

Visioning and Planning Guide

Yadkin-Pee Dee Water Resources Plan
for the Yadkin-Pee Dee Water Management
Group

Salisbury, North Carolina
July 30, 2019



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Background

Yadkin-Pee Dee River Basin

The Yadkin-Pee Dee River Basin (Basin) drains the watersheds that empty into the Yadkin-Pee Dee River (River). The River's headwaters begin as the Yadkin River outside Blowing Rock, NC and flow eastward toward Winston-Salem and then southeast. Below Badin, NC, the Uwharrie River joins the Yadkin River and becomes the Pee Dee River. It continues to flow southeast, passing into South Carolina southwest of Rockingham, NC. Major tributaries to the River in North Carolina include the South Yadkin River (confluence north of Salisbury, NC), Uwharrie River (confluence south of Badin, NC), Rocky River (confluence south of Norwood, NC), and Little River (confluence northwest of Rockingham, NC).

The North Carolina portion of the Basin covers an area of about 7,221 square miles and in portions of 24 of the state's 100 counties, making it the second largest river basin in North Carolina. The majority of the basin is within the Piedmont area of North Carolina, but also includes portions of the mountains in North Carolina and coastal plains in South Carolina.

Within North Carolina, the basin has approximately 5,990 miles of freshwater streams and rivers. In Wilkes County, the Yadkin River is impounded to form the W. Kerr Scott Reservoir, operated by the US Army Corps of Engineers. Below Salisbury, the River is impounded six more times to form hydroelectric power production reservoirs. Four of these reservoirs are part of the Yadkin Hydroelectric Project operated by Cube Hydro Carolinas: High Rock Lake, Tuckertown Reservoir, Narrows Reservoir (Badin Lake), and Falls Reservoir. Two of these reservoirs are part of the Yadkin-Pee Dee Hydroelectric Project operated by Duke Energy Carolinas: Lake Tillery and Blewett Falls Lake.

Although the majority of the land within the basin is forested or used for agricultural purposes, urban areas within the basin continue to grow. More than 1.7 million people use the Basin's waters every day for drinking water, industry, growing crops and watering livestock, generating power, and recreation. Twenty-five public water supply utilities draw water from the River in North Carolina. In addition to its valuable water supply, the Basin includes protected lands of the Uwharrie National Forest, Pee Dee National Wildlife Refuge, Carolina Sandhills National Wildlife Refuge, and Hanging Rock and Stone Mountain state parks.

Yadkin-Pee Dee Water Management Group

Formed under a Memorandum of Understanding in the fall of 2016, the Yadkin-Pee Dee Water Management Group (YPDWVG) is an organization of 19 North Carolina-based governmental, public water utility and reservoir operator parties, in the Basin. The group's purpose is to enhance the welfare of basin residents by jointly planning for the sustainable use of water from the Basin. The group provides a collaborative structure to fund and coordinate projects in order to explore mutually beneficial ways to protect and sustain the Basin's water supply.



The YPDWVG works together to plan for the water supply of the Yadkin-Pee Dee River Basin. The group has a goal of defining the basin's role in a long-term sustainable and secure regional water supply for the Yadkin-Pee Dee region, and by operating under the principles of regional collaboration, sustainable water supply, environmental stewardship, mutual and collective benefit, shared responsibility, equal representation, and financial stability.

The Need for a Long-Range Plan

Over the past 20 years, the Basin has experienced its share of water resource issues. Historical and current issues facing the basin have included water rights lawsuits, interbasin transfer disputes, dry lakebeds in extreme drought, nutrient loading and algal blooms, coal ash risks, etc. Additionally, the population within the basin is projected to grow significantly, in metropolitan areas around the City of Winston-Salem/Forsyth County and Charlotte metropolitan regions (particularly Cabarrus and Union counties). At the same time, however, more rural counties in the Basin are projected to slowly decline in population.

From lessons learned from historical water resources issues in the Basin, along with projected changes in population, land use, development, and water demands, the YPDWVG has recognized a need for a comprehensive long-range plan for how water resources should be managed throughout the Basin to ensure the future sustainability, availability, and health of the Basin's waterways.

In the fall of 2018, the YPDWVG embarked on a multi-year process to develop this long-range plan to ensure the future sustainability of the Basin's water quantity and quality to support a variety of uses. Through a series of facilitated stakeholder workshops throughout the Basin, the YPDWVG has crafted a detailed framework for how this plan is to be developed and implemented over the coming years. This plan will evaluate current and future questions, issues and concerns relating to the quantity and quality of the Basin's water resources and develop collaborative strategies to mitigate adverse impacts from these issues.

What is a Water Resources Plan?

A Water Resources Plan (Plan) is a document that guides regional coordination around complex water management issues for a river basin with the goal of ensuring a sufficient supply of water long into the future. The intent of these types of plans is to identify and fully understand key water quantity and quality issues for the Basin's water supply, evaluate potential strategies to solve these issues, and identify and implement practical solutions coordinated on a basin-wide level to ensure the long-term water supply availability. The plan is a document to be used by all in the Basin as a roadmap for effective future management of the shared water resources essential to the long-term health, leisure, and economy within the Basin.



Key Objectives of the Plan

During late 2018 and early 2019, the YPDWMG members collectively identified the overarching goals and objectives for a long-term Water Resources Plan in the Yadkin-Pee Dee River Basin. These specific objectives are closely aligned with the YPDWMG organizational mission to provide a collaborative framework to study the Basin's water resources and provide a long-term sustainable and secure regional water supply for the Yadkin-Pee Dee region.

- **The Plan should align with the YPDWMG's overarching goals, as follows:**
 - Comprehensive and collaborative regional planning
 - Effective management of the river basin
 - Optimize water supply resources
 - Facilitate broad support for water supply needs
 - United approach to drought response

- **The Plan should answer the following questions:**
 - What are the current and future water supply needs throughout the Yadkin-Pee Dee River Basin?
 - What is the available water supply for the Yadkin-Pee Dee River Basin for various needs and stakeholders?
 - What are the future challenges or threats to water supply in the Basin?
 - What are the strategies (tactics, timelines, costs, etc.) to mitigate these challenges and ensure a resilient and reliable water supply?
 - At what frequency should the WSMP be updated to reflect changing conditions?

- **The Plan should be a tool for use by the YPDWMG for the following purposes:**
 - A guide for public relations and education as well as education of elected officials and other stakeholders
 - A utility planning tool for the management of the water supply including water demands, water availability, and interbasin water transfer
 - A process for identifying, prioritizing, and financing projects based upon the vision and mission of the YPDWMG
 - A tool for the identification of future water supply sources and storage
 - A process for defining, identifying and collaborating with potential stakeholders
 - A resource for identifying possible regionalization opportunities
 - Encourages a collaborative relationship between the YPDWMG and state goals for water supply planning, modeling, and river basin management



- **The Plan should be a tool for use by individual YPDWMG members for the following purposes:**
 - A resource for long-term master planning and Capital Improvement Plan development
 - A tool for identifying regional opportunities and collaborating with regional providers/users
 - A reference for the general public and media as well as elected officials for policy-making and updating regulations
 - A resource for developing water and land conservation practices
 - A source of information to support informed decisions for maintaining or modifying current water customer rates



Stakeholder Input into the Plan

From January to March, 2019, the YPDWMG, in conjunction with the North Carolina Division of Water Resources, worked directly with stakeholders to lay the groundwork for a Water Supply Master Plan. A master plan will guide regional coordination around complex water management issues with the goal of ensuring a sustainable supply of water well into the next century. Stakeholders from public utilities, private organizations, environmental groups, government agencies and residents came together to discuss challenges and opportunities impacting our Basin and long-term goals for its future.

A total of four workshops were held beginning in January 2019, including 3 regional workshops in January 2019 and one basin-wide workshop in March 2019, as follows.

REGIONAL WORKSHOPS

- Upper Basin - January 14, 2019 (Winston-Salem, NC)
- Middle Basin - January 22, 2019 (Spencer, NC)
- Lower Basin - January 23, 2019 (Mt. Gilead, NC)

BASIN-WIDE WORKSHOP

A Basin-wide workshop was held on March 26, 2019 in Salisbury, NC to share the highlights from the first three workshops and begin developing action plans to address our most pressing issues. Focus areas and specific initiatives for the Plan were identified by the stakeholder team at this meeting.

From these meetings Communications and Funding were identified as the most important initial focus areas for the Plan, with a specific goal to “partner with other key players to communicate a clear, consistent message” so that “all people in the basin understand where their water resources come from and their role in “water health”.”

Stakeholder Input Summary

The result of the stakeholder workshops in early 2019 led to the development of four specific focus areas for the Plan, including Communications, Data/Research, Mitigation, and Funding. Stakeholders then developed and voted on specific initiatives that in each focus area that are critical pieces of the Plan. These focus areas and initiatives are summarized in Table 1.



Table 1 YPDWVG Water Resources Plan Stakeholder Developed Initiatives

Plan Focus Areas & Associated Initiatives
Communications <i>(Strategies to engage and inform the Basin's stakeholders about key water resources issues)</i>
<ul style="list-style-type: none"> • Branding • Education in schools • Yearly status reports to the community • Enhance communication with U.S. Army Corps of Engineers and State • Communicate with stakeholders: needs, issues, and benefits • Provide an understanding for all people in the basin of where their water resources come from and their role in "water health" • Partner with other key players to communicate a clear, consistent message
Data/Research <i>(Strategies to better inform our understanding of the Basin)</i>
<ul style="list-style-type: none"> • Consolidate data and water quality/quantity modeling • Establish a baseline of the health of the basin • Incorporate data and research results into decisions and management • Conduct yearly assessments for science-based decisions • Build a comprehensive, agreed-upon model to be used when driving development and operational oversight/ change within the Basin • Ensure sustainability and equitable use of the Yadkin-Pee Dee water resources <ul style="list-style-type: none"> ○ 5 year goal: Develop a website with a data warehouse for Yadkin-Pee Dee River Basin data and research ○ 10 year goal: All users are participating in the website, data warehouse and YPDWVG Plan ○ 20 year goal: An effective and working Plan for the Basin is in place and being followed
Mitigation <i>(Strategies to address issues identified from Data/Research)</i>
<ul style="list-style-type: none"> • Protect stream buffers and water supply watershed • Increase funding for agricultural cost-share and conservation easement (no- touch) • Ensure water quality and quantity for future growth • Provide equitable reduction in contaminants (sedimentation, nutrients, agriculture runoff, metals) • Implement water protection and sustainability measures for current and future generations
Funding <i>(Strategies to fund Plan initiatives)</i>
<ul style="list-style-type: none"> • Provide sustainable, long-term funding for: <ul style="list-style-type: none"> ○ Planning/research ○ Projects ○ Organization ○ Monitoring ○ Maintenance



Ongoing Engagement - Stakeholder Advisory Team

In addition to the stakeholder involvement in the visioning of the Plan, it is important to maintain stakeholder engagement throughout the development and implementation of the Plan over the next several years. Such engagement will provide stakeholders, outside of the YPDWVG membership, with a forum for input, understanding, connection and ownership of the Plan and will be essential in the successful implementation of the Plan across the Basin.

