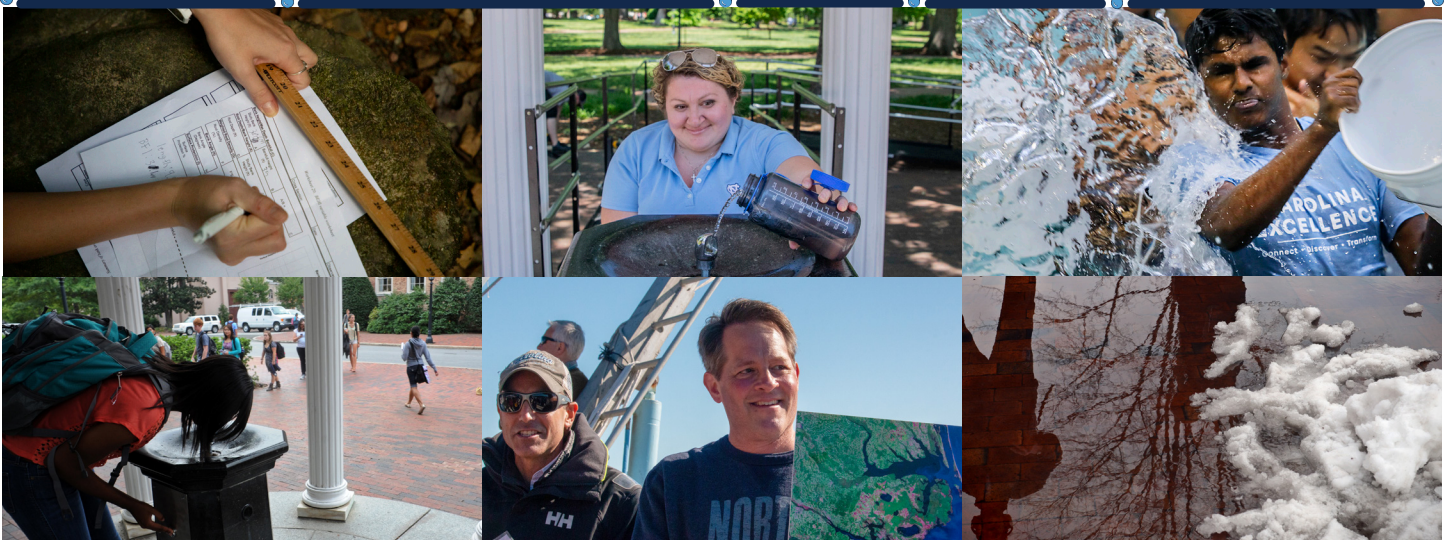


The University of North Carolina at Chapel Hill

Water Plan • 2022



Intro

Sustaining water quantity and quality for people and the environment is a growing challenge. The University of North Carolina at Chapel Hill (UNC-CH) is committed to working to ensure clean water supplies and functioning ecosystems into the future. We face major challenges around water sustainability, including growing demands for finite water resources, increasing sources and types of contaminants, and a changing climate which disrupts both water supply and delivery.

Our Water Plan lays out past accomplishments, current goals, and visions for the future. As with our recently released Climate Action Plan, we seek input from our stakeholders to help develop specific targets and metrics to gauge success.



Sources

UNC-CH's primary water sources are potable and reclaimed water purchased from the Orange Water and Sewer Authority (OWASA). The Jones Ferry water treatment plant is supported by two reservoirs and distributes potable water to campus. The Mason Farm reclaimed water plant provides treated wastewater to select campus facilities via a purple pipe network. As with other campus utilities, the primary water utility infrastructure is not owned or managed by the University. The campus water cycle for primary potable water, reclaimed water, wastewater, and stormwater is shown in Figure 1.

