

**USGS FY2015 FUNDING OPPORTUNITY**  
**STATE OF NORTH CAROLINA, DIVISION OF WATER RESOURCES**  
**FINAL WORK PLAN**  
**November 2, 2016**

**A. Introduction:**

This Work Plan was developed and is being submitted in accordance with a FY2015 WUDR Grant received from USGS. It outlines North Carolina's current water use program, its IT infrastructure related to water use data and the extent to which its current data collection efforts comply with the USGS baseline standards. It then outlines North Carolina's priorities for improving water use data and lists the methods by which the state will address those priorities. It also describes collaboration that was involved in developing this plan and obtaining previous WUDR funding. Finally, it describes additional tasks proposed in North Carolina's application for the 2015 WUDR Cooperative Agreement.

For any questions or concerns about this Work Plan, please contact our primary investigator Linwood Peele at [linwood.peele@ncdenr.gov](mailto:linwood.peele@ncdenr.gov) or (919) 707-9024.

**B. Plan Title: North Carolina Water Withdrawal and Use Programs Database Consolidation**

**1. Primary Investigator:**

Linwood Peele, NC Department of Environmental Quality  
NC Division of Water Resources, Water Supply Planning Branch Manager  
1611 Mail Service Center, Raleigh, NC 27699-1611  
Phone 919/707-9024, Fax 919/733-3558  
[linwood.peele@ncdenr.gov](mailto:linwood.peele@ncdenr.gov)

**2. Proposed Start Date:**

November 1, 2016

### **C. North Carolina's Current Water Use Programs**

The North Carolina Department of Environmental Quality (DEQ) is the primary state agency responsible for protecting North Carolina's environmental resources. It administers regulatory programs to protect air quality, water quality, and public health, and it also offers technical assistance to businesses, farmers, local governments, and the public. The North Carolina Division of Water Resources (DWR or Division) is a division of DEQ. Its mission is to protect the state's water supplies and foster stewardship of this natural resource for use by current and future generations of citizens. DWR is the primary state agency responsible for collecting water use data and making this data available for internal agency use as well as use by other agencies (including USGS) and the public.

North Carolina has required registration of large surface water and groundwater withdrawals since the early 1990s. The Division administers six programs that collect water use data. These programs are the Water Withdrawal & Transfer Registration program, the Local Water Supply Planning program, the Central Coastal Plain Capacity Use Area program, the Public Water Supply Section program, the NPDES Permitting program and the State Non-Discharge Wastewater program. More detail on these six programs is provided henceforth.

The Water Withdrawal and Transfer Registration (WWTR) program, created by NC General Statute 143-215.22H. This requirement states that any person who withdraws 100,000 gallons per day or more of water from the surface or ground water defined by the State or who transfers 100,000 gallons per day or more of water from one river basin to another river basin shall register the withdrawal or transfer. This statute also applies to agricultural production who withdrawal or transfer 1,000,000 gallons or more per day. All required water withdrawal and transfer reporting data shall be submitted electronically by April 1<sup>st</sup> for the previous calendar year.

The NC General Assembly first approved a law to regulate Interbasin Transfers (**IBTs**) in 1993 with NC General Statute 143-215.22L. There are currently seven approved IBT Certificates in North Carolina plus numerous grandfathered transfers.

The Local Water Supply Planning program (LWSP), created pursuant to NC General Statute 143-355(l), requires local government water systems and community water systems that regularly serve 1,000 or more service connections, or 3,000 or more individuals, to prepare and submit to DWR a local water supply plan describing current and expected future water sources and demands. These Plans, which contain self-reported data, are the main source of the Division's water use data.

NC General Statute 143-215.13, also known as the Water Use Act of 1967, authorizes the creation of capacity use areas where the use of water threatens the viability of the resource. Upon designation, users of the defined groundwater resource who wish to withdraw at least 100,000 gallons per day must get a permit

from DWR. Current capacity use area rules also require water use reporting from facilities using more than 10,000 gallons per day. Currently, there are 15 counties in the eastern part of North Carolina designated as the Central Coastal Plain Capacity Use Area (CCPCUA) under this statute. A map of these 15 CCPCUA counties is attached to this Work Plan as Exhibit A.

