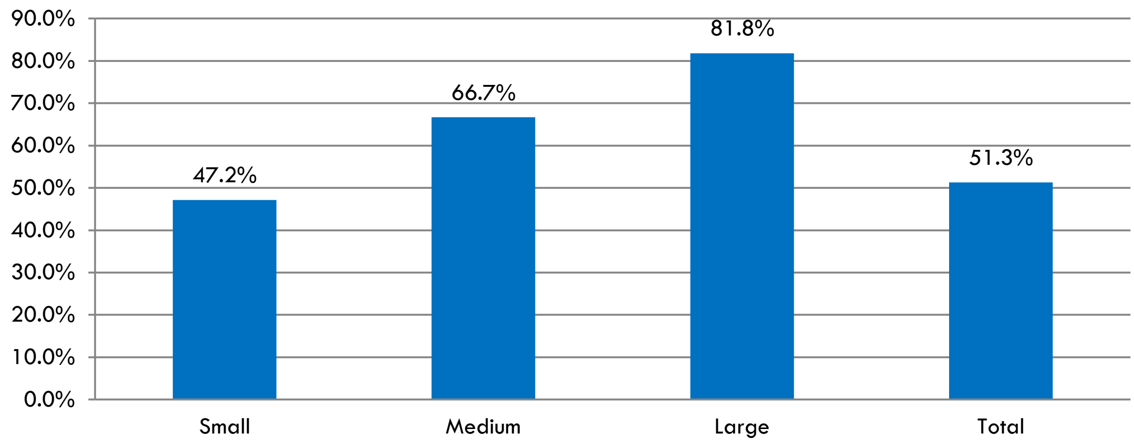
The following figure illustrates the percentage of each utility type that has a wise water use conservation plan. Not-for-profits, municipals, and regional water districts have the highest implementation rates at 49%, 47%, and 46%, respectively. Investor-owned utilities are close behind with an approximately 41% participation rate.

Figure 11. Utilities With a Conservation Plan for Wise Water Use
Based on Utility Type



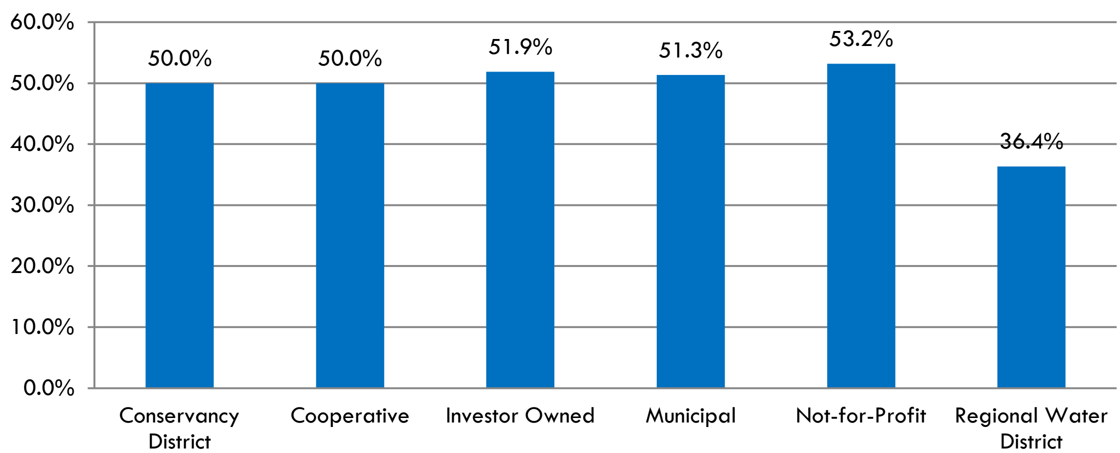
The following figure shows the percentage of utilities, based on size, that have a water shortage plan. Over half of all utilities reporting stated that they have a water shortage curtailment plan. Large utilities appear to be the best prepared for a water shortage, with 82% stating they have a plan to address such a crisis. Of medium sized utilities, 67% stated that they have a water shortage curtailment plan. Less than 48% of all small utilities reporting indicated they have a curtailment plan to implement in the untimely event of a water shortage.

Figure 12. Utilities With a Curtailment Plan in the Event of a Water Shortage
Based on Utility Size



The results, by type, for those utilities indicating they had a water shortage plan do not show much difference among types other than regional water districts being somewhat less.

Figure 13. Utilities With a Curtailment Plan in the Event of a Water Shortage
Based on Utility Type

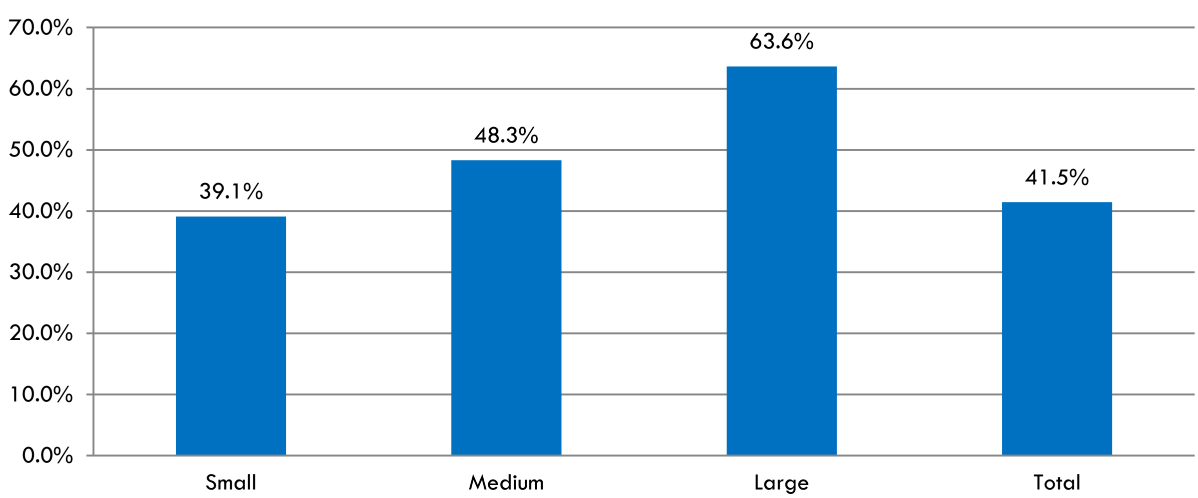


Did you know?

Larger utilities appear to be the best prepared for water shortages, with approximately 64% stating that they have plans in place to obtain additional water resources in the event of a water shortage. Of the medium sized utilities, 48% reported that they have plans to obtain additional water resources. Small utilities appear to be the least prepared, with only 39% having plans to obtain additional water resources, in the untimely event of a water shortage.

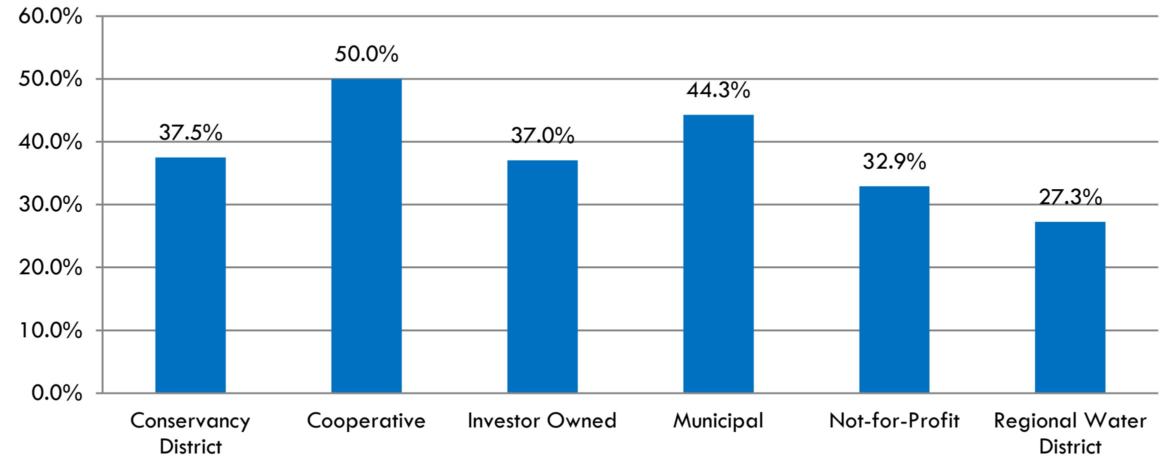
At 42%, less than half of all utilities reporting stated that they have plans for acquiring additional water resources if needed. Again, larger utilities appear to be the best prepared, with approximately 64% stating that they have plans in place to obtain additional water resources in the event of a water shortage. Of the medium sized utilities, 48% reported that they have plans to obtain additional water resources. Small utilities appear to be the least prepared, with only 39% having plans to obtain additional water resources.

Figure 14. Utilities With a Plan for Additional Resources in the Event of a Water Shortage
Based on Utility Size



The following figure illustrates the percentage of each utility type that has a plan for additional water resources in the event of a water shortage. With 44%, municipalities have the second highest percentage of utilities with plans for additional water resources. The remaining utility types have similar percentage levels of having developed plans, ranging from 27% to 37%. It appears that the size of utility has more influence on whether a utility has an actionable plan to secure additional water resources than the specific type of utility. The larger the utility, the more likely they are to have a plan. Smaller utilities are at a greater risk during a water shortage or drought.