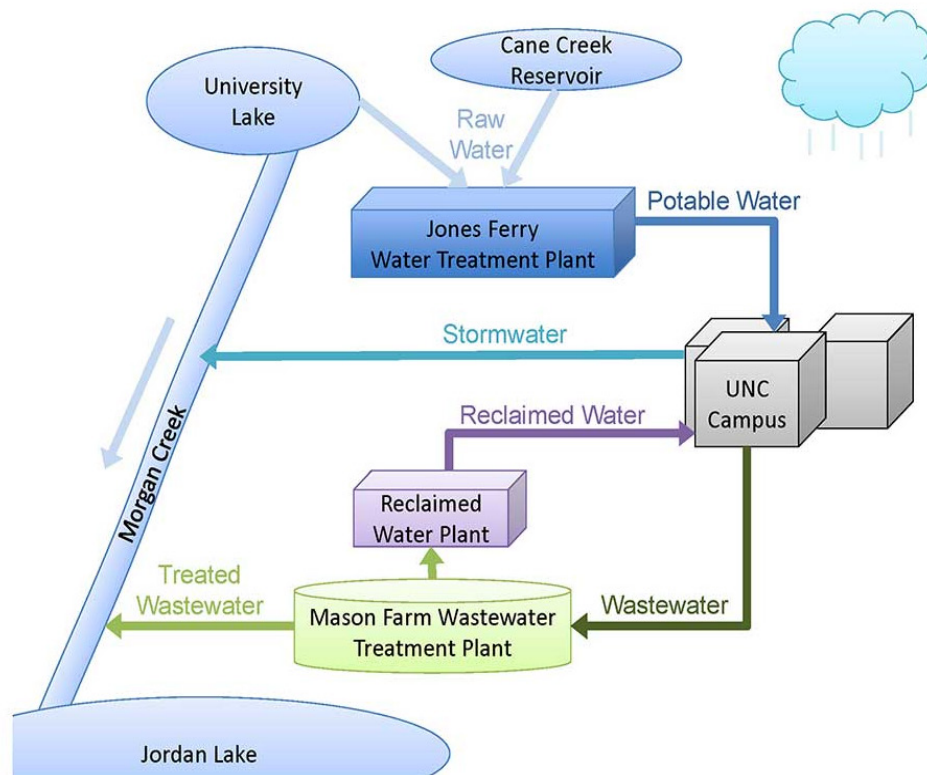


Figure 1. UNC-CH primary water source cycle.

In addition to primary sources, more than a dozen cisterns collect over 400,000 gallons of rainwater at multiple locations across campus. The rainwater captured in these cisterns displaces potable water needed to flush toilets and provide irrigation. These systems, as well as dual plumbing, are included in new capital projects as appropriate. Any campus project that increases impervious surface area must pay to hold the increased stormwater that would result.

UNC-CH's experience with innovative stormwater measures, such as green roofs, permeable pavement, preventative drain maintenance, stormwater wetland construction, and stream daylighting, has contributed to the North Carolina design guidelines for stormwater. Implementation of over 250 stormwater control measures has increased the University's downstream water quality per the Jordan Lake Rules for nutrient management. One example of a successful stormwater control measure on campus is the Battle Grove stormwater project which won a 2018 NC Source Water Protection award for both implementation and education.

Progress

Senate Bill 668 was passed in 2007 calling for at least a 20% improvement in water efficiency beyond code for new buildings and existing building retrofits. Since UNC-CH made the commitment these goals, they have been met and exceeded every year since.

Prior to the pandemic:

- Campus potable water consumption has decreased over 31% since 2007, shown in Figure 2.
- Annual potable water use intensity is 52% lower since the 2003 baseline year, with recent trends shown in Figure 3.

These significantly decreasing trends exist despite increasing campus population and millions of square feet of new buildings. Of course, the pandemic caused additional reductions in water use overall, and these reductions are expected to recover as campus operations return to normal.