It is, therefore, recommended that a stakeholder advisory team be assembled to allow for advisory level input by key organizations and stakeholders that have an interest in the future planning efforts for the Yadkin Pee-Dee River Basin. It is anticipated that stakeholders from the following types of organizations will be considered:

- NC and SC resource agencies
- Lake homeowner organizations and/or marine commissions
- Environmental groups
- Recreational groups
- Industries
- Agriculture
- Soil and Water Conservation Districts
- Business interests
- Economic Development Commissions
- Council of Governments

It is suggested the stakeholder team include representation from no more than 15 organizations. The role of the team should be to serve in an advisory nature only and is not a regulatory or oversight role, as the work of the YPDWVG is not intended to reopen, affect or duplicate Federal Energy Regulatory (FERC) hydroelectric project relicensing efforts previously conducted by Duke Energy and Alcoa (now under ownership of Cube Hydro). The stakeholder team should be requested for input into key elements of the Plan, and, in particular, with regard to potential recommendations for future governance and management of the Yadkin-Pee Dee River Basin. It is recommended the stakeholder advisory team remain engaged during the full development process of the Water Resources Plan over the next several years.



Scoping the Plan

During the initial “Planning” stage for the YPDWMG’s Water Resources Plan in early 2019, goals and objectives for the Plan were established, along with a framework for completing this comprehensive evaluation. Through this process, both YPDWMG members and other stakeholders have provided insight regarding future issues in the Yadkin-Pee Dee River Basin (e.g. technical, social, political, and regulatory), and desired outcomes from the Plan that will ensure its use as a dependable resource and planning tool for the future. The Plan is intended to help preserve, protect, and extend this valuable water supply resource through the successful implementation of the tasks identified in the following table.

Yadkin-Pee Dee Water Resources Plan Scope

Table 2 Description of Proposed YPDWMG Tasks

Task Descriptions	Focus Area(s)
Planning (currently in progress as of April 2019)	
Water Resources Plan Visioning and Planning <ul style="list-style-type: none"> Identify North Carolina stakeholders and stakeholder groups with water supply interests in the Yadkin-Pee Dee River Basin for input into the development process of the Plan for the basin. Facilitate three regional mini-workshops for preliminary planning and input to the process for developing a basin-wide Plan. Facilitate a basin-wide workshop for presentation of the results of the initial mini-workshops and preliminary scope of work for the Plan. Develop a scope of work and schedule with significant events/milestones for development of the Plan. Identify opportunities for grants and loans funding programs for financial assistance in developing the Plan. Develop a Framework Document to serve as a roadmap for the basin-wide Water Resources Plan. 	Communications Funding
Long Range Water Demand Projection Updates <ul style="list-style-type: none"> Compile known sources of water withdrawal and return data and future projected uses, as outlined in prior water demand studies for the Yadkin-Pee Dee River Basin. Identify gaps in existing data sets to be addressed for future hydrologic model development and planning efforts Update existing water withdrawal and return projections for an approximate 50-year planning horizon (through the year 2070). 	Data/Research
Communications	
Funding Assistance Planning (optional) <ul style="list-style-type: none"> Using funding opportunities identified in the project “Planning” stage, develop planning guidelines for pursuing outside funding (application requirements, funding restrictions, schedule and deadlines, etc.). Coordinate application packages and grant writing assignments to assist the YPDWMG in pursuing project funding opportunities for grants, loans, etc. 	Funding

Task Descriptions	Focus Area(s)
<p>Develop Communications Plan</p> <ul style="list-style-type: none"> • Develop a comprehensive strategic marketing plan identifying key messages, target audiences and communication tools designed to excite and engage the local community. The communications plan will be designed to build public awareness and adoption of the Water Resources Plan. • The strategic marketing plan will detail the communication methods that will be implemented to inform the community about the project and will include: <ul style="list-style-type: none"> ○ Stakeholder analysis ○ Key message development ○ Communications and marketing tools and mediums ○ Marketing and advertising schedule • Implement the initial communication tools provided in the strategic marketing plan to introduce the plan to stakeholders. 	Communications
<p>Form Stakeholder Advisory Group</p> <ul style="list-style-type: none"> • Identify Stakeholder Advisory Group needs (input, member types, etc.) for the project • Contact potential stakeholders and select teams. • Develop framework and charter for stakeholder involvement and responsibilities. • Establish schedule and standing agenda for group meetings. • Facilitate initial group kickoff meeting. 	Communications
<p>Ongoing Communications and Outreach</p> <ul style="list-style-type: none"> • Provide ongoing communications and outreach support, as detailed in the project communications plan, during each execution phase of the project. • Provide ongoing facilitation and engagement of the Stakeholder Advisory Team during each execution phase of the project. 	Communications
Scenario Development	
<p>Future Planning Scenarios – Identification</p> <ul style="list-style-type: none"> • Develop up to 15 future water supply alternative scenarios, with stakeholder input, to be evaluated for water yield modeling. • Examples of alternative scenarios may include: <ul style="list-style-type: none"> ○ Sensitivity in water demand projections derived from: <ul style="list-style-type: none"> ▪ Incorporation of sustainable, water conservation practices. ▪ Improvements in agricultural methods. ▪ Changes in projected population growth. ▪ Changes in projected power plan or industrial plan demands or demand locations. ○ Revisions to existing intakes or addition/consolidation of future intakes. ○ Changes in projected IBT amounts. ○ Impacts of climate change. ○ Impacts of alternative sedimentation fill rates. ○ Impacts of additional off-stream storage. • Development of these scenarios will include applicable calculations, assumptions, etc. to develop necessary details for incorporation into the water quantity model for analysis in later phases of the Plan. 	Data/Research

Task Descriptions	Focus Area(s)
<p>GIS Database</p> <ul style="list-style-type: none"> • Research and collect GIS data from local, state, and federal resources for incorporation into database. • Compile information into central system and develop resource for use by YPDWVG group members, to include: • Location of withdrawals and returns to surface water systems in the Yadkin-Pee Dee River Basin. • Water intake and return owner information. • Historical water withdrawal and return information. • Future water withdrawal and return projections. • Location of water utility distribution systems. • Location of public use groundwater wells. • GIS will be developed with the intent of being a useful tool for future development of the Plan. 	<p>Data/Research</p>
<p>Hydrologic Model Updates</p>	
<p>NC DEQ-DWR Water Quantity Model Update</p> <ul style="list-style-type: none"> • Provide Yadkin-Pee Dee water quantity model updates necessary for the YPDWVG's development of the Plan. <ul style="list-style-type: none"> ○ Ability to accurately represent hydropower dispatching of all hydropower facilities in the Yadkin-Pee Dee River Basin, to a level of detail equal to CHEOPS, including the ability to run hydropower generation alternative evaluation scenarios. This update should include updated hydropower generation capabilities (including turbine efficiency and hydro facility physical characteristics) for each facility, and include the most recent FERC approved license operating rules for each hydro project. ○ Updated model hydrology from 1920 through 2018. ○ Ability to evaluate hydropower facilities in 15-minute operational increments (NCDEQ models are currently a daily time step). ○ Inclusion of the current approved Yadkin-Pee Dee Low Inflow Protocol rules, with an ability to alter the rules for alternative scenario evaluation. ○ Inclusion of lake surface evaporation in the model, with the ability to alter the evaporation rates for alternative scenario evaluation. ○ Inclusion of lake sediment fill rates, with the ability to alter the sedimentation rates for alternative scenario evaluation. ○ Inclusion of critical intake elevations for each reservoir, with the ability to alter the intake elevations for alternative scenario evaluation. ○ Inclusion of W. Kerr Scott rule curve, with the ability to alter the rule curve or add multiple rule curves for alternative scenario evaluation. ○ Ability to alter the model hydrology, including runoff rates, to simulate the effect of future climate change/variability. ○ Unimpairment of historical water uses in the inflow hydrology. ○ Ability to easily add water use nodes and ability to reallocate water demands from one node to another. ○ Geographic reach to include Yadkin River headwaters above W. Kerr Scott reservoir to the NC/SC state line (OASIS model currently ends at the Pee Dee River at Rockingham). 	<p>Data/Research</p>

Task Descriptions	Focus Area(s)
<ul style="list-style-type: none"> ○ Water Quantity Model User Interface Functionality: The following user interface functionality will be included to the water quantity model. <ul style="list-style-type: none"> ▪ A universal demand multiplier function for public water supply withdrawals and returns ▪ A universal on/off switch for water shortage response plans ▪ Updated model documentation ▪ SL 2010-143 water yield evaluation feature for reservoirs and tributaries ● Provide Yadkin-Pee Dee water quantity model updates based on the water supply model functionality preferences of NCDWR for their internal planning needs. <ul style="list-style-type: none"> ○ Additional tools to allow user defined nodes and allocation of inflow ○ Additional tools to allow server support access for individual users ○ Updated agricultural/irrigation water demand forecasting tool ○ Detailed documentation for NCDWR staff to be able to update inflows, add nodes, modify water shortage response plans, etc. ○ Model training session for interested stakeholders. ○ Inclusion of Individual Water Shortage Response Plans (WSRP): Where applicable, include details of individual WSRPs, as submitted to NCDWR. 	
<p>Regulatory Agency Coordination for Water Quantity Model</p> <ul style="list-style-type: none"> ● Provide technical representatives to participate in project coordination and update meetings with the YPDWVG and/or NCDWR before and during the update of the Yadkin-Pee Dee River Basin hydrologic model. ● Coordinate periodic update discussions with North Carolina and South Carolina regulatory agencies during model development. ● Coordinate funding agreements with the NCDWR and the YPDWVG for model updates. 	<p>Data/Research Communication Funding</p>
<p>Hydrologic Model Evaluations</p>	
<p>Future Planning Scenarios – Analysis</p> <ul style="list-style-type: none"> ● Using the future planning scenarios identified in the “Scenario Development” stage of the project, the water quantity model will be used to: <ul style="list-style-type: none"> ○ Determine Sustainable Water Yield Under Baseline Conditions. ○ Perform Scenario Analysis. ○ Determine Sustainable Water Yield Under Alternative Scenarios. ○ Compare Sustainable Water Yield to Future Demand Projections. ● Using the water quantity model results, alternative scenarios will combined into “planning suites” of multiple strategies that have the most beneficial impact on future water supply for the Basin. The model will then be used to assess these “suites” of strategies and their impact on the sustainable water yield for the Basin. ● A summary of Sustainable Water Yield and model outputs under all water quantity model evaluations will be generated. 	<p>Data/Research Mitigation</p>

