Neuse River Compliance Association®
P.O. Box 1410
Clayton, N.C. 27528 - 1410

April 29, 2022

Mr. Richard Rogers, Director
Division of Water Resources, NCDEQ
1617 Mail Service Center
Raleigh, N.C. 27699 - 1617

Dear Mr. Rogers:

On behalf of the Neuse River Compliance Association ("NRCA") we respectfully submit the attached comments on the Draft NPDES Permit # NC0026441, Town of Siler City, currently advertised for public comment.

The NRCA members are comprised of local governments and other major owners of wastewater treatment facilities (see attached member list) in the Neuse River Basin. Our members have continued to improve water quality in the Neuse River and its estuary by reducing their nitrogen discharge as a group well over 70% since 1995 by investing more than $500 million in facility improvements to address nitrogen loading of the Neuse River Estuary. The membership collectively holds 28 NPDES Permits.

Attached are comments on the proposed "Total Organic Nitrogen" (TON) limit proposed in the draft permit which presents a new condition never issued in a permit in North Carolina to our knowledge. We fail to understand how this proposed limit is substantiated in the Fact Sheet provided with the permit and poses protection to the stream superior to what a total nitrogen limit of 3.0 mg/L would provide. The NRCA supports the other conditions of the draft permit, NC0026441, for the Town of Siler City, simply not with an unprecedented TON limit which could potentially set a new unnecessary standard for all NRCA NPDES permit holders.

Thank you for the opportunity to submit our comments. If you require any additional information please let us know.

Sincerely,

Barry Parks

Barry Parks, Chairman

Enclosure
cc: LNBA/NRCA Board

Neuse River Compliance Association (NRCA)
Discussion and Objection to Total Organic Nitrogen Limit
Town of Siler City, N.C., Permit # NC0026441

The Siler City Draft Permit for the 6.0 MGD expansion has a regulatory regime that replicates the same nitrogen controls as those applied to the NRCA members. It sets a Total Nitrogen annual poundage limitation using the same methodology as that applied to the NRCA members. In the permit and accompanying Fact Sheet, DWR doesn't demonstrate that the Siler City Draft Permit to be based on site-specific criteria. In addition to the regulatory regime used for NRCA members, the Siler City Draft Permit for the 6.0 MGD WWTP adds a new condition to regulate Total Organic Nitrogen (TON). Consequently, the NRCA members have a substantial interest in the novel approach to nitrogen loading included in the draft permit issued to Siler City. The NRCA is concerned, that without rule making or a site-specific basis for the new WQBEL (Water Quality Based Effluent Limit), DWR will adopt a new Water Quality Standard to be applied to NRCA NPDES permits. The promulgation of the new WQS will cause substantial prejudice to the NRCA members.

DWR has confirmed to the NRCA that no wastewater treatment facility (municipal) in N.C. has had a separate permit condition created to address the discharge of Total Organic Nitrogen or any permit that regulates TON to address the in-stream dissolved oxygen water quality standard from nitrogenous oxygen demand. Consistent with 15A NCAC 2B .0212, the draft permit includes a limit on the dissolved oxygen discharge. DWR made no showing as to why the dissolved oxygen permit limit is inadequate to protect the water quality standard. Because the establishment of a WQBEL to supplement the existing limits on Total Nitrogen and dissolved oxygen, it could establish a precedent, with substantial prejudice to the NRCA members, in applications for NPDES permit renewals or expansion**. Accordingly, the NRCA respectfully requests that the draft permit be amended to remove the Total Organic Nitrogen limit as set forth in Part I. A. (2.) a. of the Draft Permit.**

The NRCA incorporates the attached review of the Siler City draft permit (and supporting documentation attached). The NRCA respectfully submits that the cited permit condition exceeds the authority of DWR as it is inconsistent with the rules authorizing the review and issuance of NPDES permits as adopted by the N.C. Environmental Management Commission. The Fact Sheet fails to provide sufficient justification for the condition and the model (30 years old) was not adjusted to the changes in the receiving stream since 1991. See Fact Sheet p 9. The NRCA also relies on a DWR document "Draft Rocky River Interagency Meeting Notes" dated April 8, 2021 (copy attached).

The finding by DWR that a WQBEL to address the impact of Total Organic Nitrogen loading from the Siler City WWTP is appropriate lacks any showing that the DO WQS is not being met or that a supplement to the existing limit on DO is necessary with the current conditions of the receiving stream. The Fact Sheet (hereafter FS) shows that the only WQSs identified as impaired on the 303(d) list are benthos and mercury. See FS p 3. In the conclusory section of FS where DO is discussed, DWR stated that "the effluent does not appear to affect the instream DO." See FS p 6. The Compliance Summary does not show a violation of the DO WQS. See FS p.8. Despite that showing, DWR declares that the new condition is necessary for "[a]ssimilative capacity to protect the instream dissolved oxygen standard of 5.0 mg/L is based on prior stream modeling which showed that the receiving stream's dissolved oxygen is sensitive to organic nitrogen." FS p. 9. In the draft 303(d) report for 2022, DWR shows that the past listing for Dissolved Oxygen is being delisted based on more recent/new data. The identified segment of the Rocky River to be

delisted is 6.7 miles long and extends "From dam at lower supply reservoir for Siler City to Varnal Creek." The EMC approved methodology for delisting "if there are less than 2 excursions in newer data that have not been previously assessed. If the 2022 assessment results in less than 10% exceedance rate and the water was on the 2020 303(d) list, the water will be delisted if there is greater than 40% statistical confidence that there is less than a 10% exceedance of the criterion or if there are less than 3 excursion of the criterion in new data that have not been previously assessed."

Based on the Fact Sheet, DWR relied exclusively on the Division's 1991 *Rocky River Subbasin Nutrient Budget* report to determine that a WQBEL was necessary to "further address nutrient loadings as well as protection of the dissolved oxygen water quality standard for organic nitrogen, summer (April-October) limits of 3.0/4.5 mg/L monthly average/weekly average NO_2+NO_3 will be added to the permit at the 6.0 MGD flow tier." FS, pp 12-13. Also see the attached review at page 1. In the discussion, DWR omitted any discussion of the changes to the hydraulic system, in particular the removal of a dam. The attached report sets out the multiple changes in the stream, including the expansion of an upstream reservoir on the Rocky River and the removal of the downstream Hoosier Dam in 2018. In its 2021 meeting notes, DWR stated that the Dissolved Oxygen (DO) "[W]ater quality impairments in Rocky River because of water being released from the bottom of pool behind the old Hackney mill dam (USGS, DWR ambient station) during low flows and when water is not flowing over the dam. In the same part of the FS, DWR states that, based on the October 2020 *Wastewater Nitrogen Removal Optimization Plan Results and Recommendations,* the WWTP "can achieve the target effluent concentration of 15 mg/L or less TN as specified in the Settlement Agreement." That information contradicts the determination that the new WQBEL to control Total Organic Nitrogen would address an impact on dissolved oxygen water quality that is caused by the Siler City NPDES discharge.

Based on the review of DWR files, the NRCA located the May 16, 1991 Siler City Modeling report letter from J. Trevor Clements to Mr. Jim Greenfield, U.S. EPA Waste Load Coordinator. See attached review, pp 3-4. While the FS makes no reference to this document, the attached review sets out the reasons to conclude that it was used by DWR in making the decision to add the WQBEL for TON to the permit. In addition, the materials rely on the conditions in 1991, instead of when the FS was prepared. However, the two 1991 documents identified in the attached review neither recommended permit limits for organic nitrogen.