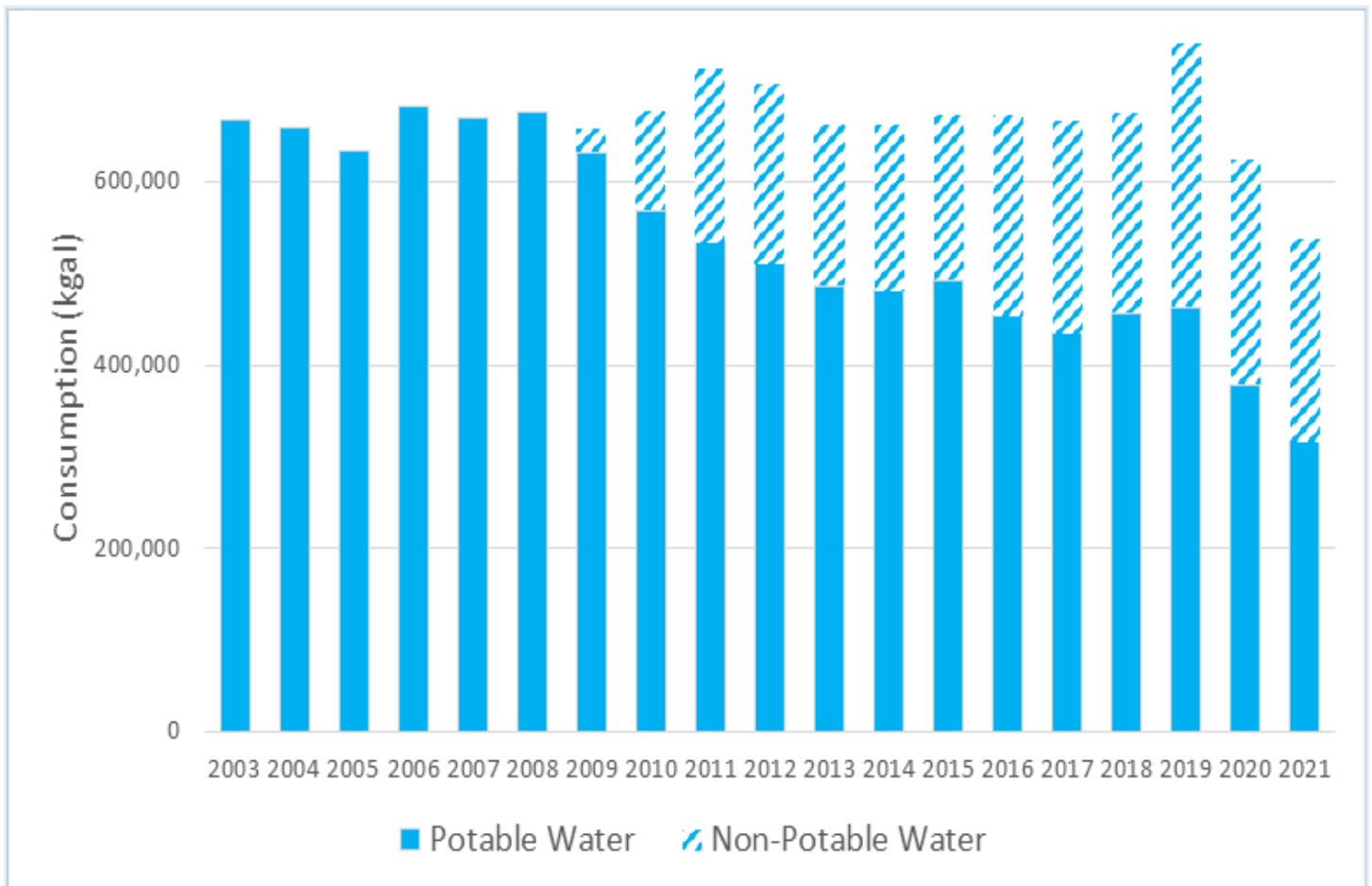


Figure 2. Annual campus water consumption (1,000 gallons) since 2003.