The Division's Public Water Supply Section collects water treatment data from public water systems as part of its responsibility for implementing provisions of the federal Safe Drinking Water Act and state drinking water systems' requirements.

The State of North Carolina has been delegated the authority to implement the federal NPDES Permitting program in our state under NC General Statute 143-215.1(a)(1). In addition to obtaining permits for all discharges into surface waters, each permitted facility is required to report the quantity and quality of their discharge to DWR. The frequency and detail of the report for each facility is based on the volume and potential impact of the discharge on the surface waters.

DWR also implements a Non-Discharge permitting program for the state, as authorized by NC General Statutes 143-215.1(a)(2). This program governs the facilities that are not required to receive coverage under an NPDES permit. These facilities treat their wastewater utilizing non-discharge treatment systems such as land application, subsurface disposal and infiltration systems.

As an exception to the aforementioned reporting requirements, many of North Carolina's agricultural water users are required to report their water usage only to the NC Department of Agriculture and Consumer Services (DACCS). Although DACCS publishes a report of the information that they collect every two years, this report is in summarized, aggregate form, so the Division is currently unable to obtain data about individual water users and withdrawal sites.

#### **D. Work Plan Summary**

The State of North Carolina currently has a statewide program for the collection and management of water use data. However, the state does not currently collect the information needed to meet all of the Tier 1, 2 and 3 information requested by USGS. The requested funding will be used to extend the state's data collection capabilities, work with the water users and other agencies to improve the quality of the data collected and to develop and implement a data interface to allow for the update of the Tier 1, 2 and 3 information to the USGS database.

The expertise gained during this project will be transferable to other state that are at different levels of program development.

## **E. North Carolina's Current Water Use Databases**

DWR has eight databases in which it stores water use data. Seven of these databases store data for a specific program, and the other one – the Water Use database - is a collection of data from three of those individual databases. These databases were created at different times pursuant to different statutes to meet different needs, and combining each of these databases into one new database would be too time and resource consuming. To better collect and report water use data, DWR wishes to import the data from the seven program databases into the Water Use database. Data could then be shared electronically from the Water Use database with the USGS and other interested parties. These eight databases are described as follows:

Water Withdrawal & Transfer Registration Program: This MySQL-based database contains data on withdrawals of surface or ground water. This data is supplied by participants in the WWTR program.

Local Water Supply Planning Program: Also stored in MySQL, this database tracks Local Water Supply Plans. A Local Water Supply Plan is an assessment of a water system's current and future water needs and its ability to meet those needs. DWR periodically compiles these local water supply plans into a statewide Water Supply Plan. This statewide plan provides a comprehensive assessment of water supply needs, water use, and water availability across North Carolina, identifies present and future major water supply issues, and provides guidance for water supply planning.

Central Coastal Plain Capacity Use Area Program: The CCPCUA is a 15-county area of eastern North Carolina with a history of aquifer overuse, and the goal of this program is to decrease water withdrawals to a sustainable level. This MySQL database tracks water withdrawals, water use, and groundwater levels.

Safe Drinking Water Information System (SDWIS): SDWIS tracks the quality and chemical composition of drinking water and the extent to which this water complies with US EPA standards for human consumption. Local water systems submit reports to the Public Water Supply Section Program regarding the quality and chemical composition of drinking water sources from both the ground and surface. Then, DWR summarizes this data, enters it into SDWIS, and shares it with the US Environmental Protection Agency.

Interbasin Transfer Database: This database tracks information regarding the transfer of water from one river basin into another. This database was originally coded in the 1990s, and it has not been updated with new data in years. One of the objectives for this project is to modernize the code in this database and bring it up to date with current data.

BasinWide Information Management System (BIMS): A DB2 database, BIMS collects data about ground and surface water related to water quality permitting and the NPDES Program. This data includes discharge and non-discharge monitoring

data, such as the flow of water out of permitted facilities and the concentration of contaminants in that outflow water. BIMS also contains data about inspections of permitted facilities (for discharge permits and non-discharge permits) as well as data about sanitary sewer overflows. BIMS tracks regulatory compliance for water use facilities – it monitors the permits and can generate violation notices. Finally, BIMS can output data electronically, and it uploads discharge monitoring reports to the US Environmental Protection Agency.