In its discussion of the WQBEL for the TON loading, DWR states: "The resultant limits are considered technologically feasible." DWR does not explain what technology can achieve the reductions. WWTP are not designed to, or capable of, removing organic nitrogen. Instead, the treatment process typically converts most organic nitrogen to inorganic nitrogen. However, recent literature has noted dissolved organic nitrogen can be present at increasing percentage (up to 85% because of the reductions of nitrate – nitrite to nitrogen gas) in the effluent because of upgrades with biological nutrient removal and advanced treatment to meet more stringent discharge limits of nutrients." See attached review 6., p 2. While the expanded WWTP will include UV treatment of the wastewater stream, that technology is in use by numerous members of the NRCA. It does not treat and reduce the amount of TON discharged by their facilities.

The NRCA comments that the WQBEL permit condition restricting the discharge of Total Organic Nitrogen, for the reasons set forth herein, violates 15A NCAC 2H. .0107(c). DWR staff failed to review the supplemental information and other pertinent information when it included the TON condition. To the extent that DWR asserts that it did consider the supplemental and other pertinent information, it violated

15A NCAC 2H .0108 by failure to include and describe such information in the Fact Sheet. The NRCA further comments that the WQBEL permit condition is inconsistent with the statutory authority controlling the imposition of NPDES permit conditions in that DWR failed to show the condition is "necessary to effectuate the purposes of this Article," N.C. Gen. Stat. 143-214.1(b)(1). DWR failed to show that the TON condition is "necessary to achieve the purposes of this Article." See N.C. Gen. Stat. 143-215.1(b)(4)a. The new WQBEL is redundant of other permit limits, in particular the TN limits and the DO limits. **Accordingly, it serves no useful purpose for control of the pollutant identified as that pollutant of concern, but it will subject the permit holder to multiple penalty jeopardy for the same violation**.

The NRCA further comments that the foundation for using the WQBEL authority under the federal Clean Water Act is not shown by DWR. DWR made no showing that the TBELs in place to protect the dissolved oxygen WQS were not sufficient to protect water quality. "On the basis of the requirements of 40 CFR 125.3(a), additional or more stringent effluent limitations and conditions, such as WQBELs, are imposed when TBELs are not sufficient to protect water quality." Chapter 6. Water Quality-Based Effluent Limitations, NPDES Permit Writers' Manual, US EPA, p 6-1 (September 2010). DWR failed to show that it implemented the required process to determine when existing effluent limitations and existing effluent quality are not sufficient to comply with water quality standards.

In the justification for the WQBEL, DWR relies on "a wasteland allocation (WLA) based on a Level-C model run in 1991." FS p.9. The NDPES Permit Writers' Manual limits the authority to a WLA set through a TMDL or any pollutant associated with an impairment of the receiving waters. See p 6-13 and 6-14. As the NRCA showed above, there is no TMDL or Nutrient Sensitive Waters strategy for the receiving waters and the only 303(d) listed impairment is for benthos. See also Speculative Limits notification dated December 10, 2021 stating: "There are no specific permitting strategies or TMDL for this stream [Love's Creek]." As dissolved oxygen is not a pollutant of concern, DWR exceeded its authority when it relied on a "wasteland allocation" set without using the appropriate procedures. See N.C. Gen. Stat. 143-215.1(c1)-(c6) which establishes the default nutrient limits absent a calibrated nutrient response model and the adoption of a nutrient control strategy by the EMC..

The NRCA acknowledges that DWR has more latitude in the use of WQBELs for site-specific water quality criteria modification. However, DWR does not state the WQBEL TON in the Siler City NPDES permit condition is a site-specific water quality criteria modification. In addition, the TON permit condition did not meet either criterion set forth by US EPA, i.e. (1) toxicity of a chemical in the water at the site or (2) a species at the site more or less sensitive than those used in developing the natural criteria. See NPDES Permit Writers' Manual, Section 6.1.2.2. at p 6-9. Absent such a determination and basis for the permit condition, the NRCA believes that DWR may add a similar condition to the NPDES permits of its members.

In conclusion, the NRCA respectfully submits that the Draft Permit should be revised to remove the Total Organic Nitrogen limit, or in the alternative, DWR should amend the Fact Sheet to establish that the Total Organic Nitrogen limit is a WQBEL unique to the receiving waters and their condition. Furthermore, a total nitrogen limit of 3.0 mg/L is suitable for this permit to protect the receiving stream.

SAUBER
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April 15, 2022

Via Email

Haywood M. Phthisic, III Haywood Phthisic (exec.director@lnba.net)
Executive Director LNBA/NRCA
P.O. Box 1410
Clayton, N.C. 27528 – 1410

Reference: Requested Review Siler City NPDES Permit Limit for Organic Nitrogen
Permit Number NC0026411
March 22, 2022, Draft NPDES Permit Renewal& Expansion

Mr. Phthisic:

At your request, I have performed a cursory review of supporting information related to the Organic Nitrogen permit limits specified within the March 22, 2022, Draft Siler City NPDES Permit (Reference #1). The Draft Permit cover letter, signed by Gary Perlmutter of the DWR NPDES Municipal Permitting Unit, offers the following explanation for the inclusion of a permit limit for Organic Nitrogen: *"For protection of the instream dissolved oxygen water quality standard from nitrogenous oxygen demand, Total Organic Nitrogen limits of 3.0/4.5 mg/L monthly/ weekly average at 6.0 MGD with a weekly sampling frequency during the months April through October were added to the permit [See A. (2.)]."*

It is my conclusion, simply based on a review of the attached documents, that current DWR permitting staff generally accepted and applied a 30-year-old QUAL2E model performed by Mike Scoville based on conditions observed in 1990 to the construction of the Siler City Draft Permit in 2022. I have not discovered any additional documents that suggests DWR has remodeled this system using updated water quality models or updated information on the current conditions in the Loves Creek basin or changes in the Rocky River basin despite significant changes in upstream Reservoir controls and flow and the removal of a downstream dam. The DWR Municipal Permitting group may have additional modeling and wasteload allocation results that have been updated in recent years, but they are not evident to me. Requests can be made directly to the DWR for any additional records you deem pertinent to you needs as necessary for the LNBA/NRCA consideration.

Summary Points:

1. The March 22, 2022, Fact Sheet NPDES Permit No. NC0026441 (Reference #2) indicates that organic nitrogen limits were based on attainment of the dissolved oxygen standard using a DWR water quality model that is over 30 years old. Over the past 30 years, significant treatment upgrades in the Siler City wastewater treatment plant have occurred and significant changes in Loves Creek and the Rocky River have occurred. The Town of Siler City, various volunteer groups, and state granting agencies have supported extensive activities to improve the Loves Creek drainage area.
See: https://www.silercity.org/?sec=08922348-60b6-43bb-a1aa-355f62e9d770.

In addition to the restoration activities in the Loves Creek Watershed, extensive changes have occurred in the Rocky River. Changes of particular interest include the significant expansion of the upstream reservoir on the Rocky River (Charles L. Turner Reservoir Dam) and the removal of the downstream dam known as the Hoosier Dam (aka Woody Dam) in 2018. Reaves Lake, the reservoir created by the Hoosier Dam was noted to have elevated chlorophyll-a levels and was an impediment to natural fish movements and met the habitat recovery goals outlined for the Cape Fear shiner. The Dam was located on the Rocky River 5 ½ miles upstream of the confluence with the Deep River.

2. Siler City Organic Nitrogen NPDES limits appear to have originated with the Speculative Limits Letter to David David Honeycutt, P.E. McGill Associates, PA dated September 20, 2021 (Reference #3).
"BOD/NH3/TSS Limits. Assimilative capacity to protect the instream dissolved oxygen standard of 5.0 mg/L is based on prior stream modeling which showed that the receiving stream's dissolved oxygen is sensitive to organic nitrogen. The resultant limits are considered technologically feasible."

