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)
Bruce Boehm
Jody Eimers
John Morris
Yinka Ayankoya (*ex officio*)

THROUGH: Ed Kerwin

FROM: Ruth Rouse

DATE: September 7, 2018

SUBJECT: September 11, 2018 NRTS Committee Meeting

The NRTS Committee will meet on Tuesday, September 11, 2018 at 5:00 pm in the OWASA Boardroom. The purpose of the meeting will be to continue the discussion on source water protection with an emphasis on per- and polyfluoroalkyl substances (PFAS).

The enclosed document provides additional background information.

We look forward to seeing you on September 11 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: Background Information
Attachment 2: Draft Sampling Plan Options for Per- and Polyfluoroalkyl Substances in Cane Creek Reservoir Watershed

Attachment 1: Background Information

On May 8, 2018, the Natural Resources and Technical Services Committee (NRTS) met to discuss source water protection. The agenda from that meeting included background information on source water protection, and the meeting discussion centered around water quality monitoring, biosolids application in the Cane Creek Reservoir watershed, and per- and polyfluoroalkyl substances (PFAS) (see meeting summary). The Committee requested staff provide the following information regarding biosolids:

- Location, magnitude, timing, and quality of Class B biosolids applied in the Cane Creek Reservoir watershed
- Any differences in requirements for biosolids between class WS-II and WS-III watersheds (note: Cane Creek Reservoir and University Lake are WS-II water supplies which means they are relatively undeveloped and protected; WS-III allows higher density development but is more protective than WS-IV water supplies).
- Information on riparian buffer requirements for biosolids application.

This attachment provides information about these questions along with a brief background about studies regarding PFAS by regulatory agencies and university researchers in North Carolina. Attachment 2 contains a draft sampling plan to characterize PFAS in the Cane Creek Reservoir watershed as requested by the Committee.

Biosolids Application in the Cane Creek Reservoir Watershed

The City of Burlington has fields permitted for the application of Class B biosolids in the Cane Creek Reservoir watershed and provided the data in Table 1 (their data used to generate the graphic in Figure 1); Figure 2 below illustrates the field locations. Figure 3 illustrates previous monitoring by researchers at NC State University, US EPA, and others for PFAS on tributaries to Cane Creek Reservoir (presentation at 2015 NC AWWA-WEA conference; data have not been published).

Figure 1: Summary of City of Burlington Class B Biosolids Applied in Cane Creek Reservoir Watershed

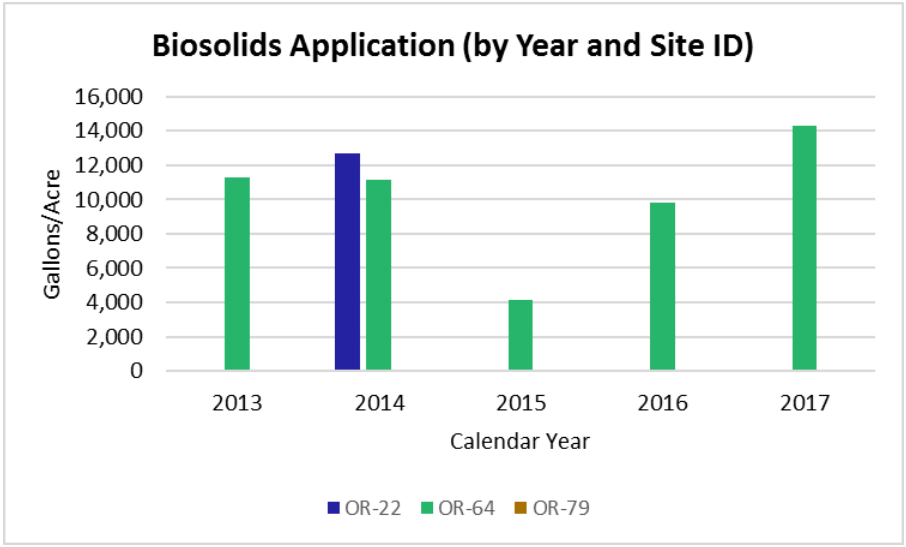


Figure 2: City of Burlington Class B Biosolids Application Sites in Cane Creek Reservoir Watersheds

