ORANGE WATER AND SEWER AUTHORITY

A public, non-profit agency providing water, sewer and reclaimed water services to the Carrboro-Chapel Hill community.

MEMORANDUM

TO: **Natural Resources and Technical Services (NRTS) Committee**
John Young (Chair)
John Morris
Heather Payne
Ruchir Vora
Bob Morgan (*ex officio*)

THROUGH: Ed Kerwin

FROM: Ruth Rouse

DATE: May 2, 2018

SUBJECT: May 8, 2018 NRTS Committee Meeting

The NRTS Committee will meet on Tuesday May 8, 2018 at 4:30 pm in the OWASA Boardroom. The purpose of the meeting will be to discuss source water protection.

The enclosed document provides additional background information.

We look forward to seeing you on May 8 and to receiving your questions, comments, and feedback regarding this important topic.

Ruth C. Rouse

Ruth Rouse, AICP
Planning and Development Manager

c: OWASA Board of Directors
Robert Epting, OWASA General Counsel

Attachments
Attachment 1: Source Water Protection

Source Water Protection

This document summarizes source water protection efforts in the Cane Creek Reservoir and University Lake watersheds. It begins with an overview of federal and state requirements and the local ordinances to meet (and exceed) those requirements. It describes land acquisition efforts to protect the watersheds, the state's source water assessment program and its upcoming source water protection efforts. Finally, the document summarizes water quality monitoring efforts that help our water treatment plant operators make informed decisions about process improvements and track issues of emerging concern.

Water Quality Standards

The federal Clean Water Act requires states to develop water quality standards, which consist of three main parts:

1. Designated uses – this describes the uses that the waterbody should be clean enough to fully support regardless of the current condition; per the Clean Water Act, all waters must be fishable and swimmable.
2. Criteria – these include numeric and narrative criteria that are established to protect the designated uses.
3. Antidegradation – these requirements provide a framework to protect water quality in waters that are fully supporting their designated uses or may exhibit high water quality.

The North Carolina Division of Water Resources (DWR) classifies each water in the state according to its designated uses. All waters must support aquatic life and swimming in accordance with the Clean Water Act; other classifications recognize water used for drinking water purposes and organized recreation. DWR also assigns supplemental classifications to recognize that a water is nutrient sensitive, is a high quality water, or has high quality and is noted of being of exceptional state or national ecological or recreation significance.

Both Cane Creek Reservoir and University Lake are classified as drinking water supplies (WS classification). DWR further divides this class into 4 subcategories depending on the amount of development in the watershed. Both Cane Creek Reservoir and University Lake are classified as WS-II, meaning that their watersheds are largely undeveloped. WS-II waters by definition are high quality waters and are protected to preserve that designation.

DWR's regulations allow the agency to issue only general permits for wastewater discharges in the Cane Creek Reservoir and University Lake watersheds; these general permits are for discharges that have minimal impact on surface waters. For example, DWR may issue general permits for single family residential use, some cooling tower discharges, and sand dredging. Other discharges of domestic waste (such as for a local government utility wastewater treatment facility) and industrial process wastewater are not permitted.

The regulations require that local governments with jurisdiction within water supply watersheds adopt and enforce ordinances that meet certain criteria depending on the water supply classification. Orange and Alamance Counties have jurisdiction in the Cane Creek Reservoir watershed, and Orange and Chatham Counties and the Town of Carrboro have jurisdiction in the

University Lake watershed. It should be noted that Alamance and Chatham Counties contain approximately 10 percent of the watershed areas; the areas in their jurisdiction are generally further from the reservoirs.