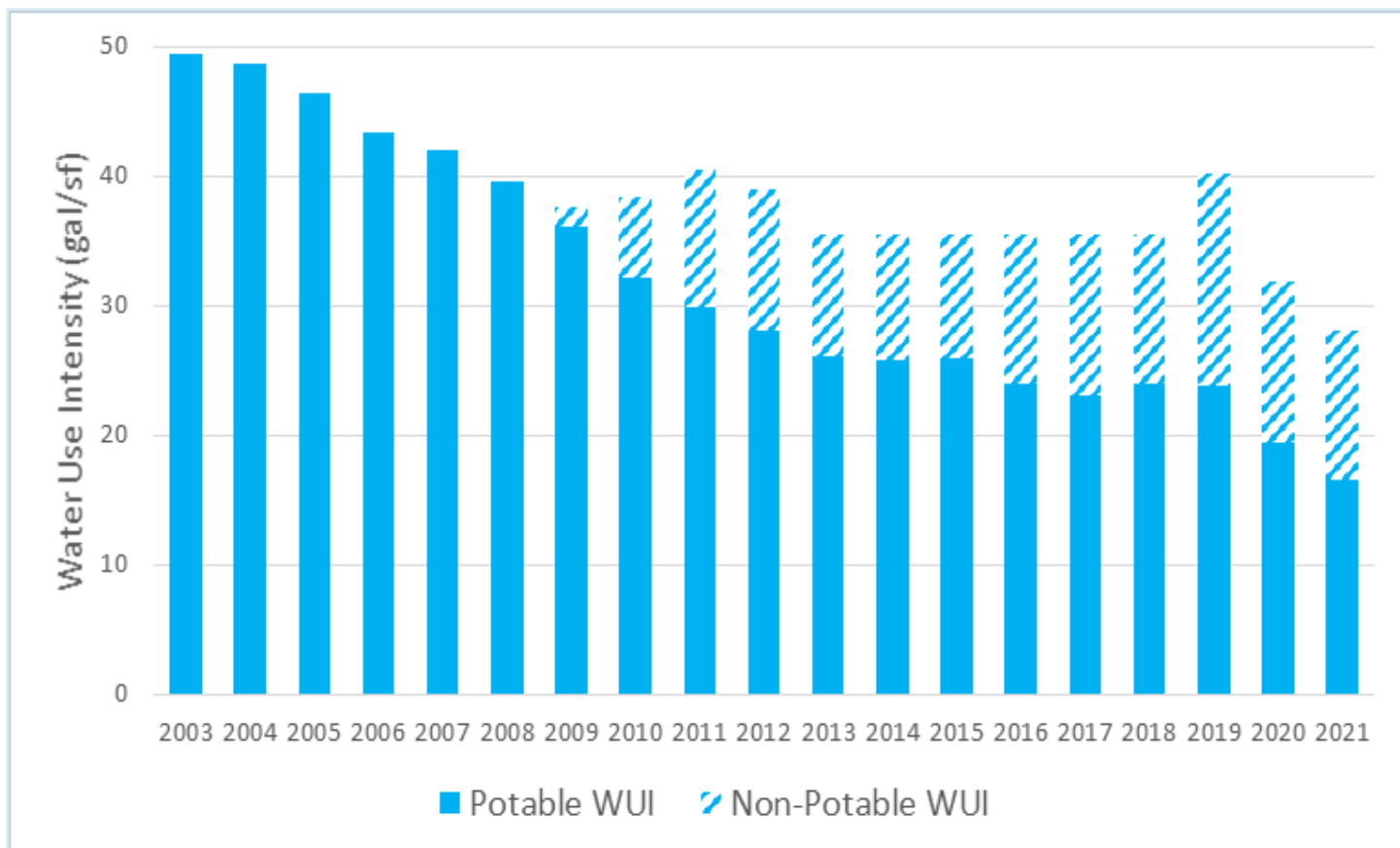


Figure 3. Campus water use intensity (gallons per square foot per year) trends since 2003.

Water efficiency progress has been accomplished by eliminating leaks and single pass cooling systems and by incorporating water-saving measures into new capital construction projects and existing building retrofits. To better manage water use, the University has installed low-flow fixtures, such as automatic sinks and low-flow showerheads, toilets, and urinals. Carolina Dining Services contributed by installing water-saving dishwashers and removing trays from the dining halls, conserving the water that would be used to wash them. Investments in research laboratories include water-saving autoclaves for sterilization, reverse osmosis systems to provide distilled water, and the use of pumps instead of aerators to provide vacuum. Grounds Services has planted low-maintenance, water-retentive landscapes and installed radio-controlled irrigation systems that apply water only when needed and directly to the plant to eliminate evaporative losses.