Task Descriptions	Focus Area(s)
Technical Evaluations & Recommendations	
<p>Low Inflow Protocol (LIP) Enhancement & Basin-wide Drought Coordination</p> <ul style="list-style-type: none"> • Compare sustainable water yield results to low inflow protocol requirements and prepare recommendations for enhancement based upon findings. • Evaluate similarities and differences between water utility Water Shortage Response Plans in the Yadkin-Pee Dee River Basin and prepare recommendations for standardization opportunities. • Evaluate and summarize opportunities for increased drought communication/coordination between reservoir operators in the Yadkin-Pee Dee River Basin. • Evaluate and summarize opportunities for more uniform drought response measures throughout the Yadkin-Pee Dee River Basin. 	Data/Research Mitigation
<p>Lake Management Evaluation and Recommendations</p> <ul style="list-style-type: none"> • Review current policies, stakeholder input, and issues concerning management of the seven Yadkin-Pee Dee reservoirs in North Carolina. • Evaluate and summarize opportunities for increased operational coordination between reservoir operators of the seven Yadkin-Pee Dee reservoirs in North Carolina. • Compile information and develop recommendations. 	Data/Research Mitigation
<p>Water Demand Management/Water Conservation Efforts</p> <ul style="list-style-type: none"> • Conduct a benchmarking survey for Yadkin-Pee Dee River Basin water utilities to assess current water conservation efforts within the Basin as compared to other successful regional programs. • Evaluate opportunities, benefits, and considerations for future water demand management/conversation programs for Yadkin-Pee Dee River basin water utilities, including quantification of potential water savings due to additional conservation programs. • Develop a framework and goals for a potential Yadkin-Pee Dee water conservation program. 	Data/Research Mitigation
<p>Water Quality - Future Considerations</p> <ul style="list-style-type: none"> • Identify and summarize previous and existing water quality studies, initiatives, and modeling in the Yadkin-Pee Dee River Basin. • Identify and summarize existing known water quality issues within the Basin. • Perform a gap analysis to identify water quality issues or questions not yet evaluated or addressed by other organizations or studies within the Yadkin-Pee Dee River Basin and provide recommendations for assessments the YPDWVG could coordinate to address these issues. • Identify emerging or potential future water quality issues within the Basin and strategies which may be implemented to mitigate against them. • Evaluate available water quality models, the cost/benefits of each, and the amount of data needed to be available/collected to conduct a basin-wide water quality modeling effort. 	Data/Research Mitigation
<p>Regulatory Issues</p> <ul style="list-style-type: none"> • Perform survey of current, pending, and potential future regulations effecting water supply, distribution, and use within the planning area including Federal, State, and Local level regulations. • Evaluate input from key regulators and other stakeholders. 	Data/Research Mitigation

Task Descriptions	Focus Area(s)
<ul style="list-style-type: none"> Analyze impacts of key legislation. Identify potential areas of future regulation needed to support the recommendations of the Plan. 	
<p>Watershed Protection Opportunities</p> <ul style="list-style-type: none"> Survey current watershed and land use ordinances within the planning area and evaluate for compatibility and potential conflicts. Evaluate and summarize areas of need for watershed protection measures in the Basin (geographical and/or specific issues such as nutrient loading, sedimentation and turbidity, fecal coliform, stormwater runoff and erosion control, etc.) Identify opportunities and strategies for watershed protection measures in the Basin. Evaluate stakeholder input and develop recommendations for watershed protection initiatives. 	Data/Research Mitigation
<p>W. Kerr Scott Water Supply Allocation Study Recommendations</p> <ul style="list-style-type: none"> Evaluate and report on requirements needed to conduct the U.S. Army Corps of Engineers' process to pursue reallocation of the water supply pool from W. Kerr Scot Reservoir for the benefit of downstream users. Identify potential benefits and consequences of increasing the water supply allocation form the reservoir. Evaluate and summarize the regulatory process for increasing the water supply allocation from the reservoir. Provide recommendations for how to move forward with a coordinated approach to water supply reallocation from the reservoir. 	Data/Research Mitigation
Collaborative Evaluations & Recommendations	
<p>Basin-wide Water Supply Contingency Recommendations</p> <ul style="list-style-type: none"> Review current emergency response procedures and develop recommendations for a comprehensive emergency response protocol through input from stakeholders. 	Mitigation
<p>Public Awareness and Education Recommendations</p> <ul style="list-style-type: none"> Review current efforts for public awareness within the basin. Review efforts in other basins/municipalities/regions. Evaluate stakeholder input and practices in public awareness for applicability. Develop recommendations for practices, programs and education regarding sources water protection, best management practices, water supply, drought management, and water rate sustainability. Communicate the economic value of water in the Yadkin-Pee Dee River Basin. 	Communication Mitigation
<p>Project Identification, Funding, and Scheduling</p> <ul style="list-style-type: none"> Analyze current and past procedures for project identification and funding. Develop a framework for project identification and prioritization and target specific funding programs using their existing criteria. Develop projected costs and schedules for completing identified projects. 	Mitigation Funding

Task Descriptions	Focus Area(s)
<p>Regional Collaboration with Other Basins</p> <ul style="list-style-type: none"> Identify opportunities for collaboration with neighboring river basins and other basin advisory groups like the YPDWMG. Evaluate IBT between neighboring river basins and recommend strategies to minimize adverse impacts. Identify opportunities for collaboration with other existing water-supply focused organizations within the Yadkin-Pee Dee River Basin. 	<p>Data/Research Mitigation Communication Funding</p>
<p>Future Data Collection and Analysis Recommendations</p> <ul style="list-style-type: none"> Evaluate sources of existing water supply related data for the Yadkin-Pee Dee River Basin. Perform a gap analysis for essential data needed to support the mission of the YPDMWG and identify opportunities for improved data collection methods/programs. Evaluate opportunities for the consolidation of data and water quality/quantity modeling. Evaluate needs, practicality, and opportunities for groundwater water supply data collection, modeling, and analysis for the Basin. Identify strategies to incorporate data and research results into decision and management. Develop a recommended framework for a YPDWMG data warehouse for the Basin. Evaluate logistics for yearly data assessments for science-based decisions. 	<p>Data/Research</p>
<p>Best Management Practices (BMP) Evaluation</p> <ul style="list-style-type: none"> Survey current BMP standards and opportunities used within the planning area, including stormwater, water/wastewater utilities, agriculture, and community development. Identify emerging technology and trends. Evaluate stakeholder input and compile a list of BMP standards. 	<p>Mitigation</p>
<p>Sustainability and Resiliency Recommendations</p> <ul style="list-style-type: none"> Evaluate emerging technology and trends in water resources sustainability and resiliency for applicability. Review current practices and stakeholder input. Develop recommendations for potential implementation in the Yadkin-Pee Dee River Basin. 	<p>Mitigation</p>
<p>Water Resources Plan Document & Rollout</p>	
<p>Water Resources Plan Document Development</p> <ul style="list-style-type: none"> Incorporate and summarize the findings of this project and input from workshops held with YPDWMG members and identified stakeholders into a comprehensive Water Resources Plan document. 	<p>Data/Research Mitigation Communication Funding</p>
<p>Water Resources Plan Public Rollout</p> <ul style="list-style-type: none"> Develop presentation materials (PowerPoint, handouts, etc.) for communication of the Plan details and finding to stakeholders. Facilitate presentations to stakeholders (e.g. conferences and symposiums, utility Board meetings, local elected leadership, etc.) Develop and gain support for resolutions of support for the Plan from local governing bodies. 	<p>Communication</p>



Phasing the Plan

The magnitude and funding requirements for the Plan necessitate a phased approach for its development. Certain evaluations or initiatives may build upon one another and require one to be completed before another. Due to the size of this effort, it will be necessary for the YPDWMG to phase funding of the Plan to align with their budgetary constraints and plan for external funding opportunities. Three plans are presented in the following tables to complete the Plan in 2½ years (Phasing Plan A), 3 years (Phasing Plan B) or 6½ years (Phasing Plan C).

Phasing Plan A (2 ½ Years)

Table 3 Phasing Plan A: Summary of Phases, Tasks and Schedule

Phase	Task Descriptions	Schedule
PHASE 1 (Planning)		Nov. 2018 - June 2019
	Water Resources Plan Visioning and Planning	
	Long Range Water Demand Projection Updates	
PHASE 2 (Scenario Development)		July 2019 - Dec. 2019
	Funding Assistance Planning (optional)	
	Develop Communications Plan & Stakeholder Advisory Group	
	Future Planning Scenarios - Identification	
	Regulatory Agency Coordination for Water Quantity Model	
PHASE 3 (Hydrologic Model Updates)		Jan. 2020 - June 2020
	NC DEQ-DWR Water Quantity Model Update ¹	
	GIS Database	
	Ongoing Communication & Outreach	
PHASE 4 (Hydrologic Model Evaluations)		July 2020 - Dec. 2020
	Future Planning Scenarios - Analysis	
	Ongoing Communication & Outreach	
PHASE 5 (Evaluations & Recommendations)		Jan. 2021 - June 2021
	LIP Enhancement & Basin-wide Drought Coordination	
	Lake Management Evaluation and Recommendations	
	Water Demand Management/Water Conservation Efforts	
	Water Quality - Future Considerations	
	Public Awareness and Education Recommendations	
	Regulatory Issues	
	Watershed Protection Opportunities	
	BMP Standards Evaluation	
	Sustainability and Resiliency Recommendations	
	Basin-wide Water Supply Contingency Recommendations	
	W. Kerr Scott Water Supply Allocation Study Recommendations	
	Regional Collaboration with Other Basins	
	Future Data Collection and Analysis Recommendations	
	Project Identification, Funding, and Scheduling	
	Ongoing Communication and Outreach	
PHASE 6 (Water Resources Plan Document & Rollout)		July 2021 - Dec. 2021
	Water Resources Plan Document Development	
	Water Resources Plan Public Rollout	

¹Funding committed by NCDEQ-DWR.