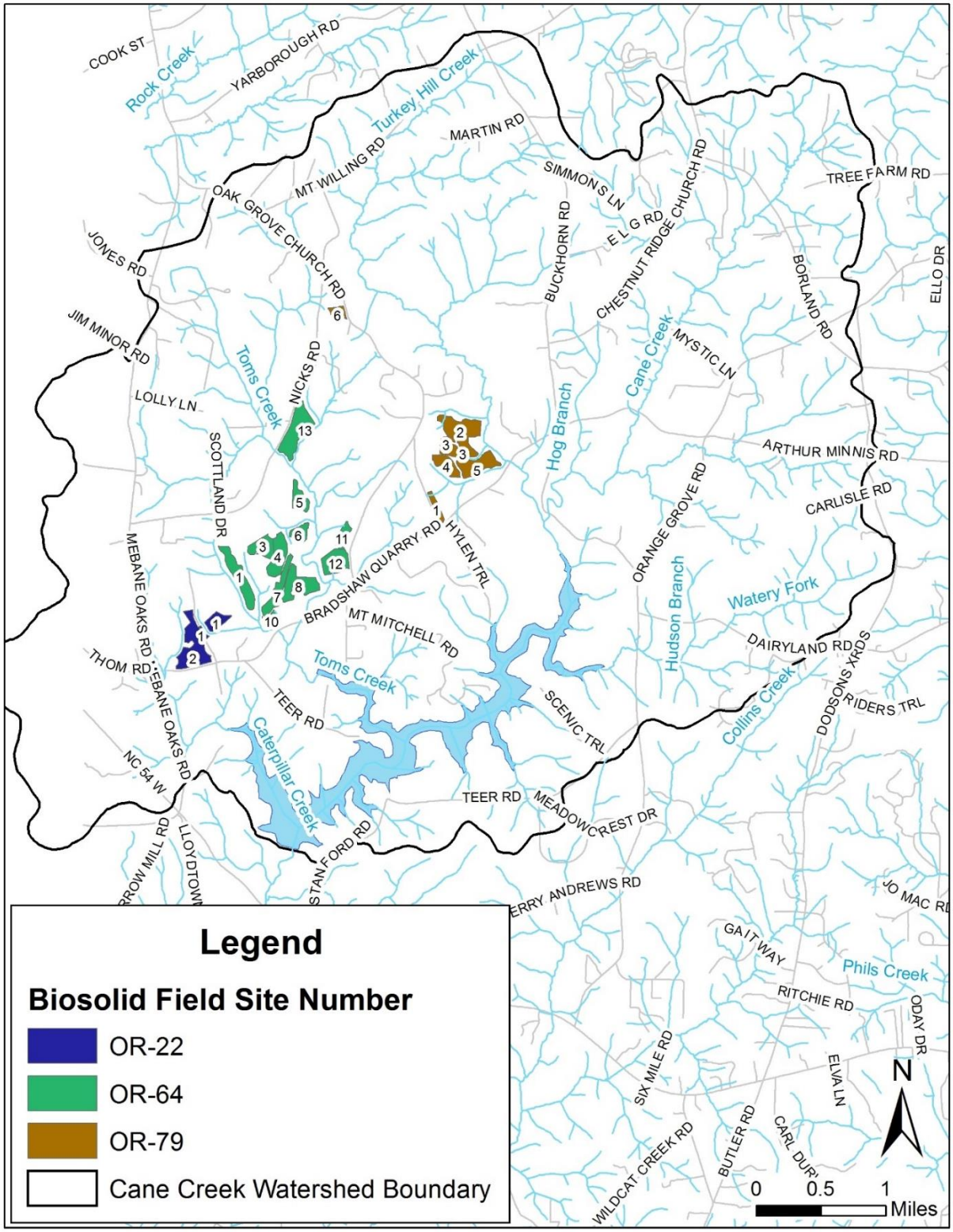


Figure 3: PFAS Sampling by Lindstrom et al. in Cane Creek Reservoir Watershed

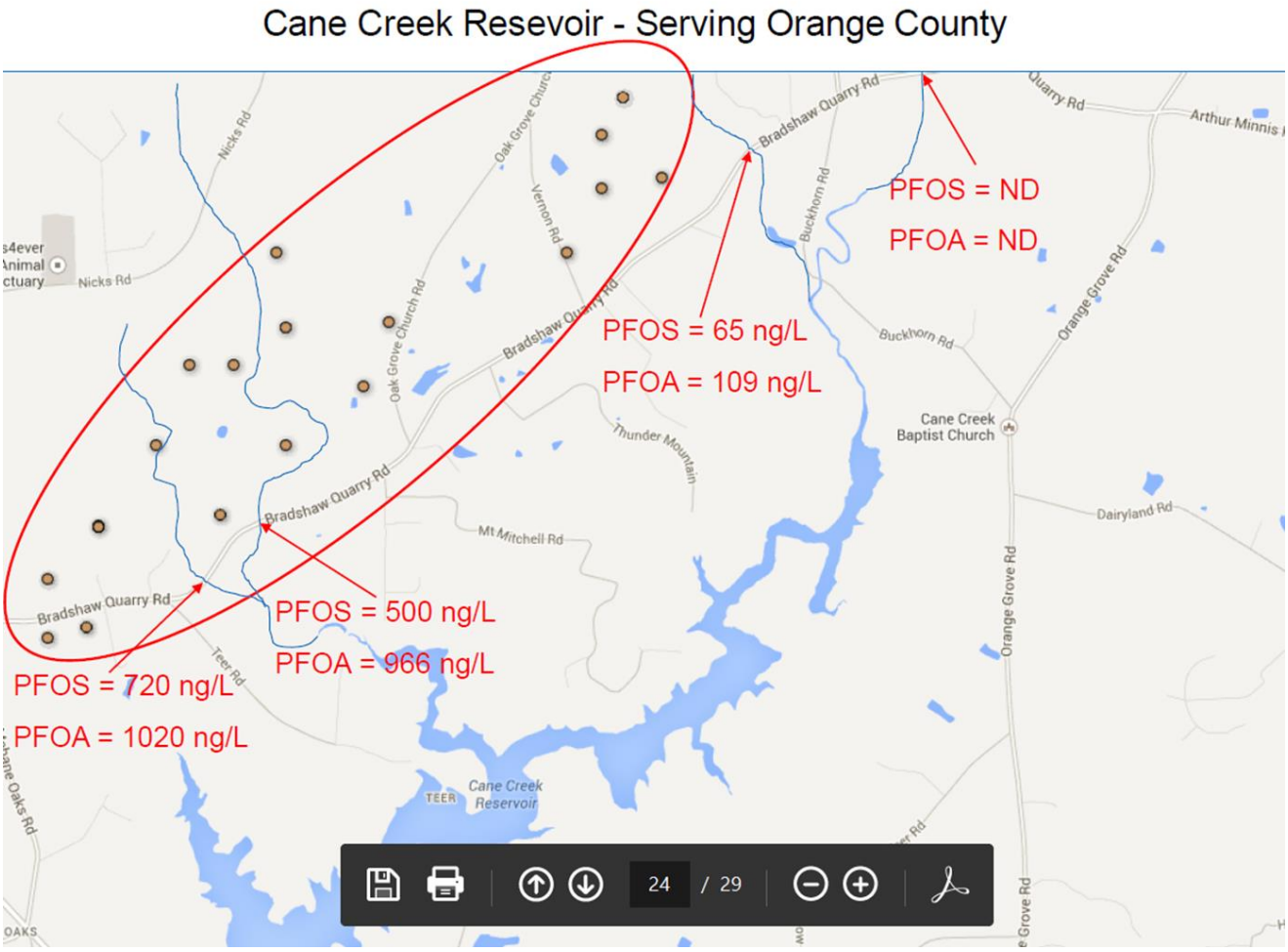


Figure from "Municipal Waste Water Treatment Plant Biosludge Applications and Perfluoroalkyl Acid Surface Water Contamination in North Carolina", presented by Lindstrom et al at NC AWWA-WEA Conference on April 13, 2015

Table 1: City of Burlington Class B Biosolids Application in Cane Creek Reservoir Watershed