Goals

1. **Reduce water footprint:** Minimize the amount of water used on campus by reducing total water consumption. Maximize the proportion of non-potable water for campus water use. Reduce the volume, rate, and pollutant load of stormwater runoff.
2. **Amplify and translate water research:** Establish a network for water-related research to be shared with students, campus operations, and local and regional sustainability partners.



Strategies

Many projects have already been implemented at UNC-CH. Therefore, a large part of the water strategy is to maintain or expand these successful projects. Sustainable water also includes high-impact water research which is being conducted across the University.

Source Water Management Strategies

Using non-potable water as a source for activities other than consumption, contact, and research increases the amount of potable water available to UNC-CH and the larger community. Source water management also means maintaining high water quality in infrastructure as well as reducing the volume, rate, and pollutant load of runoff which becomes a source for other communities.

Increase the share of non-potable water use

Project 1: Cooling Towers
<i>Description:</i> The chilled water plants run by UNC-CH and UNC Hospitals are the largest water users on campus. Expanding non-potable water for cooling towers limits the amount of potable water used.
<i>Status:</i> The cooling tower make-up water for the main campus plants is reclaimed water from OWASA.
Project 2: Athletic Field Irrigation
<i>Description:</i> Expand non-potable water use for athletic field irrigation
<i>Status:</i> All-natural turf athletic fields operated by UNC-CH's Athletics Department are now served with non-potable water for irrigation.
Project 3: Toilet Flushing
<i>Description:</i> Expand non-potable water use for toilet flushing
<i>Status:</i> UNC-CH design guidelines call for dual-plumbing systems in new buildings when and where feasible so that non-potable water can/could be used for toilet flushing. The recently renovated Mary Ellen Jones building was double plumbed.
Project 4: Landscape Irrigation
<i>Description:</i> Expand non-potable water use for landscape irrigation
<i>Status:</i> UNC-CH currently supplies non-potable water for landscape irrigation to a number of sites. Some are served by reclaimed water from OWASA (Genome Sciences Building, Tomkins Chilled Water plant). Others use harvested rainwater (Rams Head Plaza, Hanes Hall, Koury Oral Health, North Carolina Botanical Garden).
Project 5: Other Irrigation
<i>Description:</i> Reduce potable water for irrigation
<i>Status:</i> As part of a water master planning effort, UNC-CH is investigating the feasibility of switching existing potable water irrigation sites to non-potable water.
Project 6: Rainwater Up-time
<i>Description:</i> Increase up-time for rainwater harvesting systems
<i>Status:</i> As part of a water master planning effort, UNC-CH is working to improve operational efficiency for existing rainwater harvesting systems to increase the percentage of time they are operational.
Project 7: Rainwater Harvesting Metering
<i>Description:</i> Many of the existing rainwater harvesting systems on campus are not metered. Therefore, their impact on reducing UNC-CH's potable water use is not known.
<i>Status:</i> UNC-CH intends to meter any new systems installed.

Maintain stormwater quality

Minimizing stormwater runoff pollution including nutrients, sediment, and discharge improves water quality for users within the watershed.

Project 1: Stormwater Control Measures
<i>Description:</i> UNC-CH's downstream water quality is influenced by stormwater runoff that occurs on campus and flows downstream.
<i>Status:</i> Three stormwater wetlands, one at Finley Fields North, one at the Outdoor Education Center and one behind WUNC-FM near the Friday Center, have been added to campus as measures to increase bioretention of free nutrients in runoff and improve downstream water quality. A fourth stormwater wetland is underway at the NC-54 Park and Ride Lot near the Friday Center. The Battle Grove Regenerative Stormwater Conveyance project was completed in 2016. The University also implemented bioretention cells, 8 green roofs, and 14 acres of permeable pavement installations.
Project 2: Stormwater Maintenance
<i>Description:</i> Preventive maintenance of stormwater drains by removing clogs, debris, and litter allows water to move freely downstream during storm events and prevents damage to downstream water quality.
<i>Status:</i> UNC-CH Grounds Services continues to perform preventive maintenance of stormwater drains.