Water Resources Information, Storage, Analysis, and Retrieval System (WRISARS): WRISARS is a system for quick and easy access to water resources information. It mainly uses data stored in the North Carolina State Climate Office’s CRONOS MySQL database, which itself incorporates data from several different sources, including the USGS. WRISARS contains data about stream flow, ground water and reservoir levels.

Water Use: This database is a compilation of information from CCPCUA, Local Water Supply Planning, and the Water Withdrawal & Transfer Registration programs. Ultimately, DWR wants to expand this database to include data from all of the other databases. Having one “master” database will make it easier for interested parties to view the data and for DWR to electronically share its data with the United States Geological Survey.

## **F. North Carolina’s Current Data Collection Activities Compared to the USGS Baseline Standards**

North Carolina’s current data collection efforts satisfy much of the USGS Baseline Standards (Standards), but additional work is needed for the state to meet all of these needs. The water use data the Division collects is mainly self-reported from water systems and large water users. Attached as Exhibit B is a chart listing the USGS baseline standards and explaining the extent to which North Carolina’s current data collection activities meet those Standards. The first four columns of the chart explain the Tiers, and the right column describes the extent to which the state’s current data collection efforts comply with the Standards.

There are three main reasons why North Carolina’s current data collection efforts fall short of the baseline standards. First, the Standards call for states to break down their water use into twelve water use categories. These categories are the first column of data in the chart in Appendix B. For the most part, the Division does not currently ask water users to break down their use into these categories, and it has no method of obtaining this data on its own.

Second, the Standards suggest that states should collect specific information about each ground and surface water source, such as the water type, name of the aquifer (for groundwater sources), HUC-8 code, and name of the county. Although the

Division does ask water users to report the amount withdrawn from each withdrawal source, it currently doesn't track much of the aforementioned source-specific information.

Third, the Division obtains almost all of its water use data from self-reported forms completed by water systems and large water users. There are two main limitations of this process. First, North Carolina law does not require all water users to report information to the Division; users must report only when their use exceeds a certain threshold. For example, single family homes in rural areas that use well water do not have to report usage information, and neither do farmers of small plots of land. Accordingly, the data that the Division has is incomplete and only as accurate as water users' self-reporting. Second, many agricultural water users are required to report water use data only to the NC Department of Agriculture and Consumer Services (DACs), not the Division. DACs publishes a summarized, aggregate report of this information every two years. But under current North Carolina law, the Division does not have access to the information on individual water users that the Standards request.

#### **G. The Division's Priorities for Improving Water Use Data and Steps to Achieve Them**

The Work Plan consist of **three high priorities.**

The **first high priority** of the Division is to gather additional water use information. Specifically, the Division seeks to gather more information from water users about (a) each water withdrawal source and (b) how water use breaks down according to the twelve water use categories in the Standards. With this information, the Division will be much closer to meeting the USGS Standards.

The Division will review the reporting forms it sends to water users, and implement recommendations on how those forms can be expanded to collect more information. Efforts will also be made to work more closely with the NC Department of Agriculture and Consumer Services to gather more accurate water use information from the State's agricultural water users that use less than 1,000,000 gallons per day.

The **second high priority** of the Division is to improve its existing water use databases. DWR has eight databases that it uses to store water use data. Seven of these databases store data for a specific program, and the other one – the Water Use database - is a collection of data from three of those individual databases. These databases were created at different times pursuant to different statutes to meet different needs, and combining each of these databases into one new database would be too time and resource consuming. To better collect and report water use data, DWR wishes to import the data from all seven program databases

into the Water Use database. Data could then be shared electronically from the Water Use database with the USGS and other interested parties.

The **third high priority** of the Division is to develop and implement an electronic data sharing interface with USGS that will allow the Division to share its data with the United States Geological Survey.