Site ID	Field #	2017 (gal/ac-yr)	2016 (gal/ac-yr)	2015 (gal/ac-yr)	2014 (gal/ac-yr)	2013 (gal/ac-yr)
OR-22	1	0	0	0	13,813	0
	2	0	0	0	12,226	0
OR-64	1	15,584	23,785	0	8,817	14,473
	3	20,745	11,064	12,908	13,369	21,986
	4	23,327	8,649	10,484	14,153	15,750
	5	21,914	0	0	13,000	8,503
	6	20,348	0	0	26,565	0
	7	17,804	9,326	3,109	0	12,939
	8	0	0	0	9,349	0
	10	24,700	20,800	20,800	20,800	18,600
	11	0	0	0	16,111	0
	12	0	15,476	16,095	11,762	15,943
	13	19,369	11,982	0	10,013	13,778
OR-79	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0

Based on the records shared by the City of Burlington, they are in compliance with their biosolids application permit.

It should be noted that Class A biosolids are likely applied in both the University Lake and Cane Creek Reservoir watersheds. Class A biosolids facilities are required to keep records of the amount of Class A biosolids they sell along with purchaser name and address. However, they have no control over whether the biosolids are applied at the address provided. Staff called several local utilities and some did have records of sales in Orange County, and some of those sales were to addresses in our watersheds. However, much of this data is not available in a format which is readily analyzed.

North Carolina Regulations Concerning Biosolids

The NC Department of Environmental Quality's (DEQ) regulations concerning biosolids are found in 15A NCAC 02T. Prior to September 1, 2018, application of both Class A and Class B biosolids must be set back 100 feet from intermittent and perennial streams and 25 feet from ephemeral streams (perennial streams have flow in them year-round, intermittent streams have flow in them periodically, and ephemeral streams have flow in them only during storm events). The newly readopted rules set the Class B reduced the intermittent and perennial stream setbacks to 32.8 feet and Class A remains at 100 feet. The State indicated that G.S. 150B-19.3(a) prohibits

agencies from adopting a rule that imposes a more restrictive standard, limitation, or requirements than those imposed by federal law or rule. There is no federal setback requirement for Class A residuals for intermittent and perennial streams, hence the existing 100-foot State requirement remains. The main difference between Class A and Class B biosolids is in the pathogen reduction requirements. Much more stringent pathogen reduction is required for Class A since they can be sold or given away and have greater potential for human contact. In order to achieve these higher amounts of pathogen reduction, a Class A biosolids facility must meet minimum criteria for heating the biosolids. There are no differences in requirements for biosolids applications in class WS-II and WS-III streams; application is not allowed in the critical area (within ½ mile of the reservoir at full pool elevation) of either watershed classification.

PFAS Research and Regulations

The US Environmental Protection Agency (EPA) is exploring options to address PFAS. As part of this initiative, EPA held several listening sessions across the country over the summer of 2018. Information from the summit held in Fayetteville, North Carolina on August 14, 2018, including presentations, is here. The National Association of Clean Water Agencies recently provided comments to EPA, which are consistent with the position that many utilities have taken with respect to PFAS and other unregulated contaminants, that strongly supports federal leadership from the EPA in developing appropriate response that reflects the risks posed by PFAS.

This summer, the North Carolina General Assembly appropriated $5 million in funds to test drinking water at public water supplies across the state for PFAS and included air quality sampling since air emissions can transport PFAS in the environment. The North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill is coordinating this research and will use universities across the state to collect the data. The Collaboratory will award grants to more than 20 researchers at multiple NC universities to conduct baseline water quality testing and begin work on related research projects aimed at:

- Sampling public water sources statewide to establish a baseline and monitoring protocol moving forward.
- Examining air emissions to better understand how air particles may impact water on and under the ground
- Developing models to predict which private water wells are at greatest risk of PFAS contamination
- Assessing the impact of PFAS on public health and testing the performance of technologies in removing them.

In addition to intensive monitoring near the Chemours facility and downstream drinking water facilities, DEQ is conducting ambient monitoring for PFAS across North Carolina. Thus far, this has included monthly monitoring of the Jordan Lake watershed January through June 2018 and monthly monitoring of the Falls Lake watershed monthly May through October 2018.

OWASA is a member of the Triangle Area Water Supply Monitoring Project (TAWSMP). The US Geological Survey (USGS) 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. The group is following current research on PFAS and discussing the possibility of having USGS include PFAS monitoring as part of this effort.