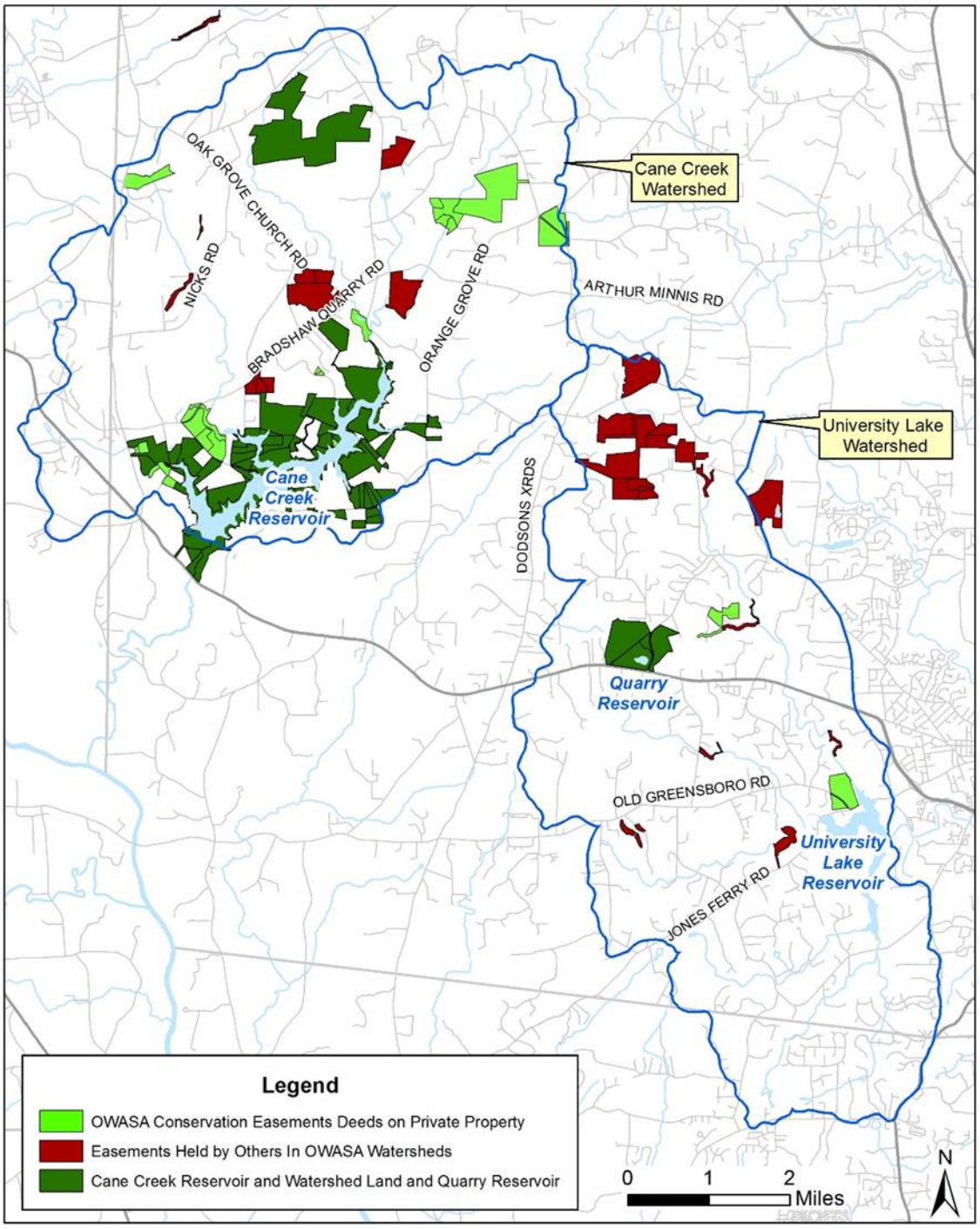
The ordinances for both Orange County and the Town of Carrboro exceed DWR's regulations. For example, DWR's regulations cap development densities at 1 dwelling unit per 2 acres within the critical area of the watershed (within ½ mile of the reservoir at full pool elevation) and at 1 dwelling unit per acre in the remainder of the watershed without stormwater control. (Note: higher densities are allowed with stormwater control). Both the County and Carrboro limit density at 1 dwelling unit per 5 acres throughout the watershed (note: some older lots and areas are grandfathered) and require high levels of stormwater control on all new development.