3. Previous Siler City NPDES Permits did not seem to include a limit for Organic Nitrogen. The Division seems to have notified Siler City of intentions to add Total Nitrogen limits to the permit on or about June 8, 2017, as mentioned in the October 17, 2018, Permit Modification Letter from Michael E. Templeton, P. E. Water Quality Permitting Section to Mr. Bryan Thompson, Town Manager, Town of Siler City (Reference #7) This letter indicated the Division will add Total Nitrogen limitations to the Siler City Permit.

4. Are there other NPDES facilities with organic nitrogen limits in NC? I am not aware of any NPDES permits containing effluent limits for Organic Nitrogen in North Carolina based on concerns for dissolved oxygen standards attainment. DWR NPDES staff may be able to answer this question. Typically, NPDES permits have limits for Total Nitrogen and Total Phosphorus when concerns are identified for the causal nutrient variables contributing to excessive chlorophyll-a.

5. Total Nitrogen is the typical measurement for NPDES permitting compliance because in-stream nitrogen concentrations can dynamically change forms because of the varying role of bacteria and other variables. In-stream measurements for organic nitrogen typically represent the nitrogen sequestered within algae cells and other biological components such as riparian soils and refractory humic compounds. Wastewater treatment processing typically converts most organic nitrogen to inorganic nitrogen. That said, recent literature has noted dissolved organic nitrogen can be present at an increasing percentage (up to 85%) in the effluent because of upgrades with biological nutrient removal and advanced treatment to meet more stringent discharge limits for nutrients (Reference #5)

6. Total Kjeldahl Nitrogen (TKN) is made up of Ammonia (NH4) and organic-Nitrogen. Total nitrogen measurements include organic nitrogen and all major forms of biologically available nitrogen.

7. BOD (biochemical oxygen demand) is the standardized laboratory procedure used to estimate the relative oxygen requirements of wastewater effluent. BOD is used as a measure of the

amount of biochemically degradable organic matter present in a sample. BOD measurements are typically regulated with NPDES permit limits. DWR Laboratory procedures for BOD results are based on DO depletion from both carbonaceous and nitrogenous actors in a wastewater sample. Historically, DWR has very rarely performed BOD tests with a Nitrification Inhibitor for BOD analysis that can offer results for Carbonaceous BOD (CBOD) only. Thus, concerns for nitrogenous dissolved oxygen demands are typically incorporated within the BOD permit parameters.

8. The December 10, 2021, Speculative Effluent Limits for the Siler City WWTP replaced the September 17, 2021 speculative limits to incorporate changes made at the request of the City to increase the weekly average limit for organic nitrogen and corrects an error in seasonal loading (Reference #4).

9. Rocky River Watch filed a Petition for Contested Case Hearing in the North Carolina Office of Administrative Hearings challenging the Siler City Permit on May 30, 2019, alleging claims under the federal Clean Water Act, state water quality laws, and state and federal water quality regulations. In June 2020 the Rocky River Watch, the Town of Siler City and the NC Division of Water Resources mutually signed a Settlement Agreement (Reference #6). The Settlement Agreement included references to Total Nitrogen, Total Kjeldahl Nitrogen, Ammonia-Nitrogen. The Settlement Agreement made no mention of limits for Organic-Nitrogen.

10. My discovery of the May 16, 1991, Siler City Modeling Report letter from J. Trevor Clements to Mr. Jim Greenfield, U.S. EPA Waste Load Allocation Coordinator (Reference #8) provided great insight into the origin of the Organic-Nitrogen permit requirements for Siler City. The document includes the results of the original Level C model Analysis of the Rocky River using a QUAL2E model. Listed below are noteworthy observations of my review:

- The modeling was based on data collected in the area circa 1990.
- There were twenty-one permitted dischargers in the subbasin. Siler City WWTP had the largest flow.
- Results indicate that nonpoint sources represent 82% and 79% of TP and TN load respectively in the Rocky River watershed on an annual basis.
- However, during summer low flow conditions (S7Q10 = 0.7 cfs) the nonpoint source contribution of TP is 1.5 % while the contribution from Siler City WWTP is 98.5%. Similarly, the nonpoint source contribution of total nitrogen is 1.2% while the contribution from Siler City WWTP represents 98.6 % of total TN. These observations strongly identify stream flow as a critical factor.
- The Siler City Reservoir, located upstream from the confluence with Love' s Creek, regulates the flow in the Rocky River. NCDEM field staff reported that release from the reservoir during summer months is almost non- existent. (Note: Summary Point 1 explains recent changes in the upstream reservoir with increased storage and I suspect there is now a minimum release of flow required.)
- The 30-year-old modeling analysis strongly highlights that:
  "Low flow conditions are frequently experienced in the Rocky River, often for extended periods of time. This is due to the presence of a reservoir upstream that releases little or no water to provide assimilative capacity. As a result, 7Q10 conditions are experienced much more often than every ten years, and DO violations probably occur every summer.

The lack of significant instream flow facilitates low velocities and substandard DO concentrations."

- The model analysis did not provide a matrix of model sensitivity analysis for dissolved oxygen for all model input parameters. However, it provides a sensitivity estimate for the effects of Organic Nitrogen under the model design conditions at the time. Specifically, the analysis offered graphics of results for Organic-Nitrogen at levels of 1mg/L, 5mg/L, and 10mg/L. The 5mg/L graphic example appeared to suppress the level of D.O. approximately 0.3 mg/L below the 5mg/L standard. The 1mg/L graphic example did not suppress the D.O. below the standard of 5mg/L D.O.
  Note: It is possible that current DWR staff "interpolated" these graphic results to arrive at the NPDES Permit limit of 3mg/L Organic Nitrogen. (see Scoville Memorandum November 5, 1990 -Figure 3).
- The Scoville analysis does state:
  - *"The Rocky River model is sensitive to organic nitrogen and ammonia nitrogen loading from the WWTP."*
  - *"Generally, as the removal of ammonia increases, the effluent organic nitrogen should decrease as well."*
  - *"Based on other facilities' effluent data, if Siler City were meeting an NH3- N limit of 1 mg/L, their organic nitrogen would be considerably less, probably around 2- 3 mg/L."*
  - *"It is evident that based on the model results, if the other oxygen -consuming limits were met, organic nitrogen could potentially make the difference of whether the instream DO standard is maintained. If the Siler City WWTP were to maintain a high degree of nitrogen removal and consistently meet the proposed limits, the DO stream standard would not be expected to be violated."*
- The materials provided within these documents (Reference #8) make modeling observations and recommendations for effluent wasteload allocations and permit limits based on the conditions at the time. Among other parameters, the permit limits recommended in these documents include summer limits for NH3-N at 1mg/L, and Total Phosphorus limits of 0.5mg/L. Note the 2022 draft Permit similarly includes NH3-N summer limits of 1mg/L monthly average. The Scoville wasteload allocation analyses seems to conclude that if NH3-N limits were met at 1mg/L the amount of organic nitrogen would be less than 3mg/L and not result in D.O. standard exceedances. Specifically note than neither Scoville nor Clements recommended any permit limits for organic nitrogen.

11. The February 28, 1991, Waste Load Allocation for Siler City signed by Michael C. Scoville, reviewed Ruth Swanek, Arthur Mouberry, and others has many handwritten notes (Reference #9). Of Specific interest is the note on the bottom of the first page: "*The impact of the upstream Dam must be confirmed!"*

The following documents/references are attached for your potential use.

#1. March 22, 2022, Draft NPDES Permit Renewal & Expansion Permit NC0026441Siler City WWTP.