Phasing Plan B (3 Years)

Table 4 Phasing Plan B: Summary of Phases, Tasks and Schedule

Phase	Task Descriptions	Schedule
PHASE 1 (Planning)		Nov. 2018 - June 2019
	Water Resources Plan Visioning and Planning	
	Long Range Water Demand Projection Updates	
PHASE 2 (Scenario Development)		July 2019 - Dec. 2019
	Funding Assistance Planning (optional)	
	Develop Communications Plan & Form Stakeholder Advisory Group	
	Future Planning Scenarios - Identification	
	Regulatory Agency Coordination for Water Quantity Model	
PHASE 3 (Hydrologic Model Updates)		Jan. 2020 - June 2020
	NC DEQ-DWR Water Quantity Model Update ¹	
	GIS Database	
	Ongoing Communication & Outreach	
PHASE 4 (Hydrologic Model Evaluations)		July 2020 - Dec. 2020
	Future Planning Scenarios - Analysis	
	Ongoing Communication & Outreach	
PHASE 5 (Technical Evaluations & Recommendations)		Jan. 2021 - June 2021
	LIP Enhancement & Basin-wide Drought Coordination	
	Lake Management Evaluation and Recommendations	
	Water Demand Management/Water Conservation Efforts	
	Water Quality - Future Considerations	
	Regulatory Issues	
	Watershed Protection Opportunities	
	W. Kerr Scott Water Supply Allocation Study Recommendations	
	Ongoing Communication and Outreach	
PHASE 6 (Collaborative Evaluations & Recommendations)		July 2021 – Dec. 2021
	Basin-wide Water Supply Contingency Recommendations	
	Public Awareness and Education Recommendations	
	Project Identification, Funding, and Scheduling	
	Regional Collaboration with Other Basins	
	Future Data Collection and Analysis Recommendations	
	BMP Standards Evaluation	
	Sustainability and Resiliency Recommendations	
	Ongoing Communication and Outreach	
PHASE 7 (Water Resources Plan Document & Rollout)		Jan. 2022 – June 2022
	Water Resources Plan Document Development	
	Water Resources Plan Public Rollout	

¹ Funding committed by NCDEQ-DWR.



Phasing Plan C (6 ½ Years)

Table 5 Phasing Plan C: Summary Phases, Tasks and Schedule

Phase	Task Descriptions	Schedule
PHASE 1 (Planning)		Nov. 2018 - June 2019
	Water Resources Plan Visioning and Planning	
	Long Range Water Demand Projection Updates	
PHASE 2 (Scenario Development)		July 2019 - June 2020
	Funding Assistance Planning (optional)	
	Develop Communications Plan & Form Stakeholder Advisory Group	
	Future Planning Scenarios - Identification	
	Regulatory Agency Coordination for Water Quantity Model	
PHASE 3 (Hydrologic Model Updates)		July 2020 - June 2021
	NC DEQ-DWR Water Quantity Model Update ¹	
	GIS Database	
	Ongoing Communication & Outreach	
PHASE 4 (Hydrologic Model Evaluations)		July 2021 - June 2022
	Future Planning Scenarios - Analysis	
	Ongoing Communication & Outreach	
PHASE 5a (Water Quantity Technical Evaluations & Recommendations)		July 2022 - June 2023
	LIP Enhancement & Basin-wide Drought Coordination	
	Lake Management Evaluation and Recommendations	
	Water Demand Management/Water Conservation Efforts	
	W. Kerr Scott Water Supply Allocation Study Recommendations	
	Ongoing Communication and Outreach	
PHASE 5b (Water Quality Technical Evaluations & Recommendations)		July 2023 - June 2024
	Water Quality - Future Considerations	
	Regulatory Issues	
	Watershed Protection Opportunities	
	Ongoing Communication and Outreach	
PHASE 6 (Collaborative Evaluations & Recommendations)		July 2024 – June 2025
	Basin-wide Water Supply Contingency Recommendations	
	Public Awareness and Education Recommendations	
	Project Identification, Funding, and Scheduling	
	Regional Collaboration with Other Basins	
	Future Data Collection and Analysis Recommendations	
	BMP Standards Evaluation	
	Sustainability and Resiliency Recommendations	
	Ongoing Communication and Outreach	
PHASE 7 (Water Resources Plan Document & Rollout)		July 2025 – December 2025
	Water Resources Plan Document Development	
	Water Resources Plan Public Rollout	

¹ Funding committed by NCDEQ-DWR.



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Schedule - Phasing Plan C (6 ½ Years)

Table 8 Phasing Plan C: Schedule

	Phase	Start	Finish	2019				2020				2021				2022				2023				2024				2025																											
				Q1	Q2	Q3	Q4																																																
1	Phase 1 (Planning)	12/28/2018	8/26/2019	█																																																			
2	Phase 2 (Scenario Development)	7/1/2019	6/30/2020					█																																															
3	Phase 3 (Hydrologic Model Updates)	7/1/2020	6/30/2021									█																																											
4	Phase 4 (Hydrologic Model Evaluations)	7/1/2021	6/30/2022													█																																							
5	Phase 5a (Water Quantity Technical Evals & Recommendations)	7/1/2022	6/30/2023													█																																							
6	Phase 5b (Water Quality Technical Evals & Recommendations)	7/3/2023	6/28/2024																	█																																			
7	Phase 6 (Collaborative Evals & Recommendations)	7/1/2024	6/30/2025																					█																															
8	Phase 7 (Water Resources Plan Development & Rollout)	7/1/2025	12/31/2025																													█																							

Plan Costs

To align with the proposed phasing plan options, order of magnitude costs have been developed for each of the Plan initiatives and evaluations. These costs have been estimated on a low and high level of projected costs, based on the particular size, level and detail, and technical requirements needed for each specific task, as reflected in the following tables.

Estimated Plan Costs under Funding Plan A (2 ½ Years)

Table 9 Funding Plan A: Estimated Costs

Phase	Task Descriptions	Est. Fee (Low)	Est. Fee (High)
PHASE 1			
(Planning)		\$90,200	\$90,200
	Water Resources Plan Visioning and Planning	\$42,800	\$42,800
	Long Range Water Demand Projection Updates	\$47,400	\$47,400
PHASE 2			
(Scenario Development)		\$79,000	\$100,000
	Funding Assistance Planning (optional)	\$12,000	\$15,000
	Develop Communications Plan & Stakeholder Advisory Group	\$15,000	\$20,000
	Future Planning Scenarios - Identification	\$42,000	\$50,000
	Regulatory Agency Coordination for Water Quantity Model	\$10,000	\$15,000
PHASE 3			
(Hydrologic Model Updates)		\$195,000	\$320,000
	NC DEQ-DWR Water Quantity Model Update ¹	\$165,000	\$275,000
	GIS Database	\$20,000	\$30,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 4			
(Hydrologic Model Evaluations)		\$145,000	\$150,000
	Future Planning Scenarios - Analysis	\$135,000	\$135,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 5			
(Evaluations & Recommendations)		\$263,000	\$403,000
	LIP Enhancement & Basin-wide Drought Coordination	\$30,000	\$35,000
	Lake Management Evaluation and Recommendations	\$15,000	\$25,000
	Water Demand Management/Water Conservation Efforts	\$40,000	\$45,000
	Water Quality - Future Considerations	\$15,000	\$25,000
	Public Awareness and Education Recommendations	\$15,000	\$30,000
	Regulatory Issues	\$18,000	\$25,000
	Watershed Protection Opportunities	\$25,000	\$40,000
	BMP Standards Evaluation	\$8,000	\$15,000
	Sustainability and Resiliency Recommendations	\$5,000	\$10,000
	Basin-wide Water Supply Contingency Recommendations	\$20,000	\$25,000
	W. Kerr Scott Water Supply Allocation Study Recommendations	\$20,000	\$40,000
	Regional Collaboration with Other Basins	\$12,000	\$20,000
	Future Data Collection and Analysis Recommendations	\$10,000	\$18,000
	Project Identification, Funding, and Scheduling	\$20,000	\$35,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 6			
(Water Resources Plan Document & Rollout)		\$50,000	\$65,000
	Water Resources Plan Document Development	\$35,000	\$45,000
	Water Resources Plan Public Rollout	\$15,000	\$20,000
	GRAND TOTAL	\$822,200	\$1,128,200

¹ Funding committed by NCDEQ-DWR.

Estimated Plan Costs under Funding Plan B (3 years)

Table 10 Funding Plan B: Estimated Costs

Phase	Task Descriptions	Est. Fee (Low)	Est. Fee (High)
PHASE 1			
(Planning)		\$90,200	\$90,200
	Water Resources Plan Visioning and Planning	\$42,800	\$42,800
	Long Range Water Demand Projection Updates	\$47,400	\$47,400
PHASE 2			
(Scenario Development)		\$79,000	\$100,000
	Funding Assistance Planning (optional)	\$12,000	\$15,000
	Develop Communications Plan & Stakeholder Advisory Group	\$15,000	\$20,000
	Future Planning Scenarios - Identification	\$42,000	\$50,000
	Regulatory Agency Coordination for Water Quantity Model	\$10,000	\$15,000
PHASE 3			
(Hydrologic Model Updates)		\$195,000	\$320,000
	NC DEQ-DWR Water Quantity Model Update ¹	\$165,000	\$275,000
	GIS Database	\$20,000	\$30,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 4			
(Hydrologic Model Evaluations)		\$145,000	\$150,000
	Future Planning Scenarios - Analysis	\$135,000	\$135,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 5			
(Technical Evaluations & Recommendations)		\$173,000	\$250,000
	LIP Enhancement & Basin-wide Drought Coordination	\$30,000	\$35,000
	Lake Management Evaluation and Recommendations	\$15,000	\$25,000
	Water Demand Management/Water Conservation Efforts	\$40,000	\$45,000
	Water Quality - Future Considerations	\$15,000	\$25,000
	Regulatory Issues	\$18,000	\$25,000
	Watershed Protection Opportunities	\$25,000	\$40,000
	W. Kerr Scott Water Supply Allocation Study Recommendations	\$20,000	\$40,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 6			
(Collaborative Evaluations & Recommendations)		\$100,000	\$173,000
	Basin-wide Water Supply Contingency Recommendations	\$20,000	\$26,000
	Public Awareness and Education Recommendations	\$15,000	\$31,000
	Project Identification, Funding, and Scheduling	\$20,000	\$36,000
	Regional Collaboration with Other Basins	\$12,000	\$21,000
	Future Data Collection and Analysis Recommendations	\$10,000	\$19,000
	BMP Standards Evaluation	\$8,000	\$15,000
	Sustainability and Resiliency Recommendations	\$5,000	\$10,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 7			
(Water Resources Plan Document & Rollout)		\$50,000	\$66,000
	Water Resources Plan Document Development	\$35,000	\$46,000
	Water Resources Plan Public Rollout	\$15,000	\$20,000
GRAND TOTAL²		\$832,200	\$1,149,200

¹ Funding committed by NCDEQ-DWR.