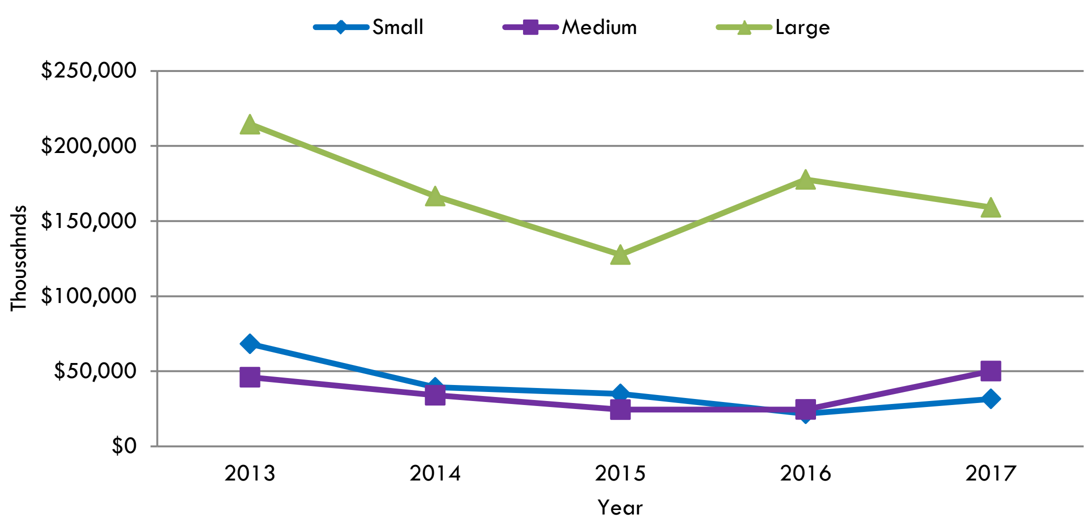
Figure 15. Utilities With a Plan for Additional Resources in the Event of a Water Shortage
Based on Utility Type



Infrastructure Improvements Needed in the Next Five Years

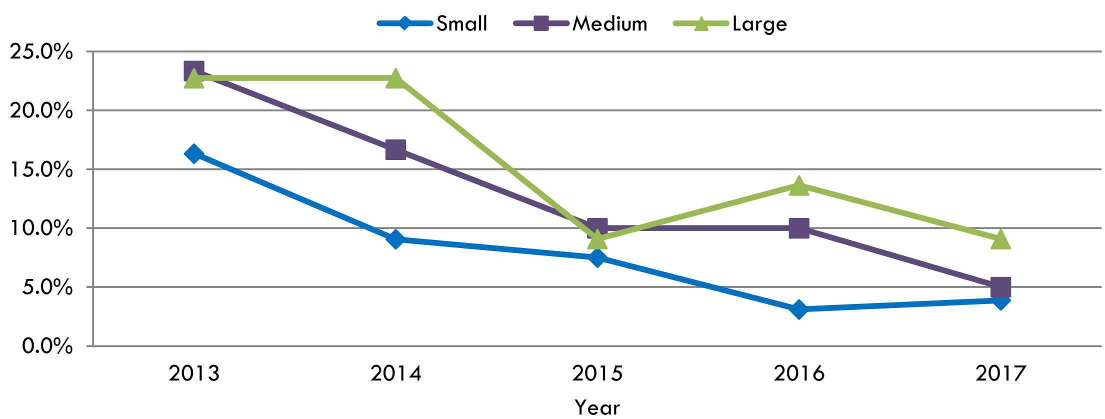
The Water Utility Resource Report asked utilities about their planned infrastructure improvements needed in the next five years. Of those utilities reporting, the total planned infrastructure improvements equal $1,220,362,417. Based on utility size, total planned infrastructure improvements for small and medium utilities are $195,690,044 and $179,039,343, while large utilities are planning to invest $845,633,030.

Figure 16. Planned Infrastructure Expenditures
Based on Utility Size



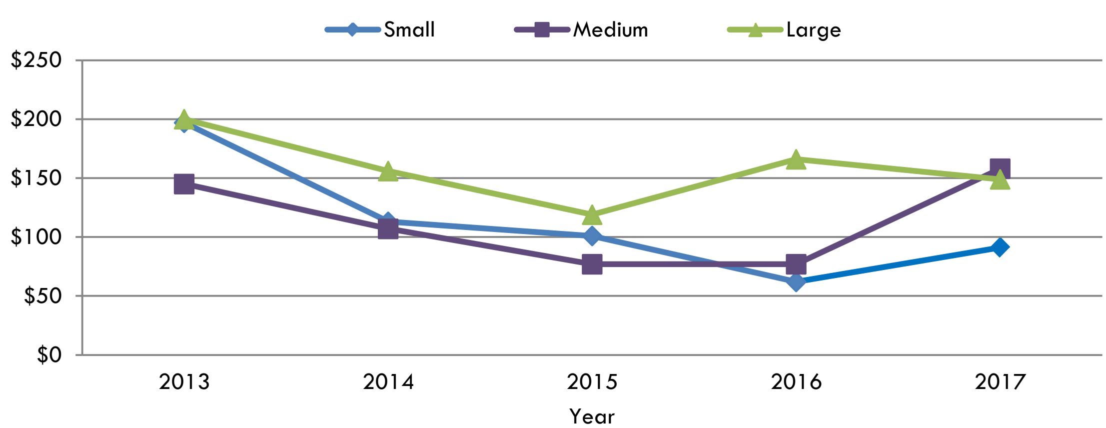
The figure below further illustrates the financial sophistication of large utilities. Comparing this figure with the previous, a positive correlation between capital expenditures and planned rate increases among large utilities becomes evident. It appears that large utilities correlate capital expenditures with rate increases and increased revenues to service any necessary debt service costs.

Figure 17. Percentage of Utilities with Planned Rate Increases
Based on Utility Size



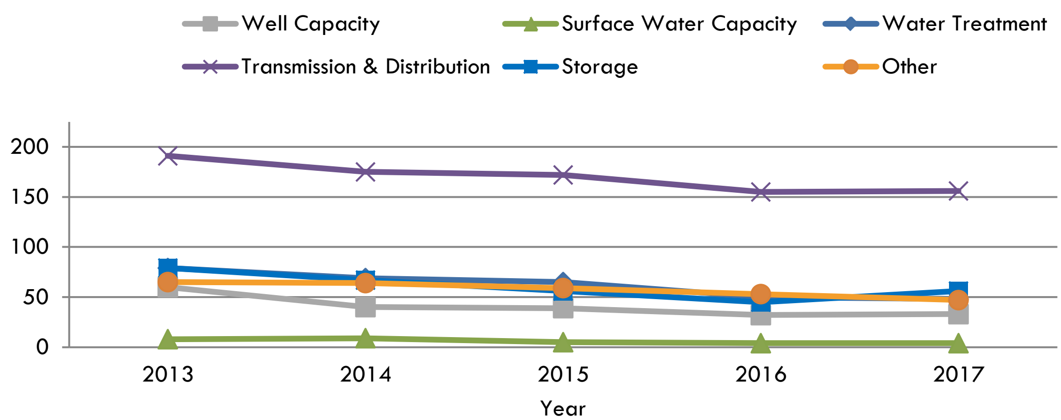
The figures above and below highlight the planned infrastructure expenditures per customer over the next five years, and suggest that small utilities will experience smaller rate increases. The data also suggests that small utilities often do not properly plan for infrastructure improvements and thus, may experience higher rate increases than the figures indicate.

Figure 18. Planned Infrastructure Expenditures
Per Customer



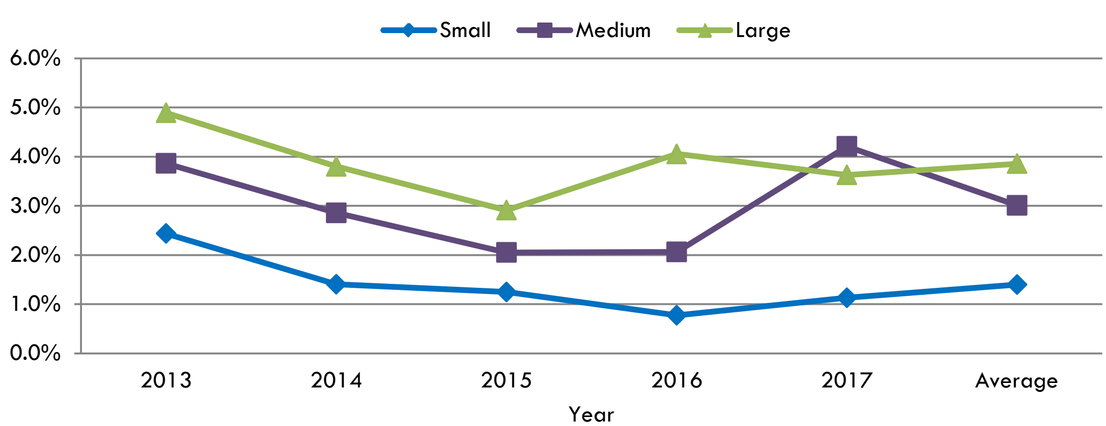
The most frequently cited planned infrastructure projects relate to transmission and distribution, followed by water storage, miscellaneous, well capacity and surface water capacity.

Figure 19. Number of Planned Infrastructure Projects
For the Five Years Ending 2017



The Utility Plant In Service (UPIS) replacement rate is the expected capital expenditures divided by UPIS. Large utilities, on average, have a higher UPIS replacement rate, followed by medium-size utilities and small utilities.