#2. March 22, 2022, Fact Sheet NPDES Permit No. NC0026441.

#3. September 20, 2021, Speculative Effluent Limits, Siler City WWTP NC0026441. Letter to David Honeycutt, P.E., McGill Associates, PA from Michael Montebello Supervisor, NPDES Municipal Permitting Unit.

#4. December 10, 2021, Speculative Effluent Limits Siler City WWTP NC0026441. Letter to David Honeycutt, P.E., McGill Associates, PA from Michael Montebello Supervisor, NPDES Municipal Permitting Unit.

#5. March 2021, Environmental Pollution Volume 273, 15 March 2021, 116436. Dissolved organic nitrogen in wastewater treatment processes: Transformation, biosynthesis and ecological impacts.

#6. June 2020, Settlement Agreement Rocky River Watch, Siler City, NC Dept of Env. Quality Water Resources Div.

#7. October 17, 2018, Permit Modification Letter from Michael E. Templeton, P. E. Water Quality Permitting Section to Mr. Bryan Thompson, Town Manager, Town of Siler City. Indicating the Division will add Total Nitrogen limitations to the Siler City Permit.

#8. May 16, 1991, Slier City Modeling Report. Transmittal letter from J. Trevor Clements, Assistant Chief, Water Quality Section, addressed to Mr. Jim Greenfield, Waste Load Allocation (WLA) Coordinator U.S. EPA, Water Division Region IV. Subject: Rocky River QUAL2E and nutrient budget analyses Cape Fear River Basin, Chatham County. This transmittal letter includes several attachments:

a) May 1991 Report ROCKY RIVER SUBBASIN NUTRIENT BUDGET, CHATHAM COUNTY, NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES, DIVISION OF ENVIRONMENTAL MANAGEMENT, WATER QUALITY SECTION.

b) October 2, 1990, Memorandum from Karen Lynch, Subject August 1990 Rocky River Algal Blooms, Chatham County.

c) November 1, 1990, Memorandum from Mike Scoville to various Division of Environmental Management Supervisors, Subject: Town of Siler City WLA Modeling Analysis NPDES No. NC0026441, Chatham County.

#9. February 28, 1991, WLA signed Michael C. Scoville, reviewed Ruth Swanek, Wasteload Allocation for Siler City.

Notable Contacts of potential Interests to the LNBA/NRCA

1. Gary Perlmutter DWR Permit Writer DWR NPDES Municipal Permitting Unit
2. Brittany York Siler City Wastewater Plant Superintendent
3. David L Honeycutt, PE Office Manager McGill Associates, P.A. Engineering Consultants
4.

Draft Rocky River Interagency Meeting Notes

Meeting 1 – Water Quality (DWR) 4/8/2021 @ 10 am

Nora Deamer	Tom Augspurger	Andy Painter	Brena Jones
Cheng Zhang	Chris McCorquodale	Craig Hoover	David Cox
Eric Morris	Gabriela Garrison	Jack Meadows	Jeff Manning
Jeff Poupart	Karen Higgins	Kyle Watkins	Mark VanderBorgh
Mike Templeton	Natalie Davis	Roy Lynch	Scott Vinson
Sean Buczek	Susannah Goldston	Todd Ewing	Vanessa Manuel
Vann Stancil	Ginny Baker	Adriene Weaver	Al Cooke
Amanda Hancock	Anjie Ackerman	Bill Holman	Blakely Hildebrand
Brian Yeich	Brittany York	C Collins	Cam Baillie
Chris Ventaloro	Christine Pickens	Cindy Simpson	Emily Wells
Francine Durso	Ian McMillan	Jason Payne	Jillian Tucker
Karin Ritter	Maria VanderLoop	Michael Montebello	Pamela Howe
Patrick Beggs	Susan Meadows	Ted Shear	Tom Gerow
Michelle Raquet			

1. **Instream water quality conditions in the Rocky River**

Overview of Water Quality - Nora Deamer (Basin Planning Branch)

Review of ambient monitoring stations, USGS gages, biological monitoring sites, history and current 303(d) listings, general trends in physical/chemical parameters including:

Nitrogen (N): Upstream scale is much lower than the downstream scale. Total nitrogen (TN) instream concentrations declining over the years. The majority of the N upstream on the Rocky River is TKN (organic) and downstream of Loves Creek in NO_3 (inorganic N). This is the result of the Siler City WWTP discharging to Loves Creek. The WWTP is currently designed to convert ammonia nitrogen to nitrate (NO3) nitrogen. Ammonia nitrogen has increased downstream at the Loves Creek and Rocky River stations in 2020. Most of the readings at the furthest downstream station (B6000000) were at or close to the detection limit of 0.02 mg/L.

Phosphorus: WWTP was contributing P to the system prior to upgrades. Very little being contributed by the WWTP into Rocky River since 2009. Upstream and downstream concentrations similar.

Chlorophyll *a*: Not normally collected for flowing steams. Previously impaired behind Woody's Dam but since the dam has been removed, chlorophyll *a* impairment no longer applicable. Impairments remain for the reservoirs. As part of a special study, chl *a* data was available for 2019 only. A single elevated concentration of 17 µg/L in June was detected. All other readings were generally below 8 µg/L.

Turbidity: Comparing the upstream to downstream, can see an increase of turbidity downstream during high flow years. Need to identify what may be contributing to turbidity in the system. There were only a few exceedances of the 50 NUT standard observed.

Fecal Coliform Bacteria (FCB): Not necessarily linked to flow but the WWTP is not contributing to the overall FCB. Varies widely with no real conclusions can be drawn. Consider identifying potential sources (i.e., pasture, septic, illicit discharge, stormwater).

pH: Within normal range (pH 6 – pH 9) but the most downstream station has seen an increase in pH but cannot explain why. Higher pH levels will increase the toxicity of ammonia/ammonium.

DO: Water quality impairments in Rocky River because of water being released from the bottom of pool behind the old Hackney mill dam (USGS, DWR ambient station) during low flows and when water is not flowing over the dam. USGS gage (02101726) DO data shows similar trends as the ambient station (B5980000).

2. Integrated report status 303(d)/305(b)

Impaired waters table was included in presentation. New listings for 2020 include fish and benthic macroinvertebrates (bugs) as well as a chlorophyll *a* in the Charles Turner Reservoir. There was a chlorophyll *a* delisting for the segment that was formally behind Hoosier/Woodys dam. The Integrated Report files can be found here: https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment/water-quality-data-assessment/integrated-report-files

The DWR biologist will attempt to sample the mainstem Rocky River in 2021 to assess any impact from possible high ammonia concentrations.

3. 2020/2021 Rocky River special study

2020 Special Study Rocky River - Sean Buczek/Craig Hoover, Intensive Survey Branch (ISB)

Physical and chemical parameters w/ focus on nutrients, DO, pH. pH influences the toxicity of ammonia (ammonia toxicity increases with increasing pH levels). ISB is assessing the watershed using monthly monitoring data collection along with in-situ deployable meters. Including in-situ biomonitoring (mussels) stations throughout the watershed. Rocky River is very much influenced by flow which also impacts turbidity levels.

Grab Sample Results -

- Ammonia spike at upper site and below WWTP in Aug, then a decrease going down stream. (Ammonia near or below the detection limit with a few exceptions),
- Nitrite Nitrate spikes below WWTP and decreases downstream,
- TKN – some spikes occurred downstream,
- Phosphorous – concentrations similar or gradually decreases downstream (WWTP not contributing to phosphorus levels),
- BOD – 5 upper sites, (to see how WWTP), little fluctuation overtime or downstream of treatment plant,
- Chlorophyl *a* - CPFRR070 (Woody's Dam) saw higher levels, spikes in Aug and Oct, less tree cover, water slows down which could result in higher productivity.