Attachment 2: Draft Sampling Plan Options for Per- and Polyfluoroalkyl Substances in the Cane Creek Reservoir Watershed

Purpose

Sampling plan to further characterize per- and polyfluoroalkyl substances (together, PFAS) in Cane Creek Reservoir.

Background

In January 2018, OWASA proactively collected samples for analysis of PFAS. These tests measured the level of 39 PFAS in OWASA's raw source waters, treated drinking water, and treated wastewater effluent as well as the raw well water source for Cane Creek Reservoir Recreation Facilities water system, process water within the water treatment plant, and Morgan Creek upstream of the wastewater effluent discharge.

These recent test results help to assure that OWASA's treated drinking water is safe to drink (summarized in a memo to the OWASA Board of Directors for the February 22, 2018 meeting), with levels of PFOS and PFOA well-below US Environmental Protection Agency (EPA) Health Advisory Levels (HAL). Nonetheless, elevated levels of PFAS detected in the raw water sample from Cane Creek Reservoir raise questions as to the potential impacts of the land application of biosolids as a potential carrier of PFAS within the watershed.

Several properties within the Cane Creek Reservoir watershed are permitted for land application of Class B biosolids. In addition to the January 2018 monitoring that OWASA conducted, previous monitoring by researchers at NC State University, US EPA, and others indicated that some tributaries to Cane Creek Reservoir have higher levels of some PFAS than other tributaries (presentation at 2015 NC AWWA-WEA conference available here). Figure 1 shows the location of their sampling locations in the Cane Creek Reservoir watershed. To better understand the potential fate and transport of PFAS in the Cane Creek Reservoir watershed, the OWASA Board of Directors requested options for a sampling plan of the Cane Creek Reservoir and its tributaries, as well as the corresponding costs of these options.