Figure 20. UPIS Capital Replacement Rate
Based on Utility Size

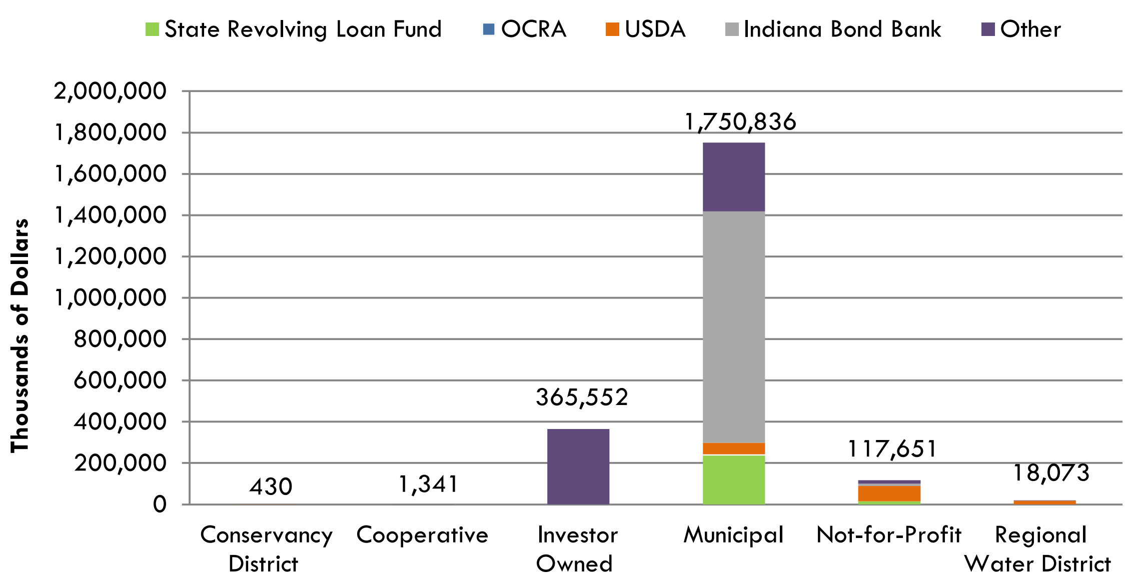


Indebtedness of Water Utilities

The Water Utility Resource Report asked utilities about the total amount of debt they have outstanding as of December 31, 2012 and funds received during 2012 from the State Revolving Loan Program, Office of Community and Rural Affairs (OCRA), US Department of Agriculture Rural Development Loans and Grants (USDA), Indiana Bond Bank, and other sources, including private bank loans or bonds.

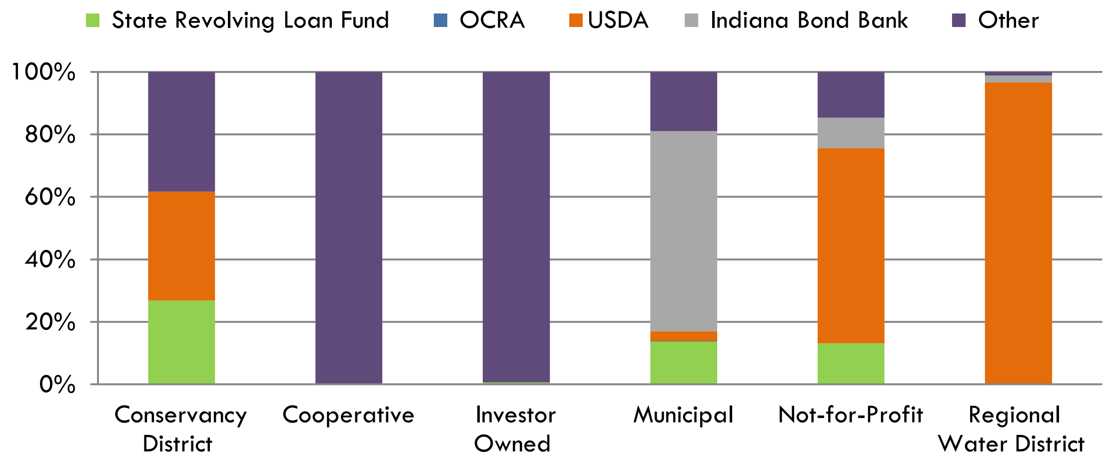
Of utilities that reported, municipal utilities have $1,750,836,000 of indebtedness. They are followed by investor-owned utilities with $365,552,000, not-for-profit utilities with $117,651,000, and regional water districts with $18,073,000. Conservancy districts and cooperatives have the least amount of debt with $430,000 and $1,341,000, respectively. Therefore the total amount of reported debt is $2,253,883.

Figure 21. Amount & Sources of Debt
Based on Utility Type



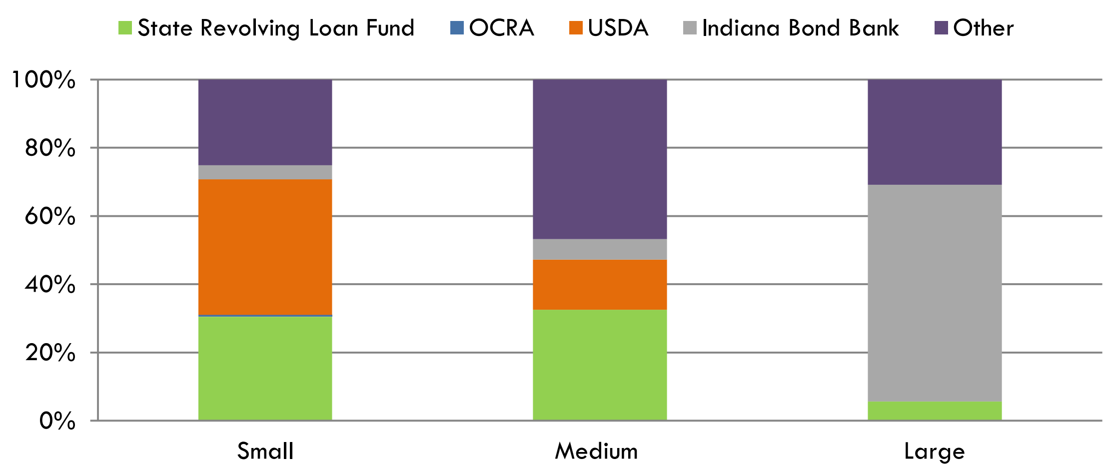
Conservancy districts use a proportional mix of funds from the USDA (35%), the State Revolving Loan Fund (27%), and private banks or bonds (38%) to fund their water capital projects. Cooperatives and investor-owned utilities rely solely on bank loans or bonds for funding. Municipals obtain 64% of their financing from the Indiana Bond Bank, whereas not-for-profit and regional water districts rely heavily on the USDA, using 62% and 97%, respectively.

Figure 22. Sources of Debt
Based on Utility Type



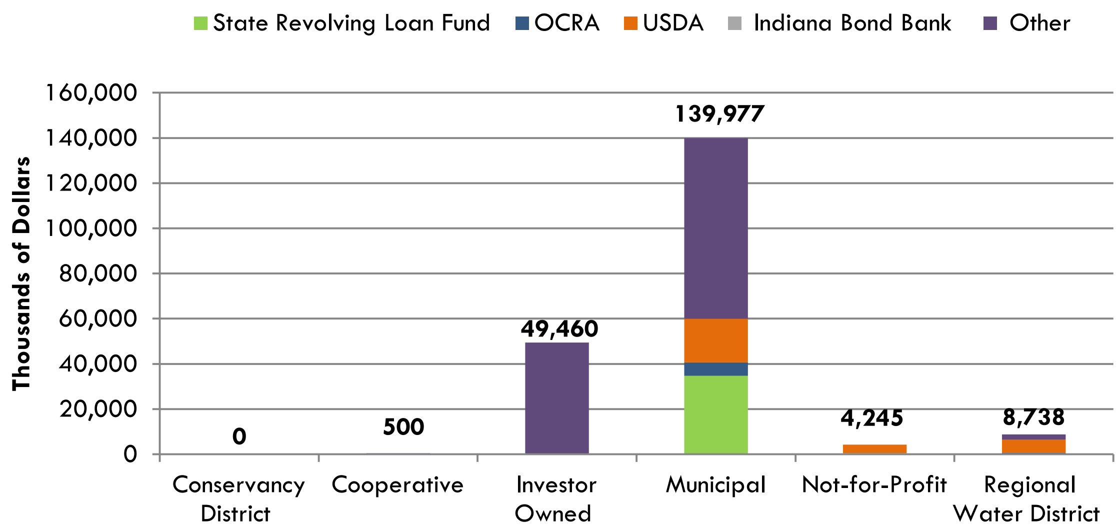
Small utilities receive 40% of their financing from the USDA and 31% from the State Revolving Loan Fund. Medium sized utilities receive 47% of their financing from private bank loans or bonds and 33% from the State Revolving Loan Fund. Large utilities receive 64% of their financing from the Indiana Bond Bank and 31% from private bank loans or bonds.