Campus Water Use Strategies

Improving efficiency reduces the overall amount of water needed to operate the University. It is also important to maintain infrastructure to ensure that water is always available.

Project 1: Building Design Guidelines
<i>Description:</i> Develop water use standards for new and existing buildings.
<i>Status:</i> UNC-CH'S building design guidelines call for at least a 30% improvement in water efficiency beyond code for new buildings and 20% improvement for existing building retrofits.
Project 2: Detecting Unusual Usage
<i>Description:</i> Using new tools from OWASA, it is possible to detect large leaks or other unusual water usage patterns.
<i>Status:</i> UNC-CH is working to set up mechanisms to use this data for water savings.
Project 3: Expanded Deployment of Water Use Tracking Software
<i>Description:</i> Explore opportunities to expand the use of AguaVista at UNC-CH for water use analysis and assessment of efficiency opportunities
<i>Status:</i> UNC-CH is working with OWASA to determine the capabilities of AguaVista.
Project 4: Water Efficiency Upgrades
<i>Description:</i> Fixture retrofits across campus improve usage efficiency through low-flow design. Continuous analysis of efficiency across campus identifies target areas for future improvements.
<i>Status:</i> UNC-CH is working through ideas with OWASA to increase water efficiency on campus using Green Revolving Fund.
Project 5: Conduct Water Infrastructure Resiliency Assessment
<i>Description:</i> Potable water is an essential resource used for research, medical, residential, and other needs on campus.
<i>Status:</i> An ongoing resiliency study of the potable water distribution network present on campus seeks to highlight risks, areas of needed improvement, and existing resiliency measures already in place.

Research Strategies

UNC-CH has tremendous strength in water research distributed throughout campus. With the launch of the Sustainable Carolina framework, the commitment to connect sustainability activities to research at the university was redoubled. Cutting edge research addressing critical societal issues occurs in centers, institutes, and departments in multiple colleges and schools (Figure 4). Strategies have been identified to ensure that relevant research on campus informs our sustainability practice, share our insights gained from research with our local and regional sustainability partners, and highlight and amplify the value research brings to sustainability practice on campus and beyond.

Project 1: Research Partnership with OWASA
<i>Description:</i> Establish a regular research check-in meeting and develop an easy way for participants to share information. Share research/educational opportunities to use OWASA’s assets as a living lab. Connect OWASA with student project opportunities.
<i>Status:</i> In progress
Project 2: Amplify campus sustainability research around water
<i>Description:</i> Through the Sustainable Carolina platform, aggregate and highlight water research on campus.
<i>Status:</i> Ongoing
Project 3: Community-university sustainability collaboration
<i>Description:</i> Foster and develop sustainability partnerships with local and regional partners to ensure that state-of-the-art knowledge is being applied to help achieve shared sustainability goals.
<i>Status:</i> Ongoing



Figure 4. Map of water research excellence across departments, institutes, and research centers of UNC-CH.

Sustainable Together

The challenge of reducing our water footprint and meeting our water sustainability goals requires collaboration across all levels of Carolina. With ambitious plans for water sustainability also comes the need for funding. While most of the strategies and ideas outlined in this Water Plan rely on decisions made at the institutional level, the individual behaviors that all members of the UNC-CH community adopt will be the key to realizing our ambitions.

Opportunities to connect and collaborate on individual behavior change will continue to develop now and into the future, and Sustainable Carolina is committed to facilitating them through an open process. For ideas on the actions you can take to reduce water consumption and create a more sustainable campus and an opportunity to leave your own idea for water conservation, please visit the "[What Can I Do?](#)" web page and leave a note through the feedback form.

By learning about the quantified water impacts that everyday choices have, communicating water messaging to peers, and staying aware of new tools that shrink water footprints, the Carolina community is moving forward towards our new ambitious water goals together.

Acknowledgements

Developing this water plan required a campus-wide collaboration. Thank you for all of the help through all stages of development. The following groups provided data or insights that helped form this plan: [Energy Services](#) and [Environment, Health and Safety](#).