In addition to the development restrictions described above, both the Town and County limit the types of development in the watershed. Non-residential uses are severely restricted to those that will have minimal impact on our water supply such as warehouses, police or fire stations, agricultural uses, some sales, and recreational uses.

Watershed Management Studies and Land Acquisition

OWASA purchased land and put protective easements on private land in its water supply watersheds based on the results of watershed studies. Figure 1 illustrates the location of protected lands in the University Lake and Cane Creek Reservoir watersheds. Further information on the watershed studies for both reservoirs is provided below.

Figure 1: Protected Land in OWASA's Watersheds



University Lake

Land acquisition was among the options evaluated in the University Lake watershed management study and plan commissioned in the late 1980s. Water quality modeling indicated that permanently protecting 2,900 acres (approximately 15 percent) of the watershed would have only slight water quality benefits and not justify the multi-million-dollar cost, but that selected

land acquisition in critical areas of the watershed may be appropriate. This recommendation was later confirmed in a follow-up analysis, which found that land acquisition would probably not be effective. A possible exception applied to undeveloped land very near the lake; the study noted that conservation easements along stream buffers would be particularly valuable near the downstream ends of tributaries as they approach University Lake.

Based on these technical recommendations, OWASA elected not to pursue a program of land or easement acquisition in the University Lake watershed, but to consider land preservation opportunities on a case-by-case basis. In 2006, OWASA purchased a 73-acre property along Morgan Creek immediately upstream of University Lake (with the help of a $1.2 million NC Clean Water Management Trust Fund grant). OWASA placed this property under a permanent restrictive conservation easement that protects all riparian areas and severely restricts future development, subdivided it into two large tracts, and re-sold the land on the open market in 2011.