Figure 23. Sources of Debt
Based on Utility Size



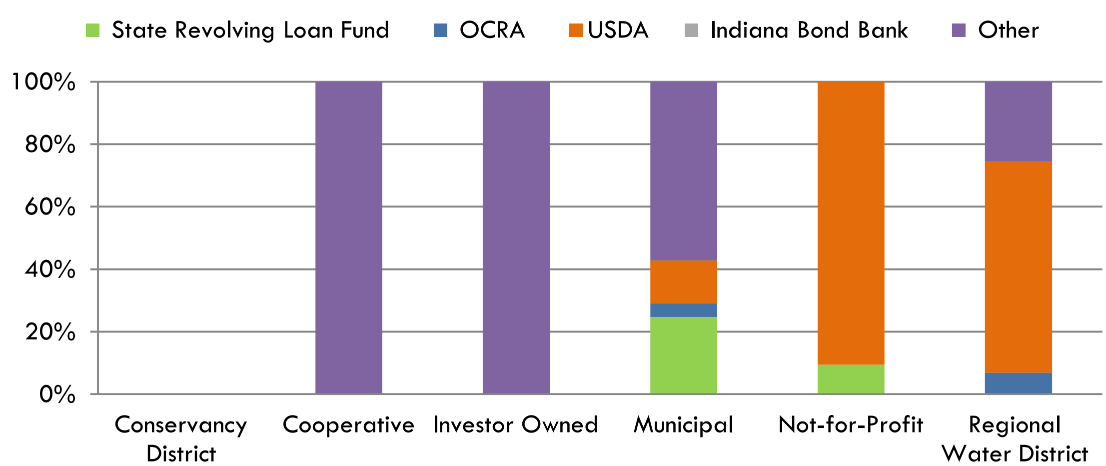
Municipal utilities incurred the most debt among all utility types in 2012, with conservancy districts and cooperatives incurring the least amount of debt. Municipal utilities incurred $139,977,000 of indebtedness. They are followed by investor-owned utilities with $49,460,000, regional water districts with $8,738,000, and not-for-profit utilities with $4,245,000. Cooperatives incurred $500,000, while conservancy districts reported incurring zero debt.

Figure 24. Debt Incurred in 2012
Based on Utility Type



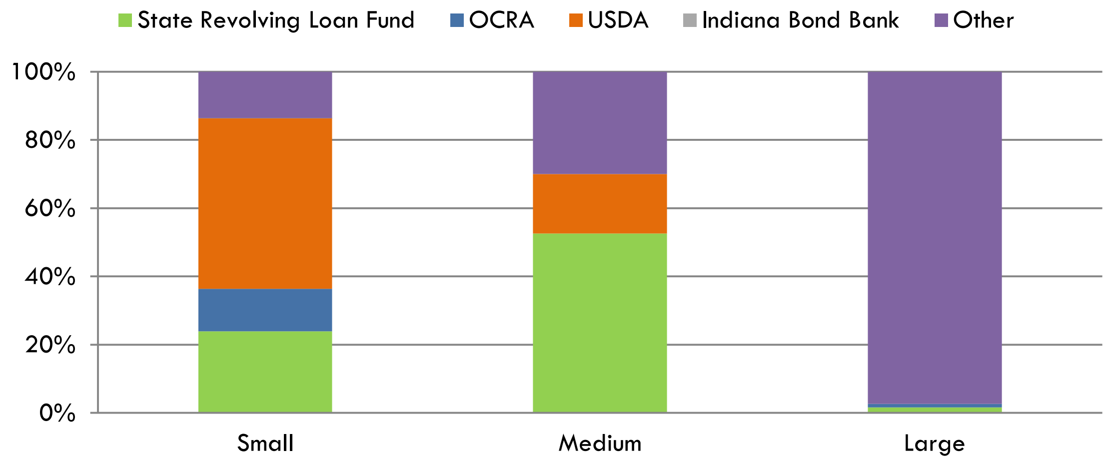
Of the utilities that reported, conservancy districts reported zero debt. Cooperatives and investor-owned utilities relied solely on private bank loans or bonds. Municipalities maintained a mix of financing sources, primarily obtaining 57% from private bank loans or bonds, 25% from the State Revolving Loan Fund, 14% from the USDA, and 4% from OCRA. Not-for-profits received 91% of their financing from the USDA. Similarly, regional water districts received 68% from the USDA, 26% from private banks or bonds, and 6% from OCRA.

Figure 25. Debt Incurred in 2012
Based on Utility Type



Small utilities were able to take advantage of a wide range of funding sources, resulting in 50% from the USDA, 24% from the State Revolving Loan Fund, 14% from private banks or bonds, and 12% from OCRA. Medium sized utilities attributed 53% of their financing from the State Revolving Loan Fund, 30% from private banks or bonds, and 17% from the USDA. Finally, large utilities received 97% of their financing from private bank loans or bonds, 2% from the State Revolving Loan Fund, and 1% from OCRA.

Figure 26. Debt Incurred 2012
Based on Utility Size



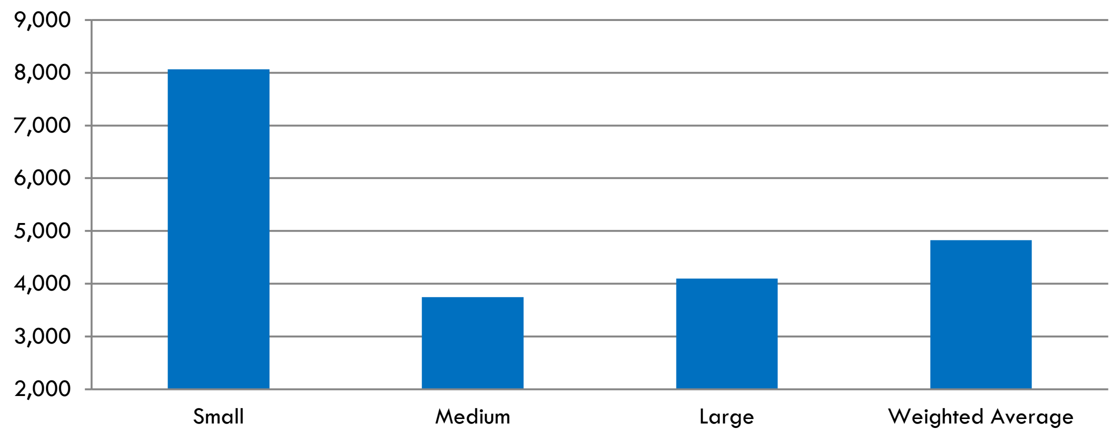
Total Utility Plant in Service as of December 31, 2012

For purposes of this report, UPIS represents funds that have been spent on physical assets such as land, pipes, pumps, meters, wells, water treatment plants, water storage facilities, office equipment, and vehicles. It does not include construction work in progress (CWIP), plant held for future use, accumulated depreciation or materials and supplies. Four hundred twenty-nine utilities reported UPIS. Based on the utilities reporting, the total UPIS as of December 31, 2012 is $8.375 billion. Utilities are categorized as small, medium and large utilities based upon a customer size of 1 to 3,300; 3,301 to 10,000; and greater than 10,000.

Def: "Utility Plant In Service" **represents funds that have been spent on physical assets such as land, pipes, pumps, meters, wells, water treatment plants, water storage facilities, office equipment, and vehicles.**

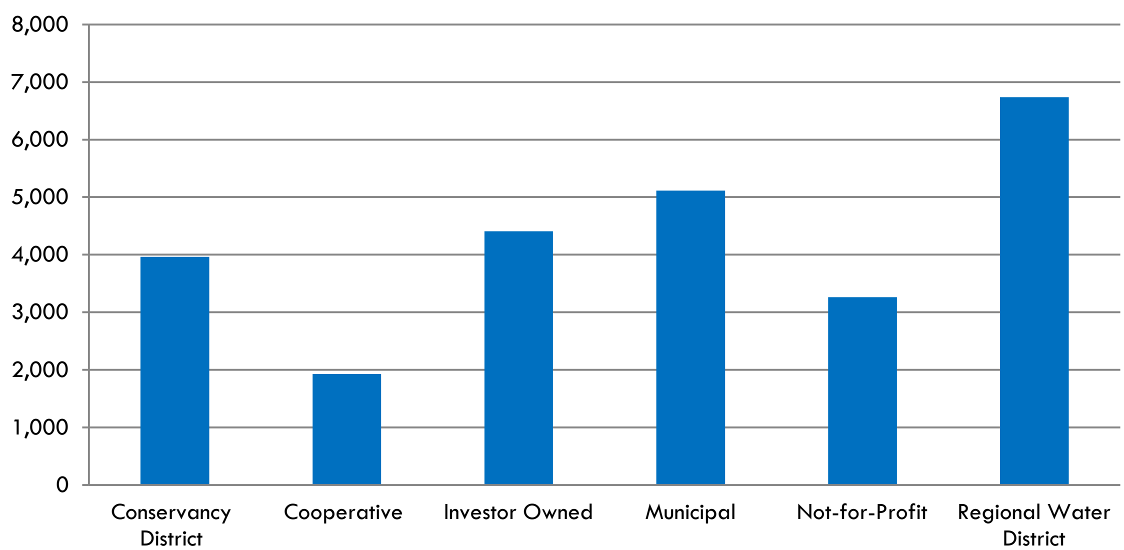
The UPIS per customer for small utilities is $8,065, which is nearly double the large utility UPIS/customer of $4,096. See Figure No. 27 below. The medium utility UPIS per customer of $3,745 is less than the large utility UPIS per customer.

Figure 27. Utility Plant in Service (UPIS) Per Customer
Based on Utility Size



It is interesting to note that of all small utility customers nearly 71% are served by small municipal utilities. The UPIS per small municipal owned customer is $10,006, the remaining small utility customers UPIS per customer is $3,617- for an average of $8,065. This is in line with medium sized utilities shown above.