In-Situ Meters. Create a monitoring program and the crew was learning along the way. One meter lost during flood events which resulted in data gaps and did not pass QA/QC (data not shared). Meters were redeployed in March 2021. Read temperature, pH, conductivity and can add a probe to measure ammonium. Use the calculated readout from the "electric potential" to get a measure of ammonia. Gives a more continuous reading and can compare to lab results ("snapshot in time") as a double check. Meters can get well below the lab's PQL.

- RRO5 upstream - Upper site is "noisier" due to location near WWTP discharge. Ammonia increased mid-March and is matching up with what others have seen.
- More confident in March 2021 data

Lab readings will be used for "decision-making" but meters allow for readings every hour to get that "snapshot". Have an option to add a telemetry meter which would allow for instantaneous readings versus downloading the data in-person. That instantaneous reading would allow ISB to make a decision on sending someone out to collect a sample. Meters are visited once every three weeks to download data, check batteries, calibrate, etc.

Bioindicators. In-situ freshwater mussel cages. Monitoring temperature, mortality, condition, and potential tissue analysis when necessary.

- Deployed November 11, 2020,
- Deployed mussel cages 8/cage (*Elliptio complanate*)
- Cages placed up and down of WWTP and downstream closer to Woody's (Hoosier) dam.
- Checked March 11, 2021 - all cages remained and all mussels alive.

Three in upper to monitor influence from WWTP and three downstream near Woody Dam location where impacts have been observed in the past.

4. Update on Siler City WWTP

Updates Siler City WWTP and Effluent Limits - Gary Perlmutter (NPDES)/Scott Vinson (RRO)

Siler City WWTP is a 4 MGD plant. Plant upgrade in the works to address biological nutrient removal and expansion to 6 MGD.

- Current NPDES permit status: expired 5/30/2019 – operating on administrative extension
  - Permit modification received 11/30/2018
  - Permitted Flow = 4.0 MGD
- DWR modified permit 5/1/2019 to accommodate waste from Mountaire Farms (industrial waste)
  - added TN load limit = 73,058 lb/yr – effective 1/1/2023
  - interim TN load limit = 243,455 lb/yr (667 lb/day) – effective 1/1/2020 – 12/31/2022
- Modified permit contested by Permittee & Rocky R Watch on 5/30/2019
- Settlement Agreement signed 6/5/2020
  - Upgrade facility to 6.0 MGD
  - Submit application for expansion/modification by 12/31/2020, and include:
    - revised TN load limit: 54,800 lb/yr – effective 7/1/2023
    - increased TN effluent monitoring (conc & load)

    - changes in instream monitoring
- City requested modification/expansion application extension to 4/30/2021 to allow more time for environmental review.

Instream v. effluent data.

Flow has generally increased and average annual 2020 flow was 3.212 MGD, which is 80% of the permitted flow. This triggers a needed plan for expansion which is currently underway.

Effluent data summary: November 2016 – February 2021.

Parameter, units	Average	Range	Feb 2021 Average	Feb 2021 Range
Flow, MGD	2.77	1.08-10.89	4.65	2.72-10.89
Ammonia, mg/L	1.5	<0.5-24.3	19.5	11.6-24.3
NO2+NO3, mg/L	9.9	< 0.2-33.0	0.33	< 0.2-1.4
TKN, mg/L	2.8	< 0.2-24.0	17.4	9.6-24.0
TN (NO2+NO3 + TKN), mg/L	12.6	1.14-39.0	17.6	9.9-24.3
TN Load, lb/mo	1781	60-18,915	18,915	NA

TN Annual Load in 2020 = 27,568 lb/yr

- BOD exceedances during the summer and March 2020 because of heavy rain events.
- Fecal Coliform Bacteria - increasing trend with higher results in summer and February 2020.
- DO, temperature, pH within limits.
- Total nitrogen a was in double digits 2020 and 2021. Spikes in February 2021.
- TKN generally low but increased in March 2020.
- Copper and Zinc have decreased.
- Chloride monitored
- Loves Creek IWC (instream waste concentration) at 4 MGD is 96.31%
- Loves Creek 7Q10 – summer 0.25 cfs and winter 0.4 cfs

Instream Water Quality data summary: January 2017 – September 2020.

- Sampled by monitoring coalition at 4 stations (required by permit). Upstream and downstream of WWTP in Loves Creek, upstream of confluence w/ Rocky River and further downstream in Rocky River.
- DO seasonal dips below 5.0 mg/L upstream. All statistically similar, follows seasonal pattern.
- Temperature also shows seasonal dips instream.
- Conductivity: higher amounts seen downstream of WWTP in Loves Creek and downstream in Rocky River indicating that the WWTP effluent could be impacting instream concentrations (statistically different then upstream).
- TKN: increase values in wastewater 2019 and summer 2020 but does not seem to be impacting instream concentrations with the exception immediately downstream of discharge indicating that the effluent is impacting TKN levels instream.
- NOx (nitrate-nitrate): statistically different from upstream to downstream.

- Ammonia-nitrogen and phosphorus also show effluent being higher on average compared to instream numbers. Numbers higher in February 2021 due to back-to-back high rain events and equipment failures/malfunctions.

NOVs (notice of violations) have been issued to Siler City because biosolids accumulated onsite (early 2020 to summer of 2020) which resulted in effluent limit violations. Heavy and frequent rain events resulted in biosolids remaining onsite instead of being land applied. Higher nitrogen concentrations in effluent were due to the need to turn off the aeration in the oxidation ditches. Fecal violations also identified as an issue but most of NOVs associated with ammonia and BOD. Contracted with a third-party to address biosolids and acquired a portable sludge press to help dewater sludge which would allow for quicker removal of solids from the site.

Optimization Plan (Mike Templeton): Previous permit writer/reviewer. Optimization plan was originally included in the modified permit but was removed as result of public comments. Included interim nitrogen limit instead. Target was to reduce TN to 20 mg/L and were able to achieve a reduction down to 10 mg/L. Unfortunately, rain events, plant failures, biosolids accumulation resulted in a setback in the implementation of operational/innovative measures.

Status of Upgrades (Scott Vinson, Roy Lynch): Two stages with the first being keeping permitted flow to 4.0 MGD. Replace equipment and add basins/oxidation ditches, clarifiers, aeration basins. First stage around $5.0 million and funding secured and should be complete by September 2022.

Second stage will include the increase of permitted flow to 6.0 MGD, additional reductions in nitrogen. Second stage cost $17.1 million. In the process of pulling together applications for grants and loans. Target date of completion of second stage will depend on when funding is received but goal is mid-2023. Phases will overlap.

Questions/Discussion:

Instream waste concentration. Contribution from Loves Creek. Concentration w/ 7Q10.

Received comments re: in-situ conductivity readings.

Meeting 2 – Species Health and Needs (Wildlife Resources Commission, US Fish & Wildlife Service) 4/8/2021 @ 1 PM

Nora Deamer	Tom Augspurger	Andy Painter	Anjie Ackerman
Brena Jones	Cheng Zhang	Chris McCorquodale	Chris Ventaloro
Craig Hoover	David Cox	Emily Wells	Eric Morris
Gary Perlmutter	Ian McMillan	Jack Meadows	Jeff Poupart
Karen Higgins	Kyle Watkins	Mark VanderBorgh	Mike Templeton
Robin Hoffman	Scott Vinson	Sean Buczek	Susannah Goldston
Todd Ewing	Vanessa Manuel	Vann Stancil	Ginny Baker
Catherine Deininger	Adriene Weaver	Al Cooke	Amanda Hancock
Brittany York	Christine Pickens	Cindy Simpson	Daniel Hannon
Francine Durso	Gerald Pottern	Jason Payne	Jean Zhuang
Jeff Marcus	Jillian Tucker	Michael Montebello	Pamela Hawe
Patrick Beggs	Phillip Cox	Susan Meadows	Ted Shear
Tom Gerow	Michelle Raquet		

Cape Fear Shiner and 2020 Project – Brena Jones (WRC)

Cape Fear Shiner. Endemic to the upper Cape Fear River drainage area. Prefer to live in riffle-run-pool complex. Officially recognized in late 1960s and listed as endangered in 1987. Found in the mainstem portions of the Deep, Haw, Rocky and Cape Fear River (5 county area).