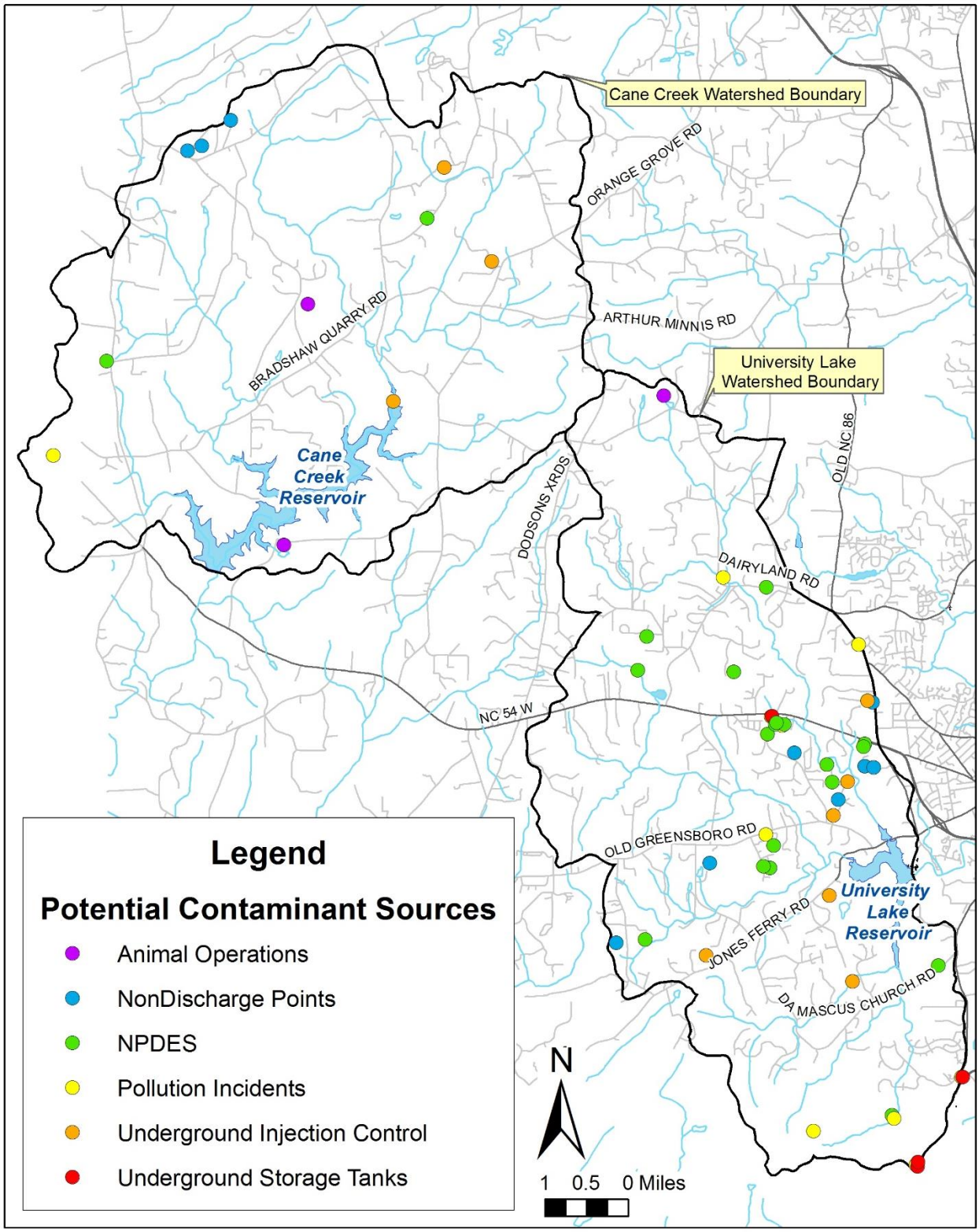
Cane Creek Reservoir

The primary recommendations in a 1996 study of the Cane Creek Reservoir watershed included large lot (5 acres or greater) residential re-zoning and the permanent protection of 1,265 additional acres of watershed land either through fee simple purchase or conservation easements. OWASA adopted those recommendations as goals for the protection of Cane Creek Reservoir and subsequently protected an estimated 1,075 acres of additional Cane Creek watershed land through purchase or conservation easements. Since 1997, Orange County's Land Legacy Program also acquired protective conservation easements on an additional 678 acres in the Cane Creek watershed. Together, OWASA and Orange County's land protection efforts have exceeded OWASA's original goal. OWASA and Orange County staff continue to work closely in coordinating the needs of our respective programs as the County protects additional land in the watershed and elsewhere. As described above, Orange County has also enacted 5-acre zoning in the Cane Creek watershed in accordance with the 1996 study.

Source Water Assessments

The 1996 amendments to the Safe Drinking Water Act required states to conduct source water assessments of all public drinking water supplies. A source water assessment is a qualitative evaluation of the potential risk of a drinking water supply to become contaminated by potential contaminant sources (PCSs) within the watershed. The assessment involves identifying the PCSs and developing a susceptibility rating for each water supply. DWR developed a source water assessment for OWASA in 2014 and updated it in 2017. Staff reviewed the PCSs in our watershed, obtained updated data, mapped the PCSs in Figure 2, and did a qualitative evaluation of the information.

Figure 2: Potential Contaminant Sources in OWASA's Water Supply Watersheds



The data show six types of PCSs in OWASA's water supply watersheds:

- Animal operations – these are the permitted facilities for animal waste operations consisting of swine, cattle, poultry, and horse farms which are required to have a certified animal waste management plan.
- Nondischarge permits – these are treatment facilities which do not discharge to a stream. Most of these in our watersheds were issued for single family residential treatment systems; there are also a couple stormwater systems permitted under this program.
- NPDES permits – these are treatment facilities which have a permit to discharge to a stream. As outlined in the "Water Quality Standards" section above, only discharges that have minimal impact on surface waters that can be permitted by a general permit are allowed in WS-II watersheds (no industrial or municipal facilities). Most of the permits issued in our watersheds are for single family residential waste systems.
- Pollution incidents – this database includes information on pollutants released to the environmental which may impact groundwater. Most of these in our watersheds are at service stations; it also appears that some are underground storage tanks which have leaked on residential property.
- Underground injection control permits – The permits issued in our watersheds were for geothermal heating and cooling systems at residences.
- Underground storage tanks – The permits issued in our watersheds are at gas stations.