Figure 28. Utility Plant in Service (UPIS) Per Customer
Based on Utility Type



The analysis above is illustrative of the major issues regarding UPIS data collection, in that, much of the data received by the Commission is not considered reliable. The data submitted by small utilities are often inconsistent due to their lack of reliable resources. The Commission often has the same concerns when assessing a small utility rate case. The issue in the submitted data may be even more pronounced as many reporting utilities have withdrawn from Commission jurisdiction, so maintaining a reliable UPIS account may not be a priority from a management perspective. Much of the data received was in error as operations and maintenance expense (O&M) equaled UPIS, the UPIS amount was missing, and the UPIS amount was considerably high or low or indicated as “unknown.”

Often, the individual responsible for record keeping did not correctly maintain the UPIS account. Mistakes often include expensing capital items or capitalizing expense items. The wide variation of amounts received per customer indicates that the UPIS received by the Commission may not be reliable. Even though it is suspected that the less sophisticated and resource challenged small utility group has likely failed to record all of its capital improvements as UPIS, it is interesting that their UPIS per customer amount is nearly double the medium and large utilities. This underscores the advantage economies of scale can provide for larger utilities.

Section VII: Operational and Financial Efficiency

The discussion that follows is based upon the data collected by SEA 132, observations made as the data was being collected and analyzed, and the institutional experience of the IURC. The water industry tends to be regional or local in nature; a large number of small systems serve a small percentage of the population, while a small number of large systems serve a majority of the population. Therefore, many small systems may find it difficult to obtain the financial benefits that economies of scale can provide. Of the 487 utilities submitting customer data, the 25 largest water utilities in the state serve 970,175 customers while the remaining 480 utilities serve 782,105 customers. The general availability of water in the state, high cost to construct water mains, and the expense to pump water have likely contributed to the local nature of the industry. However, there are opportunities for small utilities to achieve the financial benefits provided by economies of scale. The opportunities for financial savings revolve around two categories: economies of scale and management.

Economies of Scale

Economies of scale should be considered a component of any plan to encourage the efficient use of financial resources. Economies of scale should not be limited to acquisition and consolidation of utilities, but should be expanded to include wholesale water purchase arrangements, shared ownership in water source and production facilities, limiting new utility startups, and purchasing cooperatives.

One solution to create economies of scale for the fragmented water industry is to encourage the use of water purchase agreements. In many parts of the state, water utilities have reached a point where their distribution systems have become interconnected or overlapping. Often, utilities are already using existing interconnections to purchase water from a neighboring utility. Yet, in many instances, these interconnections exist solely for emergency purposes. It is useful that these interconnections exist to maintain system reliability, however it is very costly for each utility to construct and maintain separate source of supply and treatment facilities.

Recommendation

Promote efficiency, sound management, and best practices for water utilities

When water utilities need additional treated water supplies or are in a position where existing facilities require replacement, they should be encouraged to consider the financial benefits that may exist by purchasing water from a neighboring utility. In order to encourage wholesale water purchase arrangements, existing barriers must be addressed. One barrier may be the belief that every water utility must be an island unto itself. Some localities may view outside ownership or control of water resources as unreliable. Others may resist exporting their supply for the benefit of neighboring communities. Many may be concerned that if they commit to sharing resources their future economic development will be limited. Case studies of successful regional solutions should be identified with the benefits summarized and presented to utilities in order to provide guidance on best practices. One example of a

Case studies of successful regional solutions should be identified with the benefits summarized and presented to utilities in order to provide guidance on best practices. One example of a successful regional approach is the Patoka Lake Regional Water District. In addition to its own retail customers, the Patoka Lake District sells water to 23 water utilities that expand over 11 southern Indiana counties.

Another problem with the use of water purchase agreements for wholesale water service is the inability of the purchase agreements to account for an equitable transition when the purchase agreement terminates. As purchase agreements expire, some water providers may take advantage of their monopoly position in providing water to wholesale customers and attempt to protect their own ratepayers from cost increases by passing along an inordinate portion of the increase to wholesale customers. Likewise, wholesale customers do not always want to pay their fair share of price increases that inevitably occur over the course of time. Unfortunately, the parties to the former purchase agreement often feel their only recourse is to litigate the dispute.

In order to reduce the likelihood of costly litigation upon the expiration of wholesale water agreements, basic elements for establishing the parties' rights upon termination should be developed and incorporated into all water purchase agreements. A study should be conducted of water purchase agreements from utilities that have had success selling water to other utilities to identify their standard components. It would be particularly useful to identify language that can be used to establish new rates after the original term of the contract expires. An additional approach when conflicts arise would be to require an alternative dispute resolution clause in the water purchase agreements.

> **FINDING:** Greater economies of scale can be gained by encouraging or requiring existing utilities to serve new developments rather than allowing a developer to start a new utility.

The more unique solution to generate economies of scale would be shared ownership of water treatment and production facilities. There are situations where two or more utilities are adjacent to each other and are also both near raw water sources. When these situations exist, and the utilities need to add or replace existing facilities, joint ownership of newly constructed treatment and production assets should be considered as a way to gain economies of scale. This practice is relatively common in the electric industry and should be readily adapted to the water industry. Shared ownership may also address many of the concerns over loss of control and litigation over purchase water agreements because ownership is maintained while providing economies of scale.

Another opportunity involves the development of more stringent rules to establish new utilities. Greater economies of scale can be gained by encouraging or requiring existing utilities to serve new developments rather than allowing a developer to start a new utility. Several developer-owned utilities have been established where a municipal utility is nearby. In one instance, a municipality provides all of the water and sewage treatment for a developer-owned utility. One of the primary motivations a developer might have to start a utility, even when an existing utility is nearby, is to avoid donating the infrastructure to the existing utility and possibly paying system development charges for each connection. Developers new to the industry do not realize that it is common practice for the developer to provide the infrastructure and provide additional payments for capacity in the system. In these situations, the new utility simply acts as a middleman and creates additional regulatory burdens on state agencies.

Unfortunately, the rules in place today do not prevent such developers from starting a new utility. More stringent rules should be developed to ensure that developers have pursued all reasonable options with existing utilities. Developers must show that an existing utility was unwilling or unable to provide service on reasonable terms. Both the IURC and IDEM are aware of numerous times where small water and wastewater utilities have failed. When these small utilities fail, options for solutions are limited and are almost always expensive. Numerous state agencies, including the IURC, IDEM, OUCC and Attorney General's office will need to work together to establish more efficient protocols in dealing with these troubled utilities. Improved laws are needed by the IURC and other agencies to prevent the formation of troubled utilities in the first place, because the legal action required to fix them after the fact is time consuming, expensive, and a burden for the affected customers.

Recommendation

Improve the managerial, financial, and technical requirements for forming water and wastewater utilities

One of the most apparent methods to achieve economies of scale is acquisition. The best opportunities for acquisition exist for small systems serving fewer than 1,200 customers. Based on the utilities that submitted customer data, 297 serve fewer than 1,200 customers. A trend appears to be developing where the acquisition of small utilities is already occurring and should continue without additional facilitation. As regulations and cost increase, many smaller systems realize that it is difficult to meet ongoing challenges as stand-alone entities.

Another area where the opportunity for consolidation may exist lies with the number of not-for-profit and regional water utilities providing service across the state. Some counties in the state have a number of these water utilities serving the local area, often times with interconnections for reliability and for wholesale water arrangements. Opportunities may exist to merge a number of these entities to eliminate duplication of costs such as board of director fees, utility managers, office staff, and legal and accounting fees. Consolidation could also lead to greater purchasing power resulting in lower prices for meters, chemicals and other utility purchases.

There are instances where municipal systems provide wholesale service to utilities that serve only one or two subdivisions just outside the municipality's corporate boundaries. These municipalities could be encouraged to take ownership of these smaller systems. At this time, it is not clear what catalyst might be used to take advantage of these consolidation opportunities. One approach may be to perform a study to identify specific consolidation opportunities across the state and develop tools to facilitate municipalities' ownership of the satellite utilities.

A final possible alternative to obtain economies of scale is the purchasing cooperative. One of the greatest advantages large utilities have is their ability to achieve price reductions by purchasing in large volumes. In many instances across the state, consolidation opportunities will not be achieved for various reasons but a purchasing cooperative may provide a large number of small utilities with large utility benefits by consolidating their purchasing needs to provide the ability to purchase chemicals, meters, pipe and other materials at substantial discounts. It may even be possible to obtain discounts on large capital items such as pumps, motors and water storage tanks. If an entity were to consolidate the components of multiple projects and then request discounted bids on those components on behalf of its members, substantial economies of scale will be achieved. As an example, one large utility, which operates multiple utilities in the state, has been able to obtain better prices for components of each plant when it has constructed more than one treatment plant at a time.

Utility Management

Most of the water systems in the state are owned by municipal or not-for-profit entities. These entities are managed by a board of directors or town or city councils. Individuals in these positions may be volunteers or receive minimal compensation and have other jobs that consume most of their time and energy. Individuals in these positions are also subject to turnover. One solution to enhance the management of ratepayer owned utilities is to provide training for the decision makers. Once armed with knowledge, the board and council members would be better equipped to manage the utility and its consultants. In at least two states, Mississippi and West Virginia, state law requires board members to obtain training. Training should be provided in the areas of financial, managerial and technical aspects of utility operations. All small utilities would benefit from this type of training.