² It is noted that costs differ slightly between each phasing plan, as the total cost for each plan includes an annual cost for ongoing communication and stakeholder outreach efforts. Therefore, for each additional funding year of the Plan additional communication and outreach costs are projected to be incurred.

Estimated Plan Costs under Funding Plan C (6 ½ years)

Table 11 Funding Plan C: Estimated Costs

Phase	Task Descriptions	Est. Fee (Low)	Est. Fee (High)
PHASE 1			
(Planning)		\$90,200	\$90,200
	Water Resources Plan Visioning and Planning	\$42,800	\$42,800
	Long Range Water Demand Projection Updates	\$47,400	\$47,400
PHASE 2			
(Scenario Development)		\$79,000	\$100,000
	Funding Assistance Planning (Optional)	\$12,000	\$15,000
	Develop Communications Plan & Stakeholder Advisory Group	\$15,000	\$20,000
	Future Planning Scenarios - Identification	\$42,000	\$50,000
	Regulatory Agency Coordination for Water Quantity Model	\$10,000	\$15,000
PHASE 3			
(Hydrologic Model Updates)		\$195,000	\$320,000
	NC DEQ-DWR Water Quantity Model Update ¹	\$165,000	\$275,000
	GIS Database	\$20,000	\$30,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 4			
(Hydrologic Model Evaluations)		\$145,000	\$150,000
	Future Planning Scenarios - Analysis	\$135,000	\$135,000
	Ongoing Communication & Outreach	\$10,000	\$15,000
PHASE 5a			
(Water Quantity Technical Evaluations & Recommendations)		\$115,000	\$160,000
	LIP Enhancement & Basin-wide Drought Coordination	\$30,000	\$35,000
	Lake Management Evaluation and Recommendations	\$15,000	\$25,000
	Water Demand Management/Water Conservation Efforts	\$40,000	\$45,000
	W. Kerr Scott Water Supply Allocation Study Recommendations	\$20,000	\$40,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 5b			
(Water Quality Technical Evaluations & Recommendations)		\$68,000	\$105,000
	Water Quality - Future Considerations	\$15,000	\$25,000
	Regulatory Issues	\$18,000	\$25,000
	Watershed Protection Opportunities	\$25,000	\$40,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 6a			
(Collaborative Evaluations & Recommendations)		\$100,000	\$173,000
	Basin-wide Water Supply Contingency Recommendations	\$20,000	\$26,000
	Public Awareness and Education Recommendations	\$15,000	\$31,000
	Project Identification, Funding, and Scheduling	\$20,000	\$36,000
	Regional Collaboration with Other Basins	\$12,000	\$21,000
	Future Data Collection and Analysis Recommendations	\$10,000	\$19,000
	BMP Standards Evaluation	\$8,000	\$15,000
	Sustainability and Resiliency Recommendations	\$5,000	\$10,000
	Ongoing Communication and Outreach	\$10,000	\$15,000
PHASE 7			
(Water Resources Plan Document & Rollout)		\$50,000	\$66,000
	Water Resources Plan Document Development	\$35,000	\$46,000
	Water Resources Plan Public Rollout	\$15,000	\$20,000
GRAND TOTAL²		\$842,200	\$1,164,200

¹ Funding committed by NCDEQ-DWR.

² It is noted that costs differ slightly between each phasing plan, as the total cost for each plan includes an annual cost for ongoing communication and stakeholder outreach. Therefore, for each additional funding year of the Plan additional communication and outreach costs are projected to be incurred.

Funding the Plan

Recognizing the magnitude of a basin-wide Plan and limited funding availability from YPDWGM internal dues, there is a need to phase the plan and thereby spread cost commitments over multiple fiscal years. Further, it will be necessary for the YPDWGM to seek outside funding sources such as grants to assist in funding the full scope of the Plan, as proposed. Three funding options were developed to align with 2 ½ year, 3 year and 6 ½ year phasing plans previously described.

Based on this funding evaluation, it is evident that a significant portion of the funding will need to come from outside funding sources, most specifically for the 2 ½ and 3 year phasing plans. If the YPDWGM wishes to reduce their reliance on outside sources to help funding the Plan, there are several options including phasing the Plan over a longer period, raising additional internal YPDWGM funds on an annual basis or reducing the scope of the Plan. The 6 ½ year phasing plan seeks to achieve the first option. For the YPDWGM to fully fund the plan without additional outside funding and maintaining a \$75,000 per year internal commitment to the Plan, after an Fiscal Year (FY) 2019-20 investment of \$160,000, it is estimated the Plan would take nine to twelve years to complete for the scope proposed herein.

It should be noted the YPDWGM has coordinated with the NCDEQ Division of Water Resources and North Carolina Legislature to acquire a funding allocation of approximately \$275,000 from the General Assembly as the State’s contribution to the modeling effort. This contribution will be a key piece of the funding plan for FY19-20 and FY20-21.

The three funding plans are presented in the tables and figures in the proceeding sections, and summarized in Table 12 below.

Table 12 Funding Plan Summary

Funding Plan ID	Duration (Years)	Fiscal Years	Total Est. Fee	YPDWGM Funding	Outside Funding Received ¹	Additional Outside Funding Needed
A	2 ½	FY19-22	\$732K - \$1.038M	\$310K	\$275K	\$172K - \$463K
B	3	FY19-22	\$742K - \$1.059M	\$310K	\$275K	\$157K - \$592K
C	6 ½	FY19-26	\$752K - \$1.074M	\$610K	\$275K	\$0K - \$198K

¹ Funding committed by NCDEQ-DWR for model development with an estimated value of \$275,000.

Funding Option A

Funding Option A considers funding the Plan (not including Phase 1) over a two and a half year period beginning in July of 2019 through December of 2021, as reflected below. This funding option requires a significant investment into the project in FY2019-2020 and FY 2020-2021, with a much smaller investment in FY2021-2022. Additionally, this funding plan would require a significant contribution of funds, such as grants, from sources outside of the YPDWMG membership.

Table 13 Funding Option A: Funding Needs By Fiscal Year

Fiscal Year	Est. Fee (Low)	Est. Fee (High)	YPDWMG Funding	Add'l Funding Needed (low)	Add'l Funding Needed (high)
FY19-20	\$274,000	\$420,000	\$160,000	\$114,000	\$260,000
FY20-21	\$408,000	\$553,000	\$75,000	\$333,000	\$478,000
FY21-22	\$50,000	\$65,000	\$75,000	\$ -	\$ -
TOTAL	\$732,000	\$1,038,000	\$310,000	\$447,000^{1,2}	\$738,000^{1,2}

¹ Additional funding needed represents the total additional funding needed, by fiscal year, to fully fund the scheduled project phases. Under these assumptions, the YPDWMG will have an excess of \$25,000 and \$10,000 at the end of the project under the low and high cost scenarios, respectively.

² Funding committed by NCDEQ-DWR for model development with an estimated value of \$275,000.

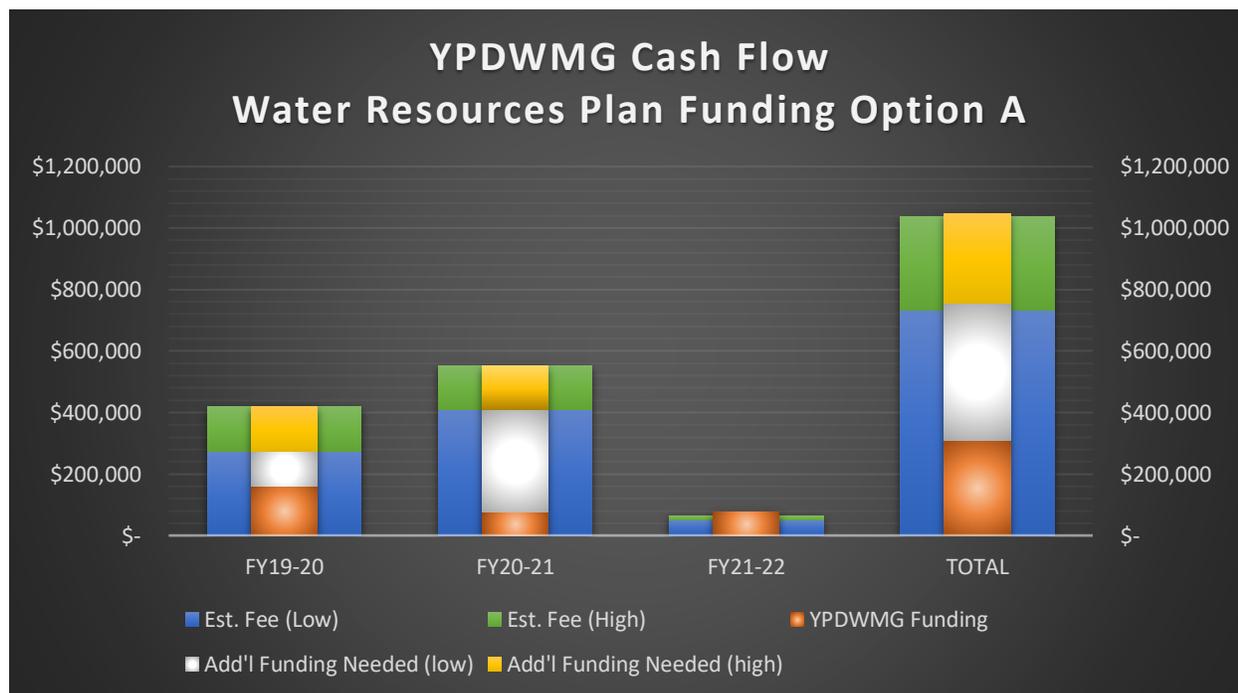


Figure 1 Funding Option A: Cash Flow Evaluation

Funding Option B

Funding Option B considers funding the Plan (not including Phase 1) over a three year period beginning in July of 2019 through June of 2022, as reflected below. This funding option represents a slightly more balanced investment approach (as compared to Option A) over the three fiscal year period. Similar to Option A, this funding plan would also require a significant contribution of funds, such as grants, from sources outside of the YPDWMG membership. However, the annual need for outside funding is slightly more balanced over the three year period with this funding option.