Note: DWR did not include biosolids land application sites in their source water assessments.

DWR developed a contaminant rating for University Lake and Cane Creek Reservoir based on the number of PCSs in the watershed and the risk rating they assigned for each PCS (higher, moderate, or lower). The overall contaminant rating was then based on the number of PCSs, their individual ratings, and their location within the watershed. Based on the criteria DWR established, both reservoirs were assigned overall contaminant ratings of "Lower".

DWR also assigned an inherent vulnerability rating to each watershed based on the watershed classification (WS-II for both), the location of our intakes on reservoirs (as opposed to streams), the amount of precipitation and slopes in the watershed, and turbidity and coliform data available from our WTP about the quality of water in our reservoirs. Based on this information, both Cane Creek Reservoir and University Lake were assigned an inherent vulnerability rating of "Moderate".

DWR then determined an overall Susceptibility rating for each watershed based on the Contaminant rating and the inherent vulnerability ratings. Only watersheds that were assigned a "Lower" contaminant rating and inherent vulnerability rating were assigned a "Lower" overall Susceptibility rating. Thus, both reservoirs' overall Susceptibility rating is "Moderate". Table 1 summarizes the ratings assigned by DWR as outlined above.

Table 1: DWR's Source Water Assessment Summary for Cane Creek Reservoir and University Lake

Reservoir	Contaminant Rating (based on number, types, and location of PCSs in watershed)	Inherent Vulnerability Rating (based on WS-II, reservoir intake, water quality data)	Susceptibility Rating (based on other two ratings)
Cane Creek Reservoir	Lower	Moderate	Moderate
University Lake	Lower	Moderate	Moderate

House Bill 894

In response to the accidental chemical release in West Virginia that resulted in a "do not use" advisory for residents in the Charleston area and to coal ash spills in North Carolina, the North Carolina General Assembly enacted House Bill 894 in 2014 (NC General Statute 130A-320(c)). The law requires public water supply systems to develop and implement a source water protection plan (SWPP). DWR drafted rules to implement the statute and held meetings in 2016 to discuss that initial draft of the rules; staff actively participated in those 2016 meetings. Email correspondence with the Division indicates they have draft rules and a fiscal note that have been approved to move forward in the rule making process. They estimate that the rules will be published for public input in mid-May 2018.

The initial draft rule requires the following elements in a SWPP (Note: without access to draft rules that will move through the rule-making process, staff is uncertain if the same basic elements remain):

- List of PCSs
- Strategy that outlines our planned response to contamination of one of our water supplies
- Evaluation of our ability to isolate the contamination
- Outreach efforts to PCSs in our watersheds to notify us of any spills
- Documentation of proactive strategies to protect our water supplies
- Communication strategy on source water protection planning status, communication with neighboring utilities and publication of proactive strategies

Orange County Local Emergency Planning Committee

Orange County Emergency Services has established the Local Emergency Planning Committee to develop a hazardous materials emergency response and preparedness plan for Orange County and establish procedures for public information and outreach. OWASA has been actively participating in these meetings and provided the County with data to identify PCSs in our watersheds.

If a spill happens in one of our watersheds, the County is the lead responder. OWASA may provide support with our spill trailer; in addition, OWASA provides the local fire districts with containment booms since they typically are onsite before we are.