USFWS funded a study in 2020 to monitor for the Cape Fear Shiner.

- 2020 was a very high flow year. Surveys for Cape Fear Shiners are best done at base flow, so the high flows likely impacted the survey results.
- Fifty six sites were visited.
- Must use seining collection method (Cannot use electrofishing technique, seining is much harder to do on the larger river systems, especially when there are high flows).
- Flows were too high in the Haw and Cape Fear rivers so sampling efforts where truncated. Brena would like to revisit these stations in the future as conditions allow.
- 2007/2020 survey comparison results showed that the Deep had similar results. Cape Fear Shiner found them in the smaller tributaries indicating that they use the tributaries when water levels are high enough.
- Moved much further upstream on the Rocky once Hoosier Dam was removed. Expanded range up to Rives Chapel Church Rd on the Rocky River.
- Continuing to work on monitoring efforts to identify where they may move and what the status may be in the future.
- Modeling efforts are underway.

Cape Fear Shiner Habitat Needs:

- Clean substrate for spawning (broadcast spawners). They need clean gravel for eggs to adhere.
- Good water quality (i.e., DO, pH, ammonia, contaminants), can affect survival and reproductive success. Sensitive to organic contaminants and metals.
- Good food supply (invertebrates and vegetative material), will use algal material – have versatile diet but need healthy invertebrate pray available.
- physical habitat complexity including the ability to move with the seasons and water levels.

There is a lot of periphytic growth in the Rocky River throughout much of the year, does this impact habitat needs of the Cape Fear Shiner? Could impact spawning but may be the secondary issues such as nutrients and water quality conditions that may be contributing to the periphytic growth. Might be more of an issue with water quality and/or eutrophication.

Does the Cape Fear Shiner require water willow (*Justicia americana*) to be present in their habitat? Brena said that she is not sure if there is a direct link between the two or if the water willow is used because it is present or because it is needed.

Conservation and Dam Removal – Emily Wells (USFWS – Ecological Services Raleigh)

Cape Fear Shiner found in Randolph, Lee, Moore, Chatham, and Harnett counties (Rocky, Deep, Haw and Cape Fear River. Reviewed map with location of dams and where the Cape Fear Shiner has been found. Portions of the Rocky and Deep identified as critical habitat areas. Hoosier Dam and impoundment on the Rocky River is also known as Woody's Dam. 18,000 linear feet impounded, 200 ft wide and 20 ft high previously used as hydropower dam but had not been used for many years before dam was removed. Impoundment/dam had removed connectivity between critical habitat for the Cape Fear Shiner. Within a couple of months of de-watering, aerial images show the where the natural channel is. Southeast Aquatic Restoration Team travels across the southeast to help with projects and dam removals. (Dam removed October – November 2018)

- USFWS committed to USACOE, DWR, WRC to monitoring the river for the Cape Fear Shiner.
- Monitoring for three years following removal of the dam to document project success.
- Four locations chosen to monitor.
- First sampled in May 2019 and found Cape Fear Shiner where the dam was removed. (Suitable habitat established)

Recovery Plan. USFWS has identified areas where more work needs to be done to provide connectivity and to open up critical habitat areas. 2011 Strategic Habitat Team identified needs. Included education, habitat plan, recovery plan, augmentation and reintroduction, dam removals, instream flows, habitat restoration and protection, surveys, mapping, policy, water quality and research. Several partners regional, local, state, and federal. Conservation Fund supported riparian restoration and conservation near the Deep and Rocky confluence. Several pieces of land have been purchased along the Rocky River. Would like to see additional parcels identified and purchased for conservation.

FWS species status assessment in 2021, which is a large project. FWS looking to determine status with survey results. Then a decision will be made to keep as endangered or down listing to threatened. Decision goal late fall or early winter 2021.

Working with DMS on mitigation guidance in working in tributaries or in areas where Cape Fear Shiners have been found. Also participating in restoration planning efforts currently underway to identify potential project areas.

Other Rare Species in the Watershed – Brena Jones (WRC)

Several mussel species are also found in the Rocky River. As part of the dam removal, WRC had the opportunity to conduct surveys on mussels in the river. Savannah Lilliput found in higher numbers than expected. The Savannah Lilliput, Brook Floater, Carolina Creekshell, Notched Rainbow, Creeper, Triangle Floater, Eastern Creekshell, and Chameleon Lampmussel are all identified in the WRC action plan and were moved before the dam was removed.

- First mussel survey at the Hoosier dam in 2016. Found the Savannah Lilliput for the first time since 1972.
- Very diverse species found in the Rocky River (listed above)
- Need stable substrate,
- Need good water quality; Larvae and juveniles often more sensitive than adults (i.e., DO, pH, ammonia, nitrates, turbidity, contaminants),
- Need correct native fish species as hosts to move and complete their life cycle (need healthy fish community),
- Reproductive time varies by species (short v. long term brooders); Sensitive life stages can be present year round.
- Hydrologic refugia (places to bury in during high flow events),
- Good food supply (i.e., algae, bacteria).

Limiting Factors: Mussels – Tom Augspurger (WRC)

Pollution and water quality degradation has been identified as one of the contributing factors to declining populations. WRC and DEQ (DWR) can measure pollutants in the water column. Need to identify what are the pollutants that need to be monitored.

Different stages of Larvae have different habitat needs to survive.

- Excessive sedimentation – smother adults, clog gills, impact attachment to fish host. Sediment also can change channel form, position, filling / scouring channels, Clean substrate is needed.
- Mussels use gills to syphon water for DO and food, they are “super filters” and therefore are highly exposed.

Why are they sensitive?

- Siphon the water through gills, extract the food and oxygen before pushing the water back out.
- Super filters and are highly exposed to sediments and water column pollutants.
- Need to understand what mussles are sensitive too.

Sensitivity or hazard assessments are being conducted.

- Ammonia – mussels highly sensitive, more so than other forms of aquatic lives. Common parameter and important in CFR, Rocky portion.

- Lab toxicity tests run on mussels to find out response using increasing toxicity levels to evaluate response (e.g., immobilization, growth, behavior etc.), immobilization used as surrogate for death.
    - Test are used to determine statistical curves to find "EC50" (Effect Concentration). EC_{50} is the pollutant concentration where 50% of the population it impacted.
    - Species Mean Acute Value (SMAV); Geometric mean of short term EC_{50} by species.
    - Genus Means Acute Value (GMAV); Geometric mean of short term EC_{50} by genus (multiple species with a genus.
- Aquatic species ranked to determine which were most sensitive.
- Freshwater mussels are the on most sensitive end of the scale when compared to other species using laboratory toxicity tests (both acute and chronic). Examples given included:
    - Ammonia,
    - Chloride,
    - Potassium,
    - Copper,
    - Nickel
- Surrogate species are often used to understand sensitivity to pollutants.
    - Fatmucket (range does not include NC)
    - Test results using the Farmucket were within a factor of 2 of other mussels 73% of the time and always withing a factor of 5 of other mussels.