FINDING: A complete set of accurate financial statements should be produced on a monthly basis for all but the smallest utilities to facilitate utility management. Anyone desiring to be a clerk-treasurer should possess the accounting knowledge or experience necessary to fulfill the financial roles and obligations of the position.

In order to make good decisions, decision makers require good information. Two areas exist where this information can be improved. The financial management and bookkeeping responsibilities for many of the small municipal utilities lies with the clerk-treasurer. This is an elected position, and there are no requirements regarding education or experience. Many utilities lack plant accounting records and, often times, are unable to produce a balance sheet that balances. A complete set of accurate financial statements should be produced on a monthly basis for all but the smallest utilities to facilitate utility management. Anyone desiring to be a clerk-treasurer should possess the accounting knowledge or experience necessary to fulfill the financial roles and obligations of the position.

Another area where management information can be improved relates to adequate analysis of alternatives for capital projects. Utilities frequently rely on engineering consultants to perform this analysis. However, utility management may not understand how to evaluate the cost differential that exists between the recommended solution and other alternatives. Capital projects should be developed with a true and complete evaluation of alternatives and decision makers should be trained to properly request a valid evaluation and identify which option is most appropriate for the utility and customers.

Small utilities can be better managed through planning. Based on data received in preparation of this report, most small utilities have not undertaken adequate master planning for capital projects. Master plans provide a road map that utilities can follow and update as the utility grows. All but the smallest utilities should be required to develop master plans that also consider regional solutions. If all utilities are required to plan for capital needs in advance and to share that information with neighboring utilities, regional opportunities will be more easily identified and realized. Master plans that are well-construed should also act as a control mechanism so that only projects that are needed and properly sized are constructed.

While water may be adequate in some areas of the state, the infrastructure costs to develop new sources of supply and to treat and store the water are high. For those utilities with high peak to average demands and those in areas facing supply constraints, water efficiency programs will reduce the cost to provide water utility service by reducing the amount of infrastructure that is needed to meet consumer demand. If consumers can reduce their total consumption and reduce utilities' peak demands, utilities will be able to reduce their investments. Customer education and pricing are also areas to consider for a water efficiency program. Finally, utilities with high water losses should take steps to reduce the loss before large investments are made to meet system demands.

Section VIII: Meeting Future Water Supply Needs

Indiana's water supplies are not evenly distributed throughout the state; droughts and areas of concentrated demand can stress these supplies. There are both infrastructure improvements and management improvements that can extend supplies. By better managing supplies, planning for the future, looking realistically at where water is now and where demand will be in the future, and acknowledging the continued variability of Indiana's climate, the state will be in a better position to weather unforeseen events.

FINDING: By better managing supplies, planning for the future, looking realistically at where water is now and where demand will be in the future, and acknowledging the continued variability of Indiana's climate, the state will be in a better position to weather unforeseen events.

Anecdotal evidence suggests Indiana is blessed with adequate water supplies and is well positioned to use this resource as an economic advantage to states lacking water. However, studies have not been completed that would measure more precisely the amount of water we have or how long it might last at current rates of consumption. While data exists that would permit demand forecasts, such an exercise would be futile without supply data. Unfortunately, it is costly to obtain water storage and recharge rates of aquifers. Therefore, before such a program is advanced, a cost benefit analysis should be conducted to determine if the benefits will outweigh the costs of knowing versus not knowing.

Monitoring our Resources

Only by monitoring groundwater and surface water levels and water quality can we determine when a source is being over pumped or polluted, both of which affect a water supply's long-term availability. Effective monitoring must be regular and ongoing in order to identify trends indicating water-level decline or increasing contaminant concentrations.

Recommendation

Conduct a cost-benefit analysis to determine if the benefits to obtain more precise water supply data exceed the cost

Groundwater levels naturally fluctuate with changes in precipitation and river stage. However, water-level declines caused by over pumping a well can stress an aquifer when the amount of water removed from the aquifer is greater than recharge into the aquifer. Recharge is reduced and runoff is increased when impervious surface area increases and topsoil is lost. To determine if an aquifer is stressed because of over pumping, drought, or reduced recharge, it is first necessary to know how groundwater levels and recharge rates change annually and seasonally.

In Indiana, several different agencies study and collect data that can be used to understand the conditions of our groundwater resources. IDNR and USGS operate and monitor a network of 36 continuous record monitoring wells in Indiana. The data collected from the network is available at the USGS Groundwater Watch website[41] and the Indiana Water Science Center website.[42] Currently, the USGS is assessing whether the size of the network is an adequate representation of all the aquifers, watersheds, ecosystems, and climatic regions in the state, because over time the network has been reduced from 90 wells to its current size of 36 wells.[43]

Recommendation

Evaluate the adequacy of existing monitoring

Additionally, the USGS Groundwater Resources Program is conducting regional groundwater availability studies of major aquifers in the United States. One of these aquifers is the Glacial Aquifer System, which underlies 25 states and includes two thirds of Indiana. The principal glacial sand and gravel aquifer in this system is the largest water source for public supply, industry, and irrigation. This study will give insight into the current condition and availability of the aquifer's supply in Indiana.[44] Agencies of the state should further refine monitoring efforts for water supply, water demand, and water-quality, prioritizing the most heavily-used aquifers and streams.

Stream flow reflects the amount of water running off the watershed into a stream channel. It is necessary to know how much water is flowing in a stream and how much water is needed to maintain stream flow in order to make water distribution decisions. There should be sufficient stream flow to maintain the integrity of the aquatic ecosystem, to assimilate waste and protect water quality, and to support new water uses. Stream flows fluctuate during floods and droughts and during the growing season when shoreline vegetation takes up water.

Knowing a stream's low flow is important because it is the water available during dry weather. In Indiana, low flow is determined by calculating the 7Q10, the lowest seven day average flow that occurs on average every 10 years. This criterion is used to set limits on discharges into streams in order to maintain water-quality standards during low flows. Maintaining flows above the 7Q10 is important for protecting water quality; however, higher stream flows may be necessary to protect aquatic life and ecology. The 7Q10 criterion does not account for longer or more extreme droughts nor does it take into account the historical flows under which the aquatic ecosystems evolved.

The USGS collects daily stream flow data throughout the state from 232 stream gauges. It uses the data to create flow-duration, low-flow, and high-flow tables, and to calculate mean discharges. Also, IDNR produces monthly water resource reports that summarize the previous month's precipitation, stream flows, and water levels in Lake Michigan, the state's eight

[41] http://groundwaterwatch.usgs.gov/IDN/StateMaps/IDN.html
[42] http://in.water.usgs.gov
[43] Personal communication with the United States Geological Survey, 2013
[44] Personal communication with the United States Geological Survey, 2013

reservoirs and the four water supply reservoirs used by Citizens Water, groundwater levels, and the state's current classification by the U.S. Drought Monitor.[45]

Poor water quality may also limit the usability of a groundwater or surface water source. The USGS's National Water-Quality Assessment program examines the water chemistry of groundwater from the Glacial Aquifer System and has identified the extent of impairments that might limit groundwater use in Indiana.[46] The IDEM monitors water-quality conditions throughout the state. It has a network of 153 public water supply wells and 160 residential wells from which it collects untreated groundwater samples. It submits a water-quality assessment report every two years and a list of impaired water to the U.S. EPA. The IDEM collects water samples from rivers and streams to assess the aquatic life, recreational, and fishable uses of the river. It also collects samples from rivers that serve as a public water supply. Currently, water-quality threats to Indiana's water include:

- Nitrate
- Livestock and poultry confined feeding operations
- Failing septic systems
- Landfills
- Underground storage tanks
- Class V injection wells (non-hazardous fluid disposal)
- Industrial facilities
- Storage and use of salt during winter

When groundwater and surface water becomes contaminated, additional treatment is necessary to use the water for drinking purposes, which is expensive. In some cases, the water source can no longer be used for some purposes such as for irrigation water or for drinking. Typically, when a well's water becomes contaminated, the well must be abandoned and another water source must be found. Remediating a contaminated aquifer or treating contaminated groundwater can be very expensive. Sometimes it is impossible to treat the water so that it is safe for human consumption or other uses.

Drought

A drought occurs when there is a prolonged period of less than normal precipitation. Dry, hot weather lasting for more than a couple of weeks can have an adverse effect on the availability of water. Extended periods of low precipitation and high temperatures often reduce stream flows, which increases groundwater withdrawals, further reducing stream flows. Groundwater can be used to augment dwindling surface water supplies during water shortages if the appropriate infrastructure is in place. However, the groundwater water level will decline when water is withdrawn at a rate faster than the rate at which the aquifer is

[45] http://www.in.gov/dnr/water/4858.htm
[46] http://water.usgs.gov/nawqa/studies/praq/glacaq/

recharged. This can happen during extreme rainfall deficits or if several wells within close proximity are pumping at the same time when rainfall is less than normal.