Table 14 Funding Option B: Funding Needed By Fiscal Year

Fiscal Year	Est. Fee (Low)	Est. Fee (High)	YPDWMG Funding	Add'l Funding Needed (low)	Add'l Funding Needed (high)
FY19-20	\$274,000	\$420,000	\$160,000	\$114,000	\$260,000
FY20-21	\$318,000	\$400,000	\$75,000	\$243,000	\$325,000
FY21-22	\$150,000	\$239,000	\$75,000	\$75,000	\$164,000
TOTAL	\$742,000	\$1,059,000	\$310,000	\$432,000^{1,2}	\$749,000^{1,2}

¹ Additional funding needed represents the total additional funding needed, by fiscal year, to fully fund the scheduled project phases. Under these assumptions, the YPDWMG will break-even at the end of the project under the low and high cost scenarios, respectively.

² Funding committed by NCDEQ-DWR for model development with an estimated value of \$275,000.

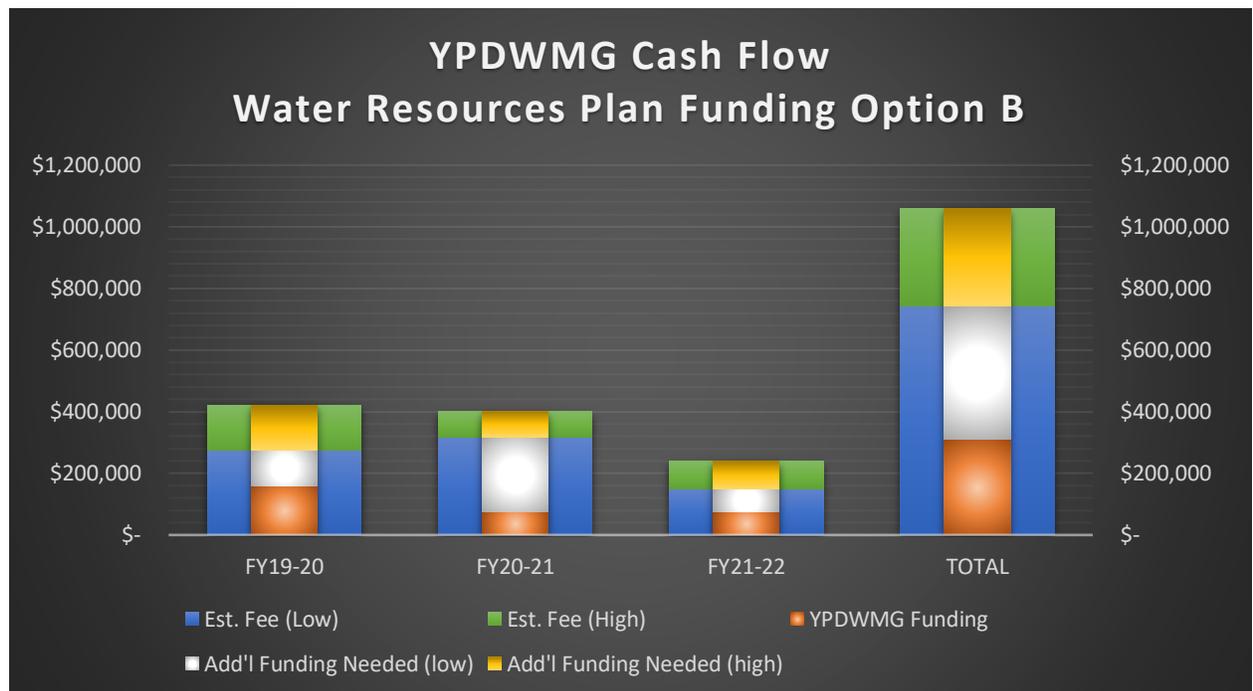


Figure 2 Funding Option B: Cash Flow Evaluation

Funding Option C

Funding Option C considers funding the Plan (not including Phase 1) over a six and a half year period beginning in July of 2019 through December of 2025, as reflected below. This funding option represents a considerably more balanced investment approach (as compared to Options A and B) over the five fiscal year period. Unlike Options A, this funding plan would also require a smaller contribution of funds, such as grants, from sources outside of the YPDWMG membership, as the YPDWMG is better positioned to fund the plan internally.

Table 15 Funding Option C: Funding Needed By Fiscal Year

Fiscal Year	Est. Fee (Low)	Est. Fee (High)	YPDWMG Funding	Add'l Funding Needed (low)	Add'l Funding Needed (high)
FY19-20	\$79,000	\$100,000	\$160,000	\$ -	\$ -
FY20-21	\$195,000	\$320,000	\$75,000	\$39,000	\$185,000
FY21-22	\$145,000	\$150,000	\$75,000	\$70,000	\$75,000
FY22-23	\$115,000	\$160,000	\$75,000	\$40,000	\$85,000
FY23-24	\$68,000	\$105,000	\$75,000	\$ -	\$30,000
FY24-25	\$100,000	\$173,000	\$75,000	\$25,000	\$98,000
FY25-26	\$50,000	\$66,000	\$75,000	\$ -	\$ -
TOTAL	\$752,000	\$1,074,000	\$610,000	\$174,000^{1,2}	\$473,000^{1,2}

¹ Additional funding needed represents the total additional funding needed, by fiscal year, to fully fund the scheduled project phases. Under these assumptions, the YPDWMG will have an excess of \$32,000 and \$9,000 at the end of the project under the low and high cost scenarios, respectively.

² Funding committed by NCDEQ-DWR for model development with an estimated value of \$275,000.

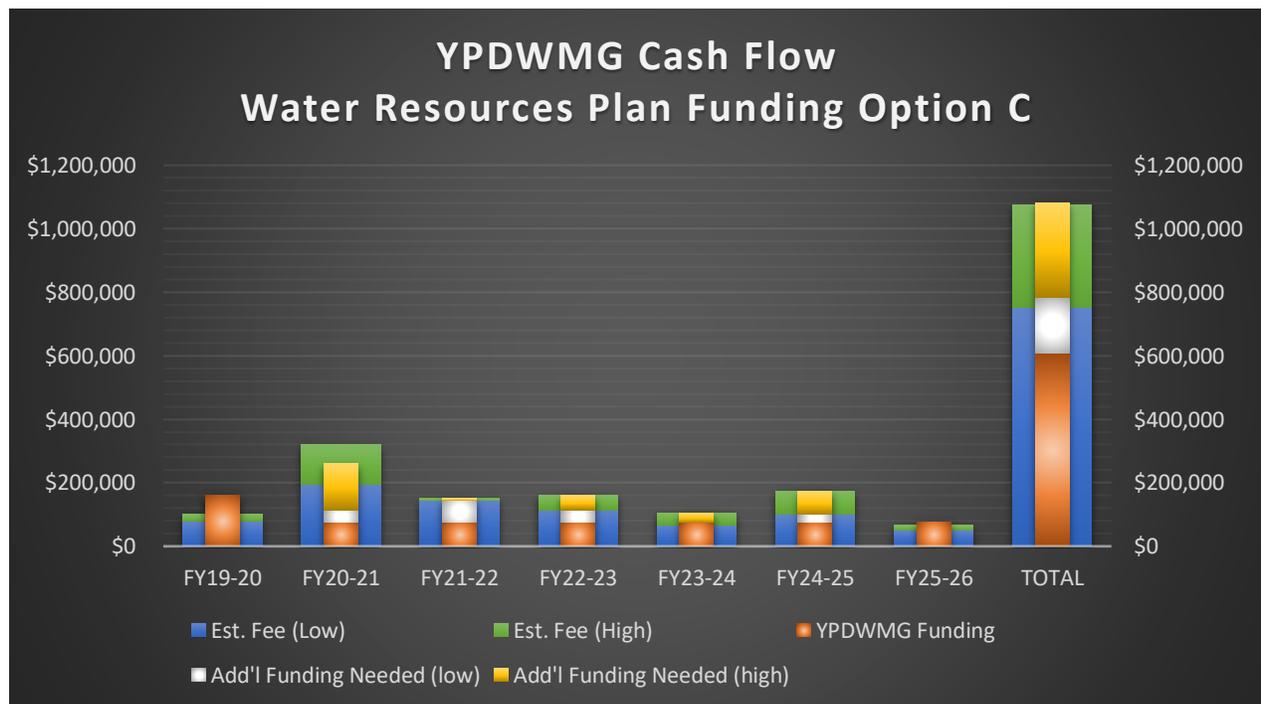


Figure 3 Funding Option C: Cash Flow Evaluation

Outside Funding Opportunities

Recognizing the significance of the Plan’s funding requirements and additional funding requirements beyond YPDWMG internal funding sources, meaningful financial support from outside funding opportunities will be needed. Opportunities for grants, cost-share arrangements, etc. exist for the YPDWMG’s development of the Plan. As previously noted, the YPDWMG coordinated with the NCDEQ Division of Water Resources and North Carolina Legislature to secure funding for the Plan’s Phase 3 hydrologic model updates. A synopsis of various additional funding sources, both public and private, and a summary of their requirements and applicability to this project are provided as follows.

Public Funding Sources

A variety of public (governmental, regulatory, etc.) funding opportunities were reviewed for potential applicability to the YPDWMG and their development of the Plan. These funding sources, potential award, important dates, and applicability to the YPDWMG’s Water Resources Plan are summarized in Table 16. It is noted that, from this review, there are limited opportunities to the YPDWMG for public funding of the Plan.