Figure 1: PFAS Sampling by Lindstrom et. al in Cane Creek Reservoir Watershed

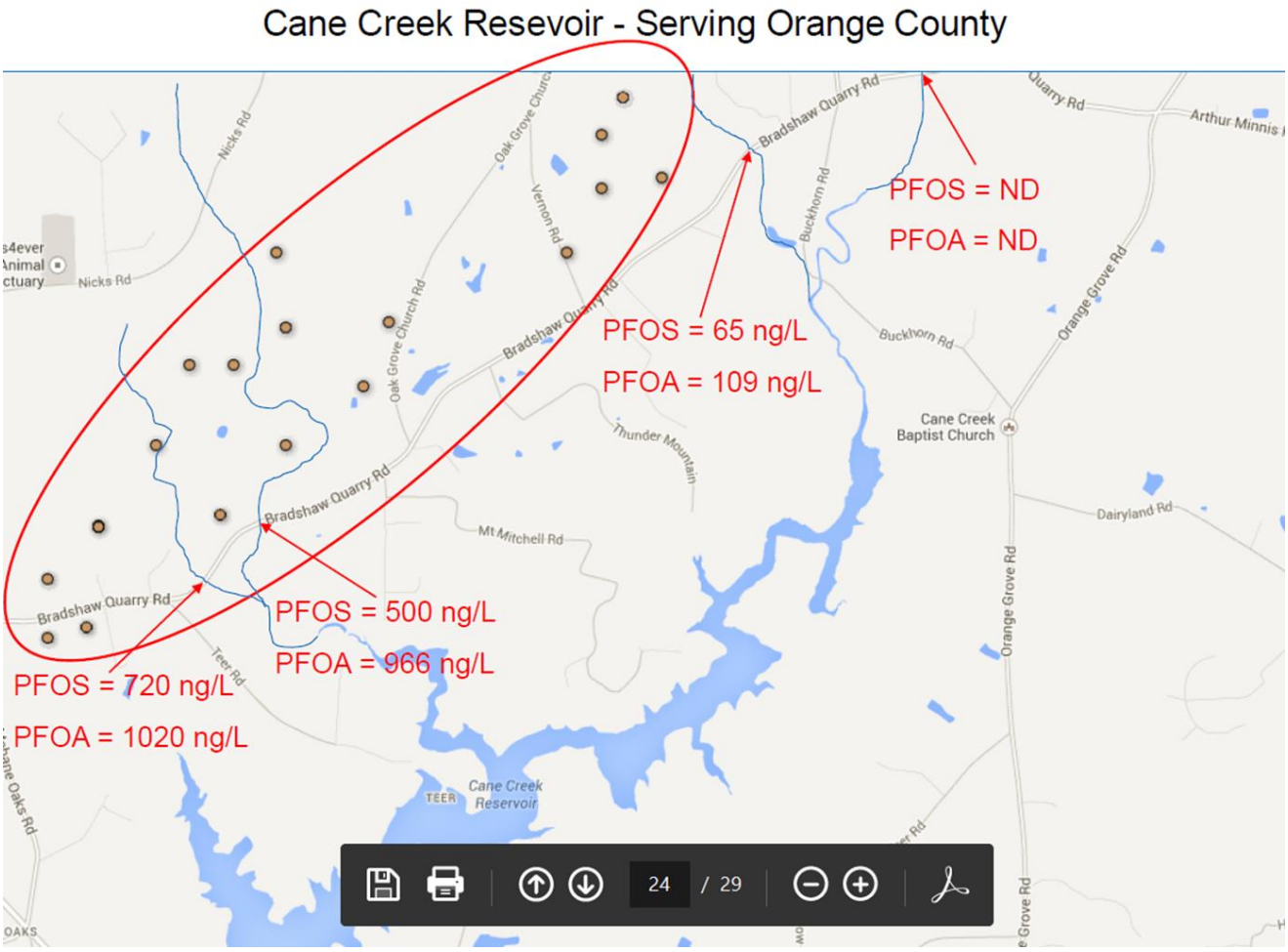


Figure from "Municipal Waste Water Treatment Plant Biosludge Applications and Perfluoroalkyl Acid Surface Water Contamination in North Carolina", presented by Lindstrom et al at NC AWWA-WEA Conference on April 13, 2015

Sampling Plan Options

Below are three reasonable options for initial characterization of PFAS levels in Cane Creek Reservoir (and possibly tributaries feeding Cane Creek Reservoir). OWASA does not have the necessary equipment or expertise to analyze these samples internally. The costs are based on estimates from a contract laboratory. The cost estimates do not include staff time to collect the samples, which is estimated to take about ½ day per sampling event. For safety and data quality purposes, it is recommended that two OWASA staff members collect each sample. Alternatively, sampling could be contracted out. Data interpretation, analysis, and reporting will require additional staff time.

While the options vary in frequency and sampling intensity, all will provide additional information about the PFAS levels in Cane Creek Reservoir. For purpose of each location type and specific locations, see Proposed Sampling Locations section and Figure 2.

1. **Quarterly sampling at Cane Creek Reservoir Intake**
   Raw water at the intake (A) will be sampled quarterly to assess levels in the reservoir,

representing the water pumped to the Jones Ferry Road Water Treatment Plant (WTP). A total of four samples would be taken per year at an estimated cost of about $2,000 per year. This option will provide seasonal information about PFAS levels at minimal cost.

2. **Monthly sampling at Cane Creek Reservoir Intake**
   Raw water at the intake (A) will be sampled monthly to assess levels in the reservoir, representing the water pumped to the WTP. A total of twelve samples would be taken per year at an estimated cost of about $6,000 per year. Option 2 increases the resolution of seasonal data of Option 1 for three times the cost.

3. **Quarterly sampling at Cane Creek Reservoir Intake and at Three Tributaries**
   In addition to sampling the intake (A) representing the water pumped to the WTP, three tributaries will be sampled quarterly. Tributaries were selected from three categories based on accessibility:
   - passes near permitted Class B biosolid land application site(s) (B),
   - passes near permitted Class B biosolid land application site(s), but there have been no recent applications (C), and
   - in an area without any known biosolid application sites (D).

   This option would require at least two full days of sampling every quarter and would result in a total of sixteen samples at a cost of about $8,000 per year. It would provide seasonal trends, provide a comparison of the impact of transport from various active land application sites with each other as well as a control site and provide insight into the persistence of PFAS in the environment once land application activities cease.

In addition to the Cane Creek Reservoir and tributary samples proposed in the three options above, staff suggests collecting a treated drinking water sample as part of each sampling event. Cost would range from $2,000 to $6,000 per year depending on if quarterly or monthly sampling is selected.