Improving its data collection forms, expanding its databases, and developing a data sharing interface with USGS are all high priority goals for the Division.

#### **H. Collaboration with Other Agencies**

This initial Draft work plan was developed internally by the Division. However, the team working on this plan participated in several conference calls and webinars with the USGS and other state agencies in the summer of 2016 concerning this grant. As it implements this plan, the Division will collaborate with the USGS, other state water use agencies, the NC Department of Agriculture and Consumer Services, the NC Rural Water Association, NC League of Municipalities, and thousands of North Carolina water users.

#### **I. Quality Control and Assurance Procedures**

While water use information is compiled from multiple sources, much of the Division's water use data comes from Local Water Supply Plans submitted by water systems. North Carolina law requires that LWSP be submitted every year. These LWSPs are reviewed by a review engineer. As staff time permits, or pursuant to requests by local water systems, review engineers can review data as often as once a year.

During a LWSP review, the engineer can request sales and purchase records, monthly withdrawal reports, and billing reports in an effort to clarify data or correct errors. The engineer can cross-reference data reported to other agencies within DEQ to further verify accuracy. Also previous years' data for a given system is used to spot check the integrity of the current year's data for that particular system. Unfortunately, the Division does not have the manpower to routinely conduct on-site visits or the funding to install water meters or other automated water use reporting systems.

#### **J. Relevance to SECURE Water Act**

The proposed Plan is very relevant to the SECURE Water Act. The project will allow for the extensive volume of information from North Carolina needed by USGS to be obtained, verified and uploaded into the USGS database.

## **K. Transferability**

The updated NC reporting forms should be extremely helpful to states that have not yet had the opportunity to implement programs to gather the information needed by their agencies and USGS.

North Carolina's work with other states and USGS staff to develop an interface that will allow for the transfer of information from the state to USGS should be helpful to other states as they develop their own interfaces.

## **L. Principal Investigator and Members of the State Team**

### **1. Primary Investigator**

Linwood Peele holds a Bachelor of Science degree in Civil Engineering and a Master of Science degree in Engineering (with a water resources concentration) from North Carolina A&T State University.

Mr. Peele was employed as an Environmental Engineer II with the Division of Water Resources from October 1995 to April 2003. He was responsible for providing technical assistance to local government water systems with development and engineering review of Local Water Supply Plans, review of engineering documents as well as assisting them with other water supply analysis and planning efforts. He also supervised the Leak Detection Program where he supervised an environmental technician who assisted water systems with locating leaks, water auditing and becoming more water efficient.

Mr. Peele has served as the manager of the Water Supply Planning Branch (WSPB) since April 2003. He is responsible for supervising the Water Supply Planning Branch, while providing technical assistance to local government water systems with Local Water Supply Plans, Water Shortage Response Planning, water supply development and assistance, water efficiency and conservation planning, drought monitoring and management, and providing technical assistance with water withdrawal and transfer registration, along with many other water supply issues.

In 2010, the WSPB acquired the Aquatic Weed Control, Stream Watch, ProjectWET and It's Our Water programs. In 2013, the branch acquired the Interbasin Transfer Certification program and in 2015, it acquired the State Environmental Policy Act program.

Mr. Peele also serves as the State Agency Liaison on the NC Rural Water Association's Legislative and Regulatory Committee, where he assist with the regulatory matters affecting NCRWA and its constituents. Mr. Peele serves on the NC America Water Works Association's Water Resources and Regulatory Affairs Committee, where he assists the committee in establishing workshops,

seminars and agendas that focus on water resources related topics as well as new regulations that affect water systems throughout North Carolina. Linwood has administrative oversight of the NC Drought Management Advisory Council, which is an interagency council composed of state and federal agencies. The Council provides consistent and accurate information on drought conditions in the state to the U.S. Drought Monitor, the Environmental Management Commission, the Secretary of the Department of Environmental Quality, the Environmental Review Commission, and the public. As the supervisor of the Water Supply Planning Branch, Mr. Peele is the rule manager for all administrative rules that fall under the purview of the WSPB. In this capacity, he facilitates workgroup meetings with all stakeholders involved from state agencies, water users, private citizens, etc.