Table 16 Summary of Public Funding Sources

Eligible?	Funding Source	Potential Award	Submittal Date	Award Date
✓	<u>North Carolina’s Clean Water Management Trust Fund (CWMTF)</u>	In 2018 allocated total of > \$400k between 9 projects	Early February	Fall of the same year
✓	<u>US Bureau of Reclamation-Cooperative Watershed Management Program</u>	Up to \$100,000 per project over a 2-year period. For Phase II projects	Phase I Projects: July; Phase II Projects: February	September
x	<u>Appalachian Regional Commission</u>	-	-	-
x	<u>North Carolina Construction Grants & loans (NCCGL) - Clean Water State Revolving Fund</u>	Loan: 1/2 of market rate, up to 20 years	-	Submit a project to Priority Funding List by March 31 st
x	<u>North Carolina Division of Environmental Quality- Drinking Water State Revolving Fund</u>	-	Two per year (March & September)	-
x	<u>North Carolina Division of Water Resources- Section 319 Grants</u>	<=60% of eligible project costs, 40% non-federal match	Early May	Late June
P	<u>North Carolina Tobacco Trust Fund Commission</u>	2018 grants ranged from < \$20k -\$200k	March	October
x	<u>USDA Rural Development - Water & Environmental Programs</u>	Up to \$15,000 or 75% of project costs	-	-

✓ = Plan is eligible for funding

P = Plan may potentially be eligible for funding

x = Plan is not eligible for funding



NORTH CAROLINA CLEAN WATER MANAGEMENT TRUST FUND

North Carolina's Clean Water Management Trust Fund (CWMTF) was established by the General Assembly in 1996. CWMTF receives a direct appropriation from the General Assembly in order to issue grants to local governments, state agencies, and conservation non-profits to help finance projects that specifically address water pollution problems. The 21-member, independent, CWMTF Board of Trustees has full responsibility for the allocation of money from the Fund. CWMTF will fund projects that (1) enhance or restore degraded waters, (2) protect unpolluted waters, and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

Grants are available for state agencies, local governments, and non-profit corporations whose primary purpose is the conservation, preservation, and restoration of North Carolina's environmental and natural resources. Applications for the annual grant cycle are due in February of each year.

Funds may be available for the YPDWMG's Plan for sections of the study targeted for water quality. Additionally, the CWMTF is a potential source of funding for future projects administered by the YPDWMG that target water quality and the reduction of pollution in the waterways.

UNITED STATE BUREAU OF RECLAMATION- COOPERATIVE WATERSHED MANAGEMENT PROGRAM

The Cooperative Watershed Management Program (CWMP) provides funding for two phases of Watershed Group funding: Phase I would involve developing bylaws, a mission statement, stakeholder outreach, developing a watershed restoration plan, and a watershed management project design. Phase II assistance would be supporting funding specific watershed projects that address critical water supply need sand quality concerns. These phases would receive up to \$50,000 or \$100,000 for Phase I and Phase II respectively. Phase II projects must contribute at least 50% of the total project costs, but Phase1 projects have no cost-sharing requirements.

Phase 1 funding applications and evaluation criteria will be posted in May 2019 and due July of the same year and Phase II applications are currently being reviewed for 2019. The YPDWMG's Plan would likely be eligible for the Phase II funding for the FY 2020 cycle.

APPALACHIAN REGIONAL COMMISSION - SUPPLEMENTS TO OTHER FEDERAL GRANTS

The Appalachian Regional Commission (ARC) awards grants to projects that address one or more of the four goals identified by ARC in its strategic plan and that can demonstrate measurable results. Typically, ARC project grants are awarded to state and local agencies and governmental entities (such as economic development authorities), local governing boards (such as county councils), and nonprofit organizations (such as schools and organizations that build low-cost housing). ARC targets special assistance to economically distressed counties in the Appalachian Region, allowing up to 80 percent participation in grants in distressed areas.

Projects that targeted the counties within the Appalachian Region would be eligible for funding from the ARC. The YPDWMG's Plan will not be eligible for this funding.



NORTH CAROLINA CONSTRUCTION GRANTS & LOANS (NCCGL) - CLEAN WATER STATE REVOLVING FUND

The 1987 amendments to the Federal Clean Water Act replaced the Construction Grants program with the Clean Water State Revolving Fund Program (CWSRF). Under the CWSRF, Congress provides the states with grant funds to establish revolving loan programs to assist in the funding of wastewater treatment facilities and projects associated with estuary and nonpoint source programs. The states are required to provide 20% matching funds. In North Carolina, these funds are made available to units of local government at one-half (1/2) of the market rate for a period of up to twenty (20) years. The actual term of the loan is determined by the State Treasurer's Office.

In order to receive funding, projects must be focused on a number of topics such as reclaimed water or energy efficiency at treatment facilities. Additionally, they must be included on a Priority Funding List. Applicants can have their projects included on the state's Priority Funding List by submitting a written request which includes a general project description, estimated project cost, and schedule on or before March 31st of each year. Projects will be rated based upon the severity of the water quality problem and included on the list accordingly. While the number of priority points is important, the applicant's willingness and ability to proceed will also play a major part in the selection of projects actually chosen for funding and included on the Intended Use Plan.

CWSRF loans through the NCCGL are intended for capital projects and like the Drinking Water SRF it is not anticipated that there is money available for planning, so the YPDWMG's Plan will not be eligible. However, projects which may be identified in the Plan for sewer capital improvements would likely be eligible for possible funding through this loan program.

NORTH CAROLINA DIVISION OF ENVIRONMENTAL QUALITY - DRINKING WATER STATE REVOLVING FUND

The North Carolina Drinking Water State Revolving Fund (DWSRF) provides funding for water sourcing, treatment, storage, or transmission and distribution systems. To fund drinking water capital projects that protect public health, North Carolina makes loans at one-half of the market rate for a period of up to 20 years. The actual term of the loan is determined by the State Treasurer's Office.

Eligible projects address a threat to public health (as described in 15A N.C.A.C 01N and the Operating Agreement). Eligible applicants include units of local government and non-profit water corporations. Since the DWSRF is federally-seeded, the loans are subject to strict federal regulations regarding environmental review and outreach for disadvantaged business enterprises. There are two funding cycles per year, typically in March and September of each year. Since this program is focused on providing funding for individual systems, it is unlikely that YPDWMG would receive funding for its planning efforts. However, projects which may be identified in the Plan for drinking water capital improvements would likely be eligible for this funding.



NORTH CAROLINA DIVISION OF WATER RESOURCES - SECTION 319 GRANTS

Section 319 is a grant program established with the Clean Water Act of 1987. It helps fund innovative non-point source management strategies expected to achieve a reduction in non-point sources of pollution. EPA is the granting agency and allocates North Carolina approximately \$1 million dollars annually.

There is currently only one funding cycle per year. Grant applications are typically due in the spring of the year. A portion of these funds is passed on through a competitive grant process to stakeholder groups, government entities, or other agencies interested in conducting projects that reduce or prevent NPS water pollution through the implementation of an approved Total Maximum Daily Limit (TMDL). These funds pay up to 60% of eligible project costs, with the applicant providing a 40% non-federal match. Grant proposals for NPS projects are solicited periodically throughout the year. Guidance on the application process and information on TMDL projects available for funding will be made available at that time.

While the YPDWMG Plan is likely not eligible for Section 319 funds, future projects identified by the Plan that target the reduction of non-point pollution through adaptive management and best management strategies have the potential to be awarded grants. Specifically, projects focusing on a specific area as opposed to a large region would have a better chance for funding.

NORTH CAROLINA TOBACCO TRUST FUND COMMISSION

The Tobacco Trust Fund Commission was created to assist tobacco farmers, tobacco quota holders, persons engaged in tobacco-related businesses, individuals displaced from tobacco-related employment, and tobacco product component businesses in the State due to the adverse effects of the Tobacco Master Settlement Agreement. The Commission can disburse funds through compensatory programs and qualified agricultural programs.

Applications for the grant are typically due in March of each year. Examples of funding include the drought management program administered through the Soil and Water Conservation Commission. Projects that target agriculture in historically tobacco-dependent counties such as smart irrigation has the potential for funding. Given the Yadkin-Pee Dee River Basin's rich history in tobacco cultivation and irrigation, it may be possible for the YPDWMG to pursue funding for the Plan through this source if the focus on agricultural best practices and the benefit for water supply planning for agriculture can be demonstrated.

USDA RURAL DEVELOPMENT - WATER & ENVIRONMENTAL PROGRAMS

Water and Environmental Programs (WEP) provides loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies, non-profit organizations, and recognized Indian tribes may qualify for assistance. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste needs.

Predevelopment planning grants (PPG) may be available, if needed, to assist in paying costs associated with developing a complete application for a proposed project. The applicant must meet the eligibility requirements of Part 1780.7 of RUS Instruction 1780. The

median household income of the proposed area to be served by the project must be either below the poverty line or below 80 percent of the statewide non-metropolitan median household income. State Directors are authorized to make PPG up to \$15,000 or 75 percent of the project costs, whichever is less. Funding for the balance of the eligible project costs not funded by the PPG must be from applicant resources or funds from other sources.

The USDA also provides guaranteed loans to develop water and waste disposal systems in rural areas and towns with a population not in excess of 10,000. USDA loans & grants target infrastructure development in rural areas. Although areas of the Yadkin-Pee Dee river basin would qualify for USDA assistance, the YPDWMG's Plan would not qualify for Predevelopment Planning Grants due to the urban areas within the study area. Future projects that target infrastructure development in rural areas would be eligible for funding.

Private (Corporate) Funding Sources

A variety of private (corporate, foundation, etc.) funding opportunities were also reviewed for potential applicability to the YPDWMG and their development of the Plan. These funding sources, potential award, important dates, and applicability to the YPDWMG's Water Resources Plan are summarized in Table 17. More private funding opportunities are available to the YPDWMG for public funding of the Plan, as compared to public funding. The YPDWMG is already making use of these types of private funding opportunities, having been awarded a \$100,000 grant from the Duke Energy Foundation's Water Resources Fund in January 2019 to fund Phase 1 of the Plan.