The impact of drought depends on ones' relationship with water and definition of drought. Agriculture is typically the first economic sector to be affected by a drought because reduced rainfall typically happens during the growing season. Indicators of an agricultural drought are low soil moisture and reduced precipitation. However, low soil moisture is not indicative of a hydrologic drought, which occurs when stream flow, groundwater levels, and reservoir levels decline. Consequently, droughts are measured for different purposes using different criteria, such as precipitation and temperature statistics, groundwater levels, low-flow characteristics, soil moisture values, and economic factors such as crop yields.[47]

Recommendation

Require drought planning

Indiana experienced droughts lasting multiple years in the 1930s, 1950s, 1960s, 1980s, with its most recent drought occurring in 2012. The 1988 drought served as the catalyst for addressing the impact of water shortages on the health, safety, and economic well-being of Indiana. Even in the water rich Kankakee River Basin, record low groundwater levels were measured in 19 out of 23 bedrock and unconsolidated observation wells.[48]

Because drought is a natural phenomenon that cannot be prevented and is not always detectable at its onset, it is critical that water utilities and government agencies identify water systems vulnerable to short-term (lasting a season) and long-term (lasting more than one season) droughts and require water utilities to do drought planning. State agencies should also prepare and coordinate on messaging to ensure consistency and a unified approach to response efforts.

Water utilities most vulnerable to drought are:

- Systems that rely on a single surface water source for supply
- Smaller systems unable to develop alternative water supplies capable of meeting demand
- Smaller systems unable to update infrastructure because of financial constraints
- Systems unable to interconnect with nearby larger systems
- Systems unable to monitor water level changes and anticipate flow changes because its surface water source is not monitored

[47] Water Shortage Task Force. 2009. Indiana's Water Shortage Plan. Indiana Department of Natural Resources, Division of Water, Indianapolis.
[48] IDNR, Division of Water. 1990. Water Resource Availability in the Kankakee River Basin, Indiana – Executive Summary.

Any community that obtains its water from surface water sources, such as rivers, streams, lakes, and reservoirs, is more vulnerable to drought than a community that uses groundwater because low precipitation and high temperatures for extended periods of time reduce stream flows. Areas in southern Indiana without access to the sand and gravel deposits along major rivers are vulnerable to drought. The state's reservoirs in the southern region (Patoka, Monroe, and Brookville) provide a reliable supply source during short-term droughts but could be affected by long-term droughts.

Recommendation

Conduct a water symposium

In order to better determine if the state's water utilities are prepared to meet expected summer demand (including a drought), it is recommended that state agencies partner with water utilities and trade associations to host a public water symposium to address issues related to summer preparedness as well as utility finances, master planning and rate structures.

The Drought of 2012

Just last year Indiana experienced the worst drought since 1988. All 92 Indiana counties were in some level of drought in 2012, and at the drought's peak, most of the state was categorized as being in extreme and exceptional drought, which are the two highest levels. By July 2012, IDNR and the state Department of Homeland Security issued a Water Shortage Warning for all counties in Indiana.

In response, many cities and towns throughout the state also issued water restrictions in July 2012. The restrictions targeted outdoor water use, which is a nonessential use. Some cities issued voluntary conservation measures; whereas, restrictions were mandatory in other cities. Measures included no lawn watering or lawn watering only on certain days or times during the day; no car washing except at commercial car washes; no cleaning sidewalks, paved areas, or structures with water; and no operating non-recycling decorative water fountains. Mandatory conservation measures are typically outlined in water conservation ordinances.

Additionally, IDEM conducted a survey of all public water suppliers during the drought. Through this survey, it was found that despite southwestern Indiana having the most severe drought conditions, central Indiana reported the most water shortages. This highlights that both water supplies and demands must be understood in order to properly prepare for and respond to drought.

Options for Future Supplies

When utilities consider developing new supplies or expanding their back-up supplies, they typically think about where to install a new well or intake. However, there are other very effective ways in which current supplies can be extended. These include improving infrastructure, using water more efficiently, reusing water, and using existing but underused supplies.

Reducing Water System Leaks

One of the most cost effective and accessible sources of additional water supply can be water saved by stopping or minimizing water lost in a utility's distribution system. Old and poorly constructed pipelines contribute to water leaks. This lost water can be expensive; money was spent withdrawing it from the source, chemically treating it, and moving it through the system before it was lost. Leaks inflate production and raise energy costs, and severe, undetected leaks can expedite infrastructure expansion. Leakage control involves efficient identification of leaks and timely, lasting repairs especially of small leaks at joints and fittings.[49] Water utilities should target an economic level of leakage. This level varies among water suppliers, but the target level is the point where the cost of reducing leaks is equal to the cost of water saved through leak reduction.[50]

Water Reuse

Water reuse is using water a second time that would have otherwise been discharged into a stream. Advantages of water reuse is that it is not climate dependent, it relieves demand from groundwater and surface water supplies, and it reduces the amount of nutrients entering surface water supplies from wastewater discharges. Two common types of reuses are using treated wastewater as an alternative supply, either for irrigation or drinking water, or injecting it back into the ground for aquifer recharge. Regardless of its end use, the reused water receives extensive treatment and disinfection. However, the extent of treatment does depend on its end use. For example, using wastewater for drinking water supply requires more treatment and disinfection than using wastewater for watering golf courses. The application of wastewater in Indiana is regulated by Rule 7 of Article 6.1 Land Application of Biosolids, Industrial Waste Product, and Pollutant-Bearing Water. This rule specifies the requirements for applying pollutant-bearing water, such as wastewater, on land with low and high public exposure. A permit is required for treatment and disinfection depending on the type of wastewater. The rule also specifies water-quality criteria and monitoring requirements. Indiana does not promote or regulate water reuse for drinking water supply. In 2012, the U.S. EPA created "Guidelines for Water Reuse" for those states with no regulations.[51]

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[49] AWWA Water Loss Control Committee. 2003. Applying Worldwide BMPs in Water Loss Control. Journal AWWA, 95(8):65-79. B. Bateman and R. Rancier (Eds.). http://www.awra.org/committees/AWRA-Case-Studies-IWRM.pdf

[50] Ibid.

[51] http://nepis.epa.gov/Adobe/PDF/P100FS7K.pdf

Water Conservation

Water conservation is about using water more efficiently in order to extend existing supplies. Conservation programs are used by water utilities to reduce customers' indoor and outdoor water use. Several water utilities in Indiana have conservation plans and some SWWF facilities operating in the Great Lakes Basin that meet certain thresholds are required to implement conservation programs.

Indoor water use has been decreasing since the passage of the 1992 Energy Policy Act, which set uniform water efficiency standards for showerheads, faucets, urinals, and toilets manufactured after January 1994.[52] Outdoor water use contributes to peak demands for water utilities and can double or triple average day demands; these peaks drive infrastructure expansions and development of new supply sources. During the hot, dry summer months when farmers increase pumping to sustain crops and power plants step up production to meet energy demands, homeowners and businesses are also watering their lawns. These simultaneous demands strain not only the water supplies, but also a water utility's ability to meet peak demands. It can be more cost effective to teach people to use water more efficiently than to build a treatment plant, develop new sources, and lay bigger pipes.

There is no one-size-fits-all conservation plan. Communities have different water supplies and demands. For example, in some communities, residential water use is highest during summer months because of lawn watering, so irrigation meters may be necessary to track outdoor water use. In another community, industrial water use is high year round, so increasing industrial efficiencies by working with each individual business would be more appropriate. Consequently, water use, future demands, climate, and culture are important factors when a water utility and community set long term goals and establish appropriate conservation plans.

Lake Michigan

One large water resource that is unavailable to the majority of Indiana is Lake Michigan. Only the communities within the Great Lakes Basin (Figure 29), and pending legal decisions, those communities in counties that straddle the basin, have access to that water. Using water from Lake Michigan or any of the abundant groundwater supplies in the Great Lakes Basin to meet outside needs is unrealistic.

[52] U.S. EPA. 2012. Green Building: Conserving Water. http://www.epa.gov/greenhomes/ConserveWater.htm

Figure 29. Extent of the Great Lakes Basin in northern Indiana (shown in blue).

Existing Reservoirs

Existing water supply reservoirs and quarries represent two possible future sources of supply. A reservoir is a man-made lake. The primary water supply reservoirs are Cedarville and Hurshtown in Fort Wayne; Geist, Morse, and Eagle Creek around Indianapolis; Prairie Creek in Muncie; Kokomo Reservoir in Kokomo; and Middle Fork in Richmond.[53] Brookville Lake, Lake Monroe, and Patoka Lake are located in southern Indiana and are owned by the U.S. Army Corps of Engineers. The state of Indiana purchased the water supply storage of Brookville, Monroe, and Patoka and IDNR oversees water sales from these reservoirs.

Recommendation

Use existing and underutilized water resources in southern Indiana

Water supply information is available for the three reservoirs from which IDNR sells water: Brookville Lake, Lake Monroe, and Patoka Lake have available water supplies. In fact, only 0.8% of Brookville Lake's available water supply is used (Table 8). Patoka Lake has the largest percentage of committed supply at 21%; however, there is still 27,649 mg available for purchase.

[53] Clark, D.E. (Ed.). 1980. The Indiana Water Resource: Availability, Uses, and Needs. Governor's Water Resource Study Commission, State of Indiana.

Quarries can also be used to supplement water supplies. As discussed in Section VII, two quarries are currently being utilized for water supply and two more have been identified as a potential water supply source that could be utilized in the event of a water shortage. The ability to use quarries as a water supply source will be case specific. Some factors to take into consideration when considering adding a quarry as a source are:

- Is the quarry inactive or abandoned?
- Can the quarry's supply provide enough water?
- How far is the quarry from the water distribution system?
- Are there any contamination concerns?

Table 8. Available water from the state-owned water supplies.
Source: Indiana Department of Natural Resources.