Proposed Sampling Locations

Staff proposes the following locations to meet the location criteria described above. The proposed sampling sites are shown on the map below.

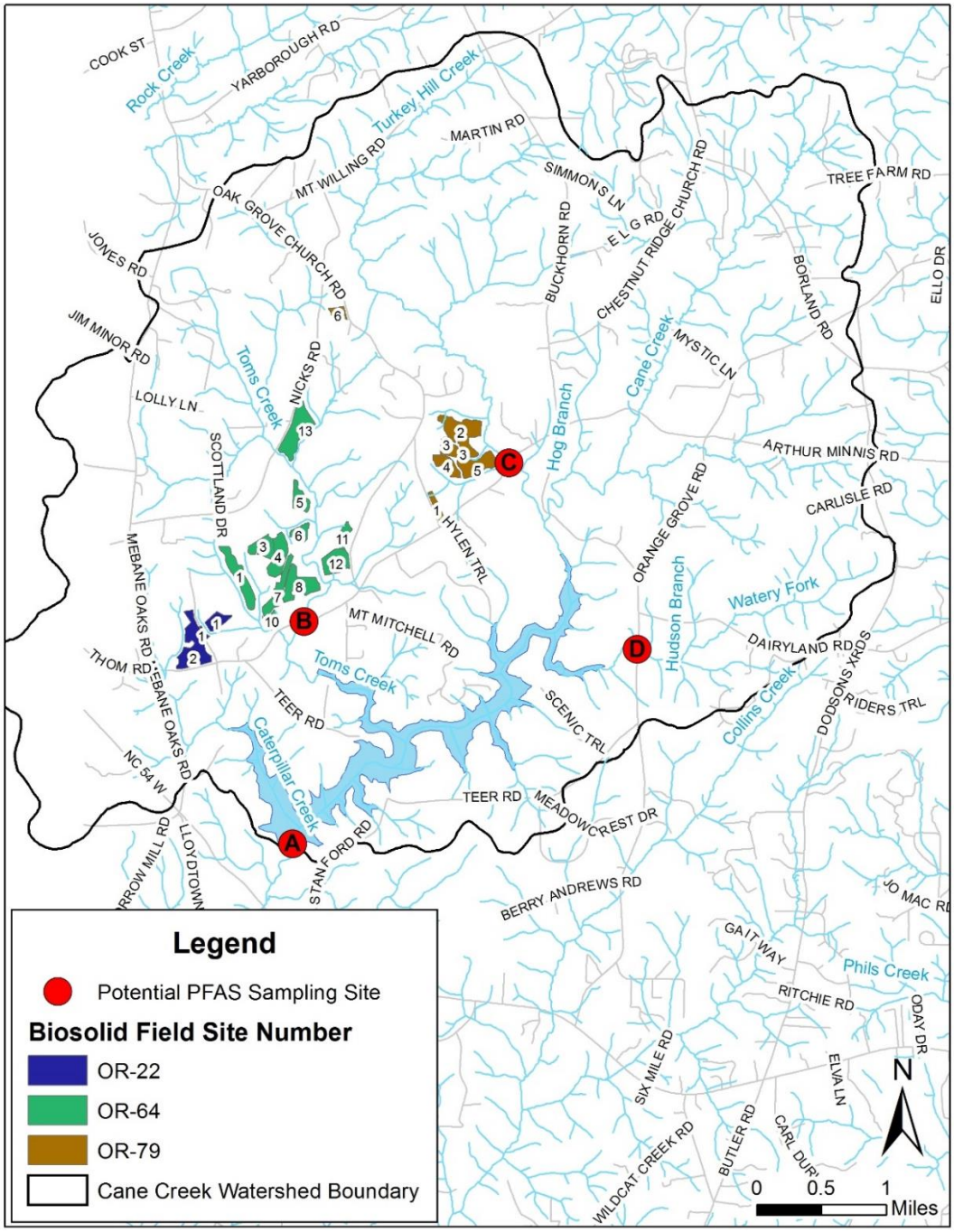
(A) Raw water intake: assess PFAS levels in the reservoir, representing the water pumped to the Jones Ferry Water Treatment Plant (WTP). It is possible that any seasonal/temporal variability in loading may be masked in the reservoir due to volume, mixing, and residence time. Quarterly sampling will provide information on any seasonal variability and monthly sampling will provide finer resolution information on seasonal/temporal variability.