## **2. Members of the State Team**

One of the temporary employees that will be working on the team is a professional engineer with a Master of Science degree in Environmental Engineering and over 30 years of experience in the water resources field.

In addition, the existing Division staff will be available to assist with the project on an as needed basis. Available staff includes two other water resources engineers, environmental program consultant and an environmental specialist.

It is anticipated that the other temporary employee that will be hired with funding from the grant will have a background in computer programming and database development.

Existing programming staff will be available to assist the temporary employee as needed. The IT Branch Chief of the Division's Water Planning Section has over 22 years of experience working with North Carolina Water Quantity and Quality data. He was the lead programmer in the design and development of the current DWR water quantity databases. The Division also has other highly qualified programming staff with decades of combined experience that can assist if necessary.

## Exhibit A: Map of the Central Coastal Plain Capacity Use Area

Exhibit A-1: North Carolina Map with the 15 CCPCUA Counties Highlighted in Gray



Exhibit A-2: View of the 15 CCPCUA Counties (Gray)



**Exhibit B:** Comparison of the USGS Baseline Standards and North Carolina's Current Data Collection Efforts. The facilities covered by the table are only those that meet or exceed the size thresholds specified in NC's reporting requirements. The underlined information is currently collected or tracked by DWR. There are currently no known saline water sources in NC.

Category	BASELINE GOALS (Tier 1)	Tier 2	Tier 3	Current Data Collection in North Carolina
Public Supply	<p><u>Monthly withdrawals reported by system, water source, and water type. Deliveries to domestic users from public-supply systems, and populations served. Report system information relevant to HUC-8 and county, and groundwater withdrawals with aquifer designation.</u></p>	<p><u>Site-specific annual and monthly withdrawals (by intake, well, or well field) reported by water source, and by water type. Quantity of water purchased between systems, and source(s) of purchased water. Quantity of water sold between systems. Reporting and/or verification of water deliveries for domestic, commercial, industrial, thermoelectric and other use.</u></p>	<p><u>Interbasin transfers. System uses (internal and other non-revenue uses) and losses. Improve estimates of populations served by site (for example, by surface-water intake, well or well field). Use of reclaimed wastewater for public or landscape irrigation.</u></p>	<p>As to Tier 1, DWR doesn't currently track the aquifers from which groundwater is withdrawn except in the designated Capacity Use Areas.</p> <p>While the facilities do not report their groundwater use by aquifer they do report their locations that could be used to identify the aquifer.</p> <p>As to Tier 2, DWR collects site-specific annual and monthly withdrawals by intake or well, but not by well field or water type.</p> <p>As to Tier 3, the only interbasin transfers currently tracked are the 7 systems with IBT Certificates.</p>
Industrial	<p><u>Annual withdrawals by facility, reported by water source.</u></p>	<p><u>Site-specific (by intake and/or well) annual and monthly withdrawals</u></p>	<p>Site-specific consumptive use estimates. <u>Site-specific discharges to surface</u></p>	<p>As to Tier 1, industrial classifications are only tracked as to broad</p>