Several caveats include that these are short term tests (intrinsic sensitivity), unlike potential exposures in an aquatic system.

Endangered Species can be more vulnerable and have a hard time recovering from an impact due to their:

- Rarity,
- Small population size,
- Immobile (do not move very fast or far).

Limiting Factors: Cape Fear Shiner – Tom Augspurger (WRC)

1988 recovery plan identified "Potential threats to the species and its habitat could come from such activities as land use changes, chemical spills, road construction, stream channel modification, changes in stream flows from g=hydroelectric power, impoundments, wastewater discharges, increases in agricultural runoff…"

CFS are highly exposed, and exposure is only half of risk.

Cape Fear Shiner was tested to various pesticides and metals alongside three other species including fathead minnow, rainbow trout, and ceriodaphnia. The Cape Fear Shiner is in the sensitive end of the range, but not the lowest.

Tested with other endangered fish species (12 total species) and the Cape Fear Shiner was about average in sensitivity.

Tested several regional wastewater effluents on the Cape Fear Shiner to assess the effect on growth and survival. The Cape Fear Shiner was less sensitive than ceriodaphnia, which is used by the state in wastewater effluent toxicity testing.

Take away is that the Cape Fear Shiner are a sensitive species to pollutants, but not the most sensitive. In contrast, mussels are going to be the sentinel organism and will likely be the first to see an impact from salts and ammonia.

Sediment is likely the only pollutant in which the Cape Fear Shine may need to receive special attention more than other aspects of aquatic life in the system.

Papers can be made available.

Discussion:

To understanding the impacts from sediment, there would be a need to understand the duration, magnitude and frequency component.

Measuring Total Suspended Solids (TSS) may be a better measurement to assess than turbidity. Not all turbidity is the same. TSS may have more of an impact on habitat and life cycle.

We currently do not have a water quality standard for TSS, nitrate or ammonia.

No state standard for sediment, nitrate, ammonia. Might want to identify parameters to focus efforts and identify a standard that is protective of mussel species in the system.

References provided by Sean Buczek:

- Moore AP, Bringolf RB. Effects of nitrate on freshwater mussel glochidia attachment and metamorphosis success to the juvenile stage. Environ Pollut. 2018 Nov;242(Pt A):807-813. doi: 10.1016/j.envpol.2018.07.047. Epub 2018 Jul 17. PMID: 30032077.
- Buczek, S.B., Cope, W.G., McLaughlin, R.A. and Kwak, T.J., 2018. Effects of turbidity, sediment, and polyacrylamide on native freshwater mussels. JAWRA Journal of the American Water Resources Association, 54(3), pp.631-643.

Meeting 3 – Water Quality (DWR) 4/12/2021 @ 10 am

Andy Painter	Anjie Ackerman	Brena Jones	Catherine Deininger
Cheng Zhang	Chris Ventaloro	Craig Hoover	Emily Wells
Gabriela Garrison	Gary Perlmutter	Ian McMillan	Jack Meadows
Jeff Manning	Kyle Watkins	Mark VanderBorgh	Mike Templeton
Nora Deamer	Robin Huffman	Roy Lynch	Scott Vinson
Sean Buczek	Todd Ewing	Tom Augspurger	Vann Stancil
Ginny Baker	Chris McCorquodale	Christine Pickens	Cindy Simpson
Francine Durso	Fred Tarver	Karen Higgins	Micheal Montebello
Natalie Davis	Patrick Beggs	Phillip Cox	Susie Meadows
Tom Gerow	Jason Payne	Michelle Raquet	Peter Johnson

(Nora) Water quality information re: Total Suspended Solids (TSS) data shown for below the WWTP on the Rocky River and Loves Creek. Occasional elevated reading seen. Need to review the flow on those days with high values, are they associated with rainfall or high flow events?

Intersection of Rocky River and Species Needs – Tom Augspurger (WRC)

Water quality is an important limiting factor.

Conservation consideration for endangered aquatic species and why they are vulnerable:

- small stretches of stream critically important,
- few individuals to sustain populations,
- natural re-colonization after impacts is slow,
- mussels are sedentary.

The diverse mussel assemblage that the found in the Rocky River have persisted over many years and there has been a short-term positive response to the dam removal.

CAPE FEAR SHINER

To identify the risk, need to identify the chemicals, mixture of chemicals and effluent concentrations entering and found in the waterbody. Because of studies conducted several years ago, the Cape Fear Shiner was identified in the "middle" of species sensitivity.

<u>Review Conclusions from Meeting 2 (Limiting factors):</u>

- Cape Fear Shiners are sensitive but not the most sensitive.
- As a result, meeting water quality standards (derived based on sensitivity of other fishes and aquatic organisms) are "likely sufficient" to maintain Cape Fear Shiner aquatic habitat and sustainable populations in the Rocky River.
- Sedimentation is a concern particularly during spawning season.
- Some rare species may be impacted by a single adverse impact can have a lasting effect on the population.

- The constructions of dams within the entire watershed have likely had the most serious impact on where the Cape Fear Shiner is found. Removing those dams will be "telling" on habitat and where water quality is adequate to provide habitat.
- Monitoring (for CFS) will tell us if water quality is sufficient or not.

MUSSELS

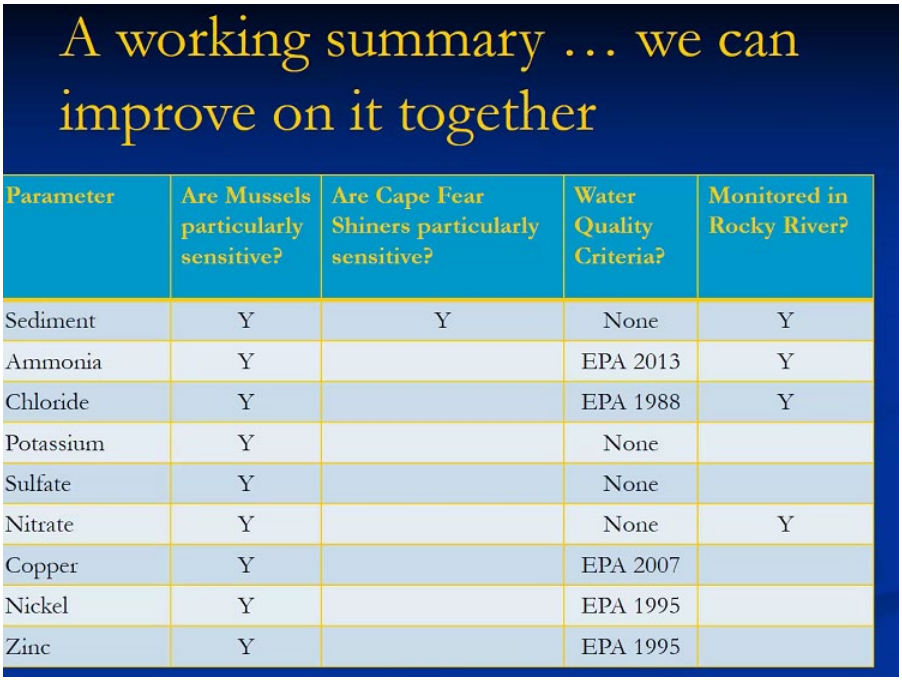
Review Conclusions from Meeting 2 (Limiting factors):

- Water quality has a significant impact on mussels.
- Studies suggest that excessive concentrations of ammonia can be responsible for widespread decline of mussels in a system.
- Mussels have been identified as one of the "most sensitive" species for pollutants, chemicals, etc.
- Chloride, copper, nickel, potassium, sulfate, zinc also identified as a compound having a significant impact on mussels (acute sensitivity).
- Sediment can affect many of the life stages (some stages more sensitive than others); smother, reduce feeding, reduce respiration (clogged gills), reduce growth rates, limit burrowing activity and impair interaction with host fish.
- High nitrate levels can have possible reproductive effects.