(B) Toms Creek at Bradshaw Quarry Road - Tributary passing near permitted Class B biosolid land application site(s) with recent applications (biosolids applied to fields shown in green on map as recently as 2017): assess seasonal PFAS levels and loading to Cane Creek Reservoir. (Note: the City of Burlington has not land applied in the Cane Creek Reservoir watershed recently and are discussing the possibility of not using their permitted fields in the Cane Creek Reservoir watershed. Prior to sampling, staff should check the status of Burlington's land application program in the watershed).

(C) Turkey Hill Creek at Bradshaw Quarry Road - Tributary passing near non-active permitted Class B biosolid land application sites (no biosolids applied on fields shown in brown on map since at least 2013): assess PFAS levels and loading to Cane Creek Reservoir after a period without land application of biosolids. Prior to sampling, staff should make sure that no biosolids applications have occurred at the site recently.

(D) Watery Fork at Orange Grove Road - Tributary in an area without any known biosolid application sites: assess levels in tributaries not receiving runoff from known biosolid land application sites.

Figure 2: Proposed Sampling Locations for PFAS Sampling Plan Options



Discussion

Protecting and investing in the quality of our water supply is one of the most important responsibilities and tools that OWASA has in ensuring clean drinking water for the community we serve. And as with any investment that we make, these efforts must be prioritized based on the likelihood of occurrence, the impact, and the associated level of risk.

Initial monitoring shows occurrence of PFAS in the Cane Creek Reservoir. Each of the options presented above would provide increased seasonal data on levels of PFAS in the Cane Creek Reservoir (i.e., more detailed information on the occurrence). These analyses are not required by law and would be a proactive, yet limited investigation.

The other consideration in making an investment of ratepayer funds and staff time is the associated impact/risk. Previous analysis showed that the levels of PFAS in treated OWASA drinking water were well below the EPA Health Advisory Limit. While increased time series on PFAS levels in the Cane Creek Reservoir would provide additional insight into seasonal variation, the results would be somewhat limited and speculative. Even as the frequency and locations of testing are increased, no testing option leads to specific or actionable information that aligns with the risk.

The current EPA Contaminant Candidate List (CCL 4) identifies 97 chemicals or chemical groups and 12 microbial contaminants that are currently not subject to any proposed or promulgated regulations, but are known or anticipated to occur in public water systems. Continuous testing for each of these compounds or other unregulated compounds would come at a high cost. Furthermore, the results would lack guidance from the scientific research and the EPA on how to interpret them and/or efficient and effective ways to respond. Collection of data without context or goals makes interpretation and determination of significance difficult.

Recommendation

While additional "OWASA only" sampling and testing for PFAS is not required, staff believes additional monitoring of PFAS at the Cane Creek raw water intake with concurrent sampling of treated drinking water leaving the Jones Ferry Road Water Treatment Plant for the next year or so is a reasonable, proactive next step (option 1 or 2). Staff recommends one of these options over option 3 for the following reasons:

1. From a utility management perspective, monitoring at our intake provides us information on the quality of the water we are treating and actions we may need to take to provide quality drinking water to the community. Staff is not clear what actions or policy decisions will be guided by data collected on tributaries to Cane Creek Reservoir.
2. Monitoring at our intake and in our drinking water is fiscally responsible. Monitoring regularly enables us to determine if levels of PFAS are changing at the intake or in our treated drinking water. If levels increased, we may then want to consider tributary monitoring to identify potential carriers of PFAS.
3. There is a lot of ongoing research at the federal and state levels regarding PFAS and other emerging contaminants. This ongoing research may help inform any future monitoring programs. Monitoring at the intake also aligns with the monitoring being proposed by the NC Policy Collaboratory.

4. The members of the Triangle Area Water Supply Monitoring Project continue to discuss the potential addition of PFAS monitoring which would include monitoring on Cane Creek and Morgan Creek as well as at our intake structures.

Staff will continue to monitor the ongoing research and policy initiatives occurring at the state and federal level on PFAS and other emerging contaminants and keep the Board informed of any new developments in this area.