	<p>by water type, and industry classification. Groundwater withdrawals reported with reference to aquifer.</p>	<p><u>reported by water source</u>, by water type, and industry classification. Deliveries from public supply to industrial facility, and deliveries from other sources, such as treated wastewater.</p>	<p><u>water, or land application.</u></p>	<p>industrial categories and not specific industrial classifications.</p> <p>DWR doesn't currently track the aquifers from which groundwater is withdrawn except in the designated Capacity Use Areas.</p> <p>While the facilities do not report their groundwater use by aquifer they do report their location that could be used to identify the aquifer.</p> <p>As to Tier 2, industrial classifications are only tracked as to broad industrial categories and not specific industrial classifications..</p> <p>As to Tier 3, DWR does not currently collect data as to site-specific consumptive use estimates.</p> <p>The deliveries from public supplies to industrial facilities is by group and not by individual industries.</p>
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<p><b>Irrigation- Crop</b></p>	<p><u>Aggregate annual withdrawals reported by water source</u>, by water type, acres irrigated, and method of irrigation. <u>Aggregate areas may be sub-county levels, but are feasible to summarize to county or HUC8.</u></p>	<p><u>Site-specific monthly withdrawals by well and/or diversion from surface-water feature</u>, or delivery from reclaimed wastewater. <u>Monthly withdrawals reported by water source</u>, water type, with associated acres irrigated and crop type, and method of irrigation system.</p>	<p>Consumptive use and conveyance loss estimates by aggregate area (sub-county, county, HUC8, or up to HUC12). Site-specific return flows.</p>	<p>Agricultural producers who withdrawal or transfer less than 1,000,000 gallons per day are not required to report their water use to DWR.</p> <p>They are however required to report their water use of 10,000 gallons or more in any one day to the NC Department of Agriculture and Consumer Services. These values are combined by NCDACS into a Agricultural Water Use Report that reports water use not by individual users but by county and statewide use. Individual responses remain confidential.</p>
<p><b>Thermoelectric</b></p>	<p><u>Site-specific annual and monthly withdrawals</u>, and net power generation reported by cooling-system type (once-through or recirculating), by water source, and by water type, and the</p>	<p><u>Site-specific annual and monthly consumptive use.</u></p>		

	<u>source of the information (plant, gov. agency, etc.).</u> <u>Site-specific return flows.</u>			
<b>Self-Supplied Domestic</b>	Self-supplied domestic populations, by HUC8 and county, and by water source.	Studies of actual metered domestic withdrawals, monthly by source. Improve estimates of self-supplied populations by utilizing property data and/or public water supply service areas, or other methods.		
<b>Irrigation – Golf Courses</b>	<u>Site-specific annual and monthly withdrawals reported by water source.</u> by water type, and acres irrigated. Groundwater withdrawals designated by aquifer.	Consumptive use estimates, by course, reported by month or annual. Acres irrigated by system type, by course.		As to Tier 1., while the facilities do not report their groundwater use by aquifer, they do report their location that could be used to identify the aquifer.
<b>Livestock</b>	<u>Annual withdrawals for major facilities, reported by water source</u> and by water type.	<u>Site-specific annual and monthly withdrawals for all facilities reported by source of water.</u> and by water type. Site-specific animal counts and animal type.	Improved and verified coefficients for water use per head for animal type, confined or open-range, seasonal variability, and other variables. Water withdrawals from sources supported by USDA programs to protect streams.	
<b>Mining</b>	<u>Annual withdrawals reported by HUC-8 and county, by source of water.</u> and by water type.	<u>Site-specific annual and monthly withdrawals.</u> Site-specific commodity identified.	Evaluation/reporting on water use by process (commodity processing, dewatering, dust suppression, etc.). <u>Reporting on return flows/discharge of</u>	As to Tier 1., while the facilities do not report their groundwater use by aquifer they do report their location that could be used to

			<u>water from dewatering.</u>	identify the aquifer.
<b>Aquaculture</b>	<u>Annual withdrawals reported by HUC-8 and county, by source of water,</u> and by water type.	<u>Site-specific annual and monthly withdrawals.</u> Site-specific facility information (method, species cultured, etc.)		As to Tier 1., while the facilities do not report their groundwater use by aquifer they do report their location that could be used to identify the aquifer.
<b>Commercial</b>	Annual and monthly deliveries from public supply for commercial use.	<u>Site-specific annual and monthly withdrawals for self-supplied establishments.</u>		The deliveries from public supplies to industrial facilities is by group and not by individual commercial facilities.
<b>Hydroelectric Power</b>	<u>Site-specific, annual and monthly water use (water use to spin turbines) by water source and water type, and the source of the information (plant, govt. agency, etc.).</u>			
<b>Wastewater Treatment</b>	Annual and monthly deliveries from wastewater treatment plants to other users. Specify category delivered to (i.e. industrial, thermoelectric, irrigation, etc.)	<u>Site-specific discharges to surface or land application.</u>		DWR collects data about annual and monthly deliveries from wastewater treatment plants to other uses, but doesn't collect information about the specific category delivered to.