Water Quality Monitoring

OWASA performs weekly water quality monitoring in University Lake and Cane Creek Reservoir. This monitoring provides the water treatment plant operators with valuable information on which reservoir(s) to pull water from, which intake we should use in each reservoir, and decision making regarding treatment. We collect depth integrated samples of algae from the photic zone (depth which light reaches) which are identified to genus level, measure cyanotoxins during the spring, summer, and early fall, and collect profiles of the water quality through the water column at one-meter intervals for temperature, dissolved oxygen, pH, chlorophyll-a, phycocyanin (the pigment present in cyanobacteria) and conductivity.

OWASA actively participates in the Triangle Area Water Supply Monitoring Project (TAWSMP). The US Geological Survey performs the sampling for this Partnership which began in 1988. The TAWSMP samples area water supply reservoirs and tributaries to them to identify trends in water quality parameters and monitor for parameters of emerging concern. Scopes of work were developed for each phase of the TAWSMP which include parameters which remain the same from phase to phase such as nutrients, chlorophyll a, major ions, and total suspended solids as well as parameters of interest for that particular phase. The Project is currently in phase VIII, and this phase is focusing on bromide, chromium, and 1,4-dioxane. The group is also following current research on per- and polyfluoroakyl substances (PFAS).

OWASA performs sampling when topics of interest arise. For example, we completed special monitoring for PFASs in our raw water, drinking water, Morgan Creek, and in our wastewater treatment plant effluent when researchers from Duke University found some of those substances in our drinking water. Further information was provided to the Board of Directors on February 22 and March 8, 2018.

OWASA partners with others to obtain data on emerging issues through our membership in the Urban Water Consortium (UWC), a group of the larger utilities in North Carolina who fund research on matters of importance to water utilities. This partnership enables us to cost-effectively fund studies of interest. One study that UWC is currently funding is with a researcher at NC State University to monitor algal toxins in water supply reservoirs using a method that integrates toxin levels over two to four week periods of time. The method allows for constant monitoring as opposed to grab samples which provide one snapshot in time. OWASA elected to provide additional funding to the researcher to obtain data on University Lake and Cane Creek Reservoir. We anticipate receiving the data from this study later this calendar year.

Professional Associations

OWASA is a member of various water and wastewater organizations, and our employees review their publications and research and attend state and national conferences sponsored by these groups. The research funded through these associations, presentations provided at conferences, and the networking opportunities that these associations offer enable staff to stay abreast of current water resources issues in general and on emerging contaminants. OWASA has participated frequently in utility surveys or provided other data for research sponsored by these associations.

Conclusion

Staff believes that the strategies described above work together to protect our drinking water reservoirs and enable us to provide safe drinking water to our customers:

- Development Restrictions - Orange County and the Town of Carrboro have placed development restrictions in the Cane Creek Reservoir and University Lake watersheds that exceed state requirements and only allow those uses which may have minimal impact on our water supplies. For the growth that is allowed, both the Town and County require stringent stormwater controls.
- Water Quality Monitoring – OWASA monitors its reservoirs on a weekly basis to help us make operational decisions to prevent treatment issues and taste and odor concerns. We proactively partner with neighboring utilities to cost-effectively monitor our watersheds for parameters of emerging concern and to continue to monitor for metals and nutrients to identify trends in water quality over time.
- Research – OWASA funds university researchers on issues of emerging concern through our participation in the Urban Water Consortium. We also fund research or provide data and information for research through our memberships in various professional organizations.
- Other Requirements – OWASA will be developing a Source Water Protection Plan in accordance with forthcoming regulations to implement House Bill 894.
- Other Initiatives – OWASA actively plans with its Orange County partners and neighboring utilities for emergency scenarios through Orange County Emergency Planning Committee and through the Jordan Lake Partnership and its forthcoming successor. OWASA is also actively participating in the Jordan Lake One Water Association (JLOWA) which is addressing water quality in Jordan Lake through a stakeholder process. Since our watersheds lie within the Jordan Lake watershed, recommendations from JLOWA could further protect our local water supplies.

Staff recognizes that there may be other steps we can take to protect our reservoirs and look forward to discussing source water protection with the Committee.