Reservoir	Water Supply Storage (mg)	Committed Supply (mg)	Percent Committed
Brookville Lake	29,098	243	0.08%
Lake Monroe	52,136	9,200	18%
Patoka Lake	34,949	7,300	21%

Other Water Resources

Groundwater is abundant in several areas of the state, and, in some areas, groundwater is an underutilized resource. Therefore, the feasibility of obtaining groundwater in a particular area and the amount that can be withdrawn would require local analysis. However, the State of Indiana does own and has studied the groundwater resources in Charlestown State Park. The estimated supply from this aquifer, if it were to be fully developed within the boundaries of the state park, is 75 mgd. Currently, with the existing infrastructure, the pumping capacity is 3 mgd. In addition, the state may own other facilities such as prisons and state hospitals which may have significant production facilities that could be explored for their potential.

In many cases, industrial facilities build to their own needs, but in an emergency, large-scale industrial facilities could be used to provide at least temporary sources of water. Relatively high capacity wells, perhaps unused at this time, may be within usable distance of a water utility. It might be appropriate to set a threshold for such facilities and inventory them. Likewise, power plants use large amounts of water and may represent another potential source of water. Some, like the abandoned Marble Hill nuclear plant, had large wells installed and, at least in part, is currently being used for water supply. It may be appropriate to set a threshold for such facilities and inventory these as well.

Interbasin Transfer

An interbasin transfer moves water from one basin into a second basin. The water is routed through tunnels, channels, or other engineered systems and discharged into a receiving water body. There are many examples of interbasin transfers in the United States. New York City transfers water from the Catskill Mountains, and Los Angeles diverts water from eastern California. Although transfers to major metropolitan areas is quite common, so are transfers to smaller communities, such as the diversion of water from the Catawba River Basin in North Carolina to Charlotte, Concord, and Kannapolis.

Diverted water is used to meet growing public supply, irrigation, and power generation demands in the receiving basin. However, these transfers are not without controversies. Issues include equitable share of water for communities downstream of the diversion, especially during low flow and drought conditions. Also, large transfers could result in the dewatering of the supply source. Any pollutants in the supply source could become more concentrated, which affects not only the quality of the water in the donor basin, but also in the receiving basin when the pollutants are discharged with the water. Transfers from surface waters lower streams flows, which affects aquatic ecosystems.

FINDING: Currently Indiana does not have any laws prohibiting interbasin transfers except in the Great Lakes Basin. In the future, should any entity in Indiana desire to withdraw water from another basin, rules should require the entity to show that other users will not be adversely affected.

As discussed previously, transfers out of the Great Lakes Basin are regulated by the Great Lakes Compact. Only communities outside the basin, but located within a county that straddles the basin, may apply for an exception. In 2009, Waukesha, Wisconsin, was the first community in the U.S. to submit an application for a diversion. The application, which was submitted to the Wisconsin DNR, is still pending. The decision will likely set a precedent for future applications. Currently Indiana does not have any laws prohibiting interbasin transfers except in the Great Lakes Basin. In the future, should any entity in Indiana desire to withdraw water from another basin, rules should require the entity to show that other users will not be adversely affected.

Water Resource Management

Population growth and shifts, economic development, aging infrastructure, climate change, and land use all impact water resources. Typically water management only focuses on water-supply development without consideration of ecosystems or social impacts. An alternative to this traditional method is Integrated Water Resources Management (IWRM). IWRM is "a process that promotes the coordinated development and management of water, land, and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment."[54]

[54] Global Water Partnership. 2012. What is IWRM? http://www.gwp.org/The-Challenge/What-is-IWRM/

The American Water Resources Association[55] (AWRA) identifies and defines the four key concepts of IWRM as:

1) **Manage water sustainably** – Water management must balance the multiple objectives of different interests with consideration for economic development, social equity, and the environment as well as current and future generations.

2) **Coordination is required for integration** – Integrate water management between and within levels of government and other organizations, with recognition of the respective roles of each.

3) **Encourage participation** – Involve the local public and stakeholders from all water use sectors.

4) **Resources are connected** – Holistic management recognizes the interconnectedness of land and water, surface water and groundwater, water quantity and water quality, freshwater and coastal waters, and rivers and the broader watershed.

Managing our resources requires assessing our supplies and determining current and future needs both locally and regionally. To do this, groundwater and surface water supplies must be monitored for water level, flow, and water quality changes. Monitoring does occur in Indiana (see Monitoring our Resources), but the data is not analyzed on a holistic basis. Analyzing the data in relation to areas of population growth and future economic development can give insight into where demand is greatest, and identify the long-term water use and supply trends for that area. Additionally, water demand data for all users must be analyzed. One use, such as public supply, cannot be analyzed without regard to other uses such as agriculture or industrial uses, because all the water withdrawn is from the same interconnected sources. Continued investment in hydrologic data collection and analysis is critical for determining when and how to respond to changes in water use and supply.

Recommendation

Begin Integrated Water Resource Management

IWRM expands water utilities' options for securing adequate supplies. Instead of just installing a new well or surface water intake to meet new demands, IWRM can be used to determine whether water conservation, an aggressive leak detection program, or water reuse is cost effective and can supply the additional needed water. Unlike traditional groundwater and surface water supplies, these alternative options are not affected by climate variability and have minimal environmental impact.

[55] American Water Resources Association. 2012. Case Studies in Integrated Water Resources Management: From Local Stewardship to National Vision. http://www.awra.org/committees/AWRA-Case-Studies-IWRM.pdf

Having the regulatory framework in place that facilitates these alternative sources is critical. It requires coordination among different state agencies and partnerships between city departments. State and local policies, legislation, and financial structures must support IWRM in order to initiate planning and authorize funding. Several states and communities in the United States have begun IWRM. The AWRA published case studies on seven IWRM programs that highlight the different ways in which IWRM can be implemented.[56] These seven states (Oregon, Washington, California, New Mexico, Minnesota, Florida, and New York), as well as many other states which to some degree use IWRM, started on the path to using IWRM many years ago. In several of those seven states, there was a definite impetus to begin IWRM, such as an interstate water issue on the Rio Grande or a region where a drought occurs on average every five years. Indiana is not in quite the same circumstances. Yet, Indiana should not wait to start on the path to IWRM. While our droughts are not as periodic as the example above, there is a risk that we could experience a drought that is similar to or worse than in 1988, or have back-to-back droughts. Even absent a drought threat, Indiana's economic development would be best served by acquiring solid data regarding supply and demand, and implementing IWRM. As mentioned above, monitoring does occur in Indiana (see Monitoring our Resources), but the data is not analyzed on a holistic basis. Based upon our review of available information and data, Indiana still has much work to be done towards assessing even the current supply and demand for water in totality.

FINDING: Several states and communities in the United States use Integrated Water Resources Management. Oregon, Washington, California, New Mexico, Minnesota, Florida, and New York began using it years ago.

There are various ways for Indiana to start on the path to IWRM. One way is to use the State Utility Forecasting Group (SUFG) as a model for a new institution that would focus on water. The SUFG, which must be based at a state supported university by law, has been analyzing and forecasting the supply, demand, and price of electricity for 25 years as well as conducting special studies related to energy. The SUFG is based at Purdue, but the actual forecast is a collaborative between Indiana University and Purdue University. Although the Legislature would like to know if Indiana will run out of water resources, there is no way for the IURC to draw this conclusion based on one year's worth of information. There are various water related groups already based at state-supported universities, including the IGS at Indiana University and the Purdue Water Community. Leveraging the academic resources of Indiana's state universities into an institution such as the SUFG would put Indiana on the path to IWRM. The development of a model comparable to that developed by the SUFG for the comprehensive analysis of both current production and projected water needs could be utilized by the IURC and other state agencies. That model should also be capable of producing outputs based on various scenarios.

The proposed Integrated Water Resource Management Coordinating Committee would capitalize and leverage existing agency strengths

[56] American Water Resources Association. 2012. Case Studies in Integrated Water Resources Management: From Local Stewardship to National Vision. http://www.awra.org/committees/AWRA-Case-Studies-IWRM.pdf

For many years, staff members from IURC, OUCC, and IDEM have met from time to time to discuss small, troubled water and wastewater utility issues. This informal group is called the Water Wastewater Task Force (WWTF). Modeling this task force, a new committee could be created and would be known as the Integrated Water Resource Management Coordinating Committee. The proposed Integrated Water Resource Management Coordinating Committee would capitalize and leverage existing agency strengths and be composed of the following state agencies: Indiana Economic Development Corporation, IDNR, IDEM, IFA, Homeland Security(IDHS), OUCC and IURC. This group would focus on planning, water resource management, and economic development related to water resources. The Integrated Water Resource Management Coordinating Committee is depicted in Figure 11. The committee would meet quarterly to discuss water resource issues and formulate plans to put Indiana on the path to using IWRM.

In 1994, IDNR created Indiana's Water Shortage Plan. A Water Shortage Task Force was created by law in 2006 to refine the IDNR Water Shortage Plan. The Water Shortage Task Force met for several years, completed its mission, and is no longer active. During its existence the Water Shortage Task Force addressed many of the issues that directly relate to the IWRM initiative. The task force was composed of members representing: Public Water Supply Utilities, Agriculture, Steam Electric Generating Utilities, Industry, Municipalities, Environmentalists, Consumer Advocates, Economic Development Advocates, Academia and the Public. One way to address Indiana's water supply concerns is to reactivate the Water Shortage Task Force and give the group new direction and purpose. By reactivating this group, already comprised of qualified entities, and giving it new direction, the state could leverage the large amount of work already accomplished and put Indiana on the path to IWRM.