Table 17 Summary of Private Funding Sources

Eligible?	Funding Organization	Potential Award	Submittal Date	Award Date
✓	<u>The Blanche and Julian Robertson Family Foundation</u>	Varies	Late February	April
✓	<u>Coca-Cola Foundation</u>	Varies	Rolling	Rolling
x	<u>Duke Energy Foundation: Water Resources Fund</u>	Previously funded \$100K of YPDWMG Plan Fund is no longer available		
✓	<u>Duke Energy Foundation: Powerful Communities - Nature</u>	Varies	April 30 th	June 30 th
P	<u>Cornell Douglas Foundation</u>	\$10,000 to \$15,000	Rolling	Rolling
P	<u>Foundation of the Carolinas:</u>			
P	• <u>2019 Margaret C. Woodson Foundation Grant Program</u>	-	February 1 st	Late April
P	• <u>2019 Stanly County Community Foundation Grant Cycle</u>	\$1,000 to \$10,000	March 15 th	June
x	<u>PepsiCo Foundation</u>	Varied	Rolling	Rolling
P	<u>North Carolina Golden LEAF Foundation</u>	≤ \$200,000	Rolling	Rolling

✓ = Plan is eligible for funding

P = Plan may potentially be eligible for funding

x = Plan is not eligible for funding



THE BLANCHE AND JULIAN ROBERTSON FAMILY FOUNDATION

The Blanche & Julian Robertson Family Foundation has supported tax-exempt organizations and governmental agency projects that help the people of Salisbury and Rowan County since 1997. Specifically, they prioritize projects that encourage constructive change, strive toward achieving excellence, and have a significant public service component.

The 2019 application deadline closed in early February 2019, but the criteria are broad enough that the YPDWMG may be eligible to receive funding from the Foundation in the next funding cycle. The application will need to focus on the benefit of the Plan to the overall Basin and region, but focus more directly on the benefit to Rowan County and its watersheds.

COCA-COLA FOUNDATION

The Coca-Cola Foundation, a 501(c)(3) non-profit, was founded in 1984 as the global philanthropic arm of the Coca-Cola Company. The support initiatives of the foundation are focused upon healthy and active lifestyles, community recycling, education, and water stewardship. In 2007, Coca-Cola set a long term goal to return to nature and communities an amount of water equal to what they use in beverages and production and set a target date of 2020 to meet that goal. The strategies to achieve this goal are through programs targeted towards the principles of reduce, recycle, and replenish. The replenish goal is achieved by investing in locally relevant projects that focus on watershed protection, conservation, and providing access to clean water and sanitation.

The Coca-Cola Foundation has created the Community Water Partnership program as a platform to raise awareness of water resource challenges and to engage the global community. The program is in its sixth year and has engaged in more than 250 community water/watershed projects in over 70 countries. In the Southeastern US, Coca-Cola has partnered to protect river and stream resources in the Tennessee, Cumberland, and Mobile River Basins. Their goal in these basins is to harmonize rapid urban growth with the protection of freshwater ecosystems in the drought threatened areas by increasing the implementation of sustainable water policies and practices.

The Foundation accepts program and project proposals on a rolling basis and the YPDWMG Plan would be eligible for an award.

DUKE ENERGY FOUNDATION- WATER RESOURCES FUND

The Water Resources Fund was initiated in 2014 with the aim support North Carolina's waterways through nonprofit partnerships. Their fund totals to \$10 million dollars to support science-based and research support programs that focus on (1) improving water quality, quantity, and conservation (2) enhancing fish and wildlife management habitats (3) expanding public use and access to waterways, or (4) increasing citizen's awareness about their roles in protecting water resources.

This fund has been an excellent funding source in past years for projects, including the YPDWMG's Plan. However, the final funding cycle of the Fund occurred in 2018, where the YPDWMG received an award of \$100,000 in the final cycle of the fund, last year. The Duke Energy Foundation- Powerful Communities: Nature Grant, as described below, could be a viable alternative in the absence of the Water Resources Fund.



DUKE ENERGY FOUNDATION- POWERFUL COMMUNITIES: NATURE

The Duke Energy Foundation supports surrounding communities by funding K-12 Education, workforce development, nature, and state level strategic funding programs through their Powerful Communities Fund. The Nature fund specifically supports water quality, quantity, and conservation and access.

To be eligible, an applicant must be tax-exempt as a public charity or governmental entity (including school systems), serve communities that are also served by Duke Energy, and be able to demonstrate measurable community impact. The yearly application window is open in the spring (February 1st to April 30th in 2019) and the grant decisions are made in late June. Programs within the YPDWMG's Plan, along with the development of the plan itself, would likely be eligible for this funding source.

CORNELL DOUGLAS FOUNDATION

The Cornell Douglas Foundation provides funding for non-profits with projects focus on topics such as watershed protection, land conservation, environmental health and justice, and sustainability of resources. To be eligible, the grant recipient must have tax-exempt status under 501(c)3 or similar organization. Applications are accepted on a rolling basis and the average grant award is \$10,000. The YPDWMG may be eligible for funding if it can show tax exempt status since it is not a formal 501(c)3 organization.

FOUNDATION OF THE CAROLINAS

The Foundation of the Carolinas has multiple grants that support topics such as health, education, and the environment in North and South Carolina. These grants are typically county specific and funded by the Foundation of the Carolinas annual competitive grant making program. Eligible applicants include nonprofits, congregations, governmental institutions, and educational institutions.

Margaret C. Woodson Foundation Grant Program

The Margaret C. Woodson Foundation Grant Program funding awards are limited to projects and programs that benefit the people of Rowan and Davie Counties and address social problems, improved opportunities for youth at risk and address health matters. For the YPDWMG's Plan to be eligible, the application would need to focus on the benefit of the Plan to the overall Basin and region, but focus more directly on the environmental and educational benefit to Rowan and Davie Counties and their watersheds.

Stanly County Community Foundation Grant Program

The Stanly County Community Foundation is funded by multiple supporters, and generally support projects that focus on education, human services, and arts and culture. The awards range between \$1,000 and \$5,000, with the most common award being \$2,000. For the YPDWMG's Plan to be eligible, the application would need to focus on the benefit of the Plan to the overall Basin and region, but focus more directly on the environmental and educational benefit to Stanly County and its watersheds.

PEPSICO FOUNDATION

The PepsiCo Foundation is the branch of PepsiCo, Inc. responsible for providing charitable contributions to eligible non-profits. Established in 1962 with an initial focus on promoting health



and fitness, the foundation has evolved its goals to include nutrition, safe water, and water use efficiencies, and education and empowerment.

The foundation is committed to contributing to programs that will lead to sustainable outcomes and impacts for the global community. To achieve these goals, they invest resources by strategically partnering with nonprofits and nongovernmental organizations (NGOs) that have demonstrated expertise and ability to magnify positive outcomes through action. Organizations must demonstrate a defined and purposeful fit to PepsiCo Foundation's funding priorities and have a track record of success to be considered for funding.

With respect to the foundation's safe water and water use initiatives, PepsiCo seeks environmental programs that protect water sources and improve the usage of existing water to help minimize the growing water crisis faced by millions of people around the globe. The strategic focus areas include water security, sustainable agriculture, and adaptive approaches to climate change. At this time, the PepsiCo Foundation is unable to fund unsolicited proposals for funding and therefore would not support the YPDWMG's planning efforts, unless invited by the corporation to make a proposal.

NORTH CAROLINA GOLDEN LEAF FOUNDATION

The North Carolina Golden LEAF Foundation provides funding to support projects that strengthen North Carolina's long-term economy, with a focus on regions that are tobacco-dependent, economically distressed, and/or rural communities. The Foundation prioritizes projects that focus on agriculture, economic development workforce preparedness, healthcare, education, and community vitality. Within the community vitality priority, the Foundation scores project based on hookups to public infrastructure, dollars invested in public infrastructure, and business start-ups or expansions and awards up to \$200,000. Based on the categories and grant metrics, to be eligible for funding awards, the YPDWMG would need to highlight the focus areas of the plan that will benefit agriculture, economic development, and community vitality resulting from sustainable water resources in the Yadkin-Pee Dee River Basin.

Summary

In summary, the YPDWMG’s vision for a Water Resources Plan for North Carolina’s Yadkin-Pee Dee River Basin represents the most comprehensive water supply planning effort for the region to-date. With a scope developed through a series of facilitated stakeholder workshops throughout the Basin, the YDPWMG has crafted a detailed framework for how this plan is to be developed and implemented over the coming years. This plan will evaluate current and future questions, issues and concerns relating to the quantity and quality of the Basin’s water resources and develop collaborative strategies to mitigate adverse impacts from these issues.

Plan Scope and Phasing

The Plan is intended to help preserve, protect, and extend the Basin’s water supply through the successful implementation of the evaluations and initiatives in the following four key areas.

- Funding
- Communication
- Data/Research
- Mitigation

Additionally, evaluations and initiatives are categorized under the following phases.

- Phase 1 – Planning (in progress)
- Phase 2 - Scenario Development
- Phase 3 - Hydrologic Model Updates
- Phase 4 – Hydrology Model Evaluations
- Phase 5 - Technical Evaluations and Recommendations
- Phase 6 - Collaborative Evaluations and Recommendations
- Phase 7 - Water Resources Plan Documentation and Rollout

Three phasing plans are presented to complete the Plan, beyond the initial planning work of Phase 1, which is currently in progress as of early 2019. These proposed phases are summarized in Table 18.

Plan Cost and Funding

To align with the proposed phasing plan options, order of magnitude costs have been developed for the Plan, with an assumption for both low and high range costs depending on final scope elements included in the Plan by the YPDWMG. These costs and funding needs are summarized in Table 18. Regardless of which phasing/funding plan is selected, a significant investment will be needed from the YPDWMG membership, as well as meaningful financial support from outside funding opportunities (i.e. grants, NCDEQ cost-share, etc.).

Table 18 Summary of YPDWMG Water Resources Plan Phasing and Funding Options

Phasing/Funding Plan ID	Duration (Years)	Fiscal Years	Total Est. Fee	YPDWMG Funding	Outside Funding Received ¹	Additional Outside Funding Needed
A	2 ½	FY19-22	\$732K - \$1.038M	\$310K	\$275K	\$172K - \$463K
B	3	FY19-22	\$742K - \$1.059M	\$310K	\$275K	\$157K - \$592K
C	6 ½	FY19-26	\$752K - \$1.074M	\$610K	\$275K	\$0K - \$198K

¹ Funding committed by NCDEQ-DWR for model development with an estimated value of \$275,000.