Caveats for lab testing: short term and do not typically include reproduction.

Action/Need: Work together on what chemicals/parameters to prioritize in the Rocky River.

What chemicals and/or parameters should be focused on for protection rare and threatened aquatic species in the Rocky River? Tom shared a graph he put together that includes the parameter, mussel, and Cape Fear Shiner sensitivity (Y, N), water quality criteria (reference criteria), and monitored in the Rocky River (Y, N),



Parameter	Are Mussels particularly sensitive?	Are Cape Fear Shiners particularly sensitive?	Water Quality Criteria?	Monitored in Rocky River?
Sediment	Y	Y	None	Y
Ammonia	Y		EPA 2013	Y
Chloride	Y		EPA 1988	Y
Potassium	Y		None	
Sulfate	Y		None	
Nitrate	Y		None	Y
Copper	Y		EPA 2007	
Nickel	Y		EPA 1995	
Zinc	Y		EPA 1995	

Parameters include sediment, ammonia, chloride, potassium, sulfate, nitrate, copper, nickel, zinc. Mussels sensitive to all chemicals. Cape Fear Shiner sensitive to sediment. Tom noted that some of the criteria and/or standards may be outdated.

Potential path forward ideas:

- Where is there overlap between chemical sensitivity between aquatic species (CFS and mussel species),
- Are we monitoring for these chemicals in the Rocky River and Loves Creek?
- If not currently monitoring, can we add them?
- How much is to much, develop local target that is protective of these species.
- What is a protective value? What are local conditions like in relation to that value?
- What is the biological monitoring telling us? Mussels and benthic macroinvertebrate monitoring, biological surveys by WRC and FWS.

Agree on a subset of parameters that are important for protection of the species?

Protective concentrations: develop statewide water quality standard, stream or site-specific water quality standards, permit limits, and/or water quality guidance and/or recommendations. Tom noted that developing a statewide or site-specific water quality standard would be a “heavy lift”.

Questions to ask: What is the safe numeric value? Is there a numeric value?

(Group) (Chris) Consider the option of identifying an instream target value. An instream target value can be established fairly quickly based on current rules instead of a statewide water quality standard. Can be based on literature values and can be applied to neurotoxins, etc.

What should be considered for identifying a sediment water quality standard?

(Tom) USGS used to estimate bedload but estimating bedload is difficult and time consuming. What should be measured and how can it be measured? EPA created technical documents on how to measure sediment. Guidance focused developing a “standard” based on local conditions.

(Nora) Question to Gary Perlmutter (NPDES) on monitoring for potassium or sulfate? (Gary) Copper, nickel, zinc may be monitored. Chloride will continue to be monitored.

(Brena) Might be helpful to include whether the criterion of NC matches the criteria NC (particularly ammonia) and if this group could advance. (Gary) Ammonia in WW permits. Statewide EPA water quality standard of 1.0 (summer) and 1.8 (winter) factor in flow for WW limits.

Improving Water Quality in the Watershed – Group

(Nora Deamer, DWR) Basin Planning: Highlight water quality issues in the watershed, incorporate resource agency information and information sharing opportunities, develop watershed appropriate recommendations.

DWR: ambient and biological monitoring, modeling (nutrient, water quality), NCDP, regional office inspections and technical guidance to permitted facilities, work with SWCDs to prioritize nutrient reducing BMPs, support local watershed planning processes, support grant opportunities.

(Anjie Ackerman, DMS) Overview of DMS and new watershed planning effort underway.

1. Regional planning process happening in the Cape Fear watershed now, kickoff was Mar/Apr 2020.
2. All DMS projects put in the ground have to be related to mitigation, but they pull in other partners to add other aspects to projects.
3. Currently planning in CF 02 (03030002) and CF 03 (03030003), about 600 sq mi. (VHB is contractor). Primarily a data collection and modeling effort (includes the Upper Rocky River Watershed Plan that was implemented several years ago). Goals including satisfying mitigation needs, enhance natural resources of NC, prioritizing watersheds where mitigation maximizes functional improvement, identifying watersheds that are likely to develop and identify linchpin watersheds that can cause cascading effects in a region with high development potential, provide feedback to improve DMS statewide watershed prioritization model through cross-validation.
4. Schedule: Task 1, existing conditions and data gaps completed. Task 2, RBRP model comparisons complete fall '21. Task 3, data development and modeling, stakeholder meeting, Fall '21. Task 4, management strategy recommendations, stakeholder meeting, spring '22.
5. Several DMS projects ongoing in Rocky River watershed, completed and under construction (implemented 10 projects and construction underway on three projects).

Contact Anjie if you are interested in being included in the stakeholder process (anjie.ackerman@ncdenr.gov).

(Kyle Watkins, Chatham SWCD) Voluntary cost share programs available through the Agriculture Cost Share Program (ACSP) and the Community Conservation Assistance Program (CCAP).

- Prioritize areas that are in impaired watershed (Applicants ranked for funding, those in impaired watersheds receive priority). There are priority areas in the Rocky River watershed.
- Overview of what the SWCD does in the watershed. Practices vary but the common goal is to protect water quality. Example of BMP: waste management plans, litter spreaders and ensuring nutrients are applied at agronomic rates, waste storage, livestock exclusion system (includes fence, wells, heavy use areas), not many crop but have installed grassed waterways, field borders and filter strips, crop conversion to grass is often implemented in areas that have been exposed or no longer in production.

(Nora - Question) With the new processing plant, how many new operations have come into the watershed?

(Kyle) Only has one comes to mind, but no new operations have contacted the SWCDs. Some operations have expanded in order to increase production. New operation has a waste management plan, litter spreader, etc. Good relationship with the cooperator. The Rocky River itself is pretty well buffered compared to other stream segments in the county.

(Emily Wells, USFWS) Continues to be engaged with DMS planning, reviewing mitigation projects with aquatic species in mind. With that review, recommendations being provided on how to install or work in areas with known or historic records of the rare and/or threatened aquatic species. Upstream projects are different than within the reach where the species is identified.

Species Status Assessment (SSA) being done and focuses on the Cape Fear Shiner on species abundance and whether to change status. Continue to work with WRC, State Parks, and watershed and conservation groups, to protect riparian corridor especially around where Hoosier Dam was located. Several conservation groups out there that USFWS would love to work with.

(Question) Tom Gerow (copied from WebEx chat): "has the concept of implementing different types of mitigation, based on watershed location, been used before? that is an interesting idea to maximize functional uplift."

From Emily Wells (copied from WebEx chat): "the Mitigation folks always try to choose the best fit for the sites but have sometimes steered away from areas that are near T&E species in the past. Our goal is to let folks know that there are many options for doing mitigation, and one type might be a better fit than others when there are T&E species near or downstream. We want to get the functional improvement in the watershed while still being careful in regards to the species needs and in-water work."

(Brena Jones, WRC) Primary role is to provide technical guidance to regulatory agencies or other partners working in the watershed.

- Collect data on species that are present in a particular watershed, but the program is very small and cannot get to all areas of interest.
- Identify partners to collect data, improve methodology, etc.
- Habitat Conservation Group, review permits and provide feedback and recommendations on projects and permits being issued.
- State Wildlife Action Plan includes information on rare species as well as data gaps to help avoid moving species to federally identified endangered species list.

(Question – Tom Gerow) How often are mussel surveys done?

(Brena) There is no set schedule for mussel monitoring efforts. The removal of the Hoosier Dam just happened to coincide with monitoring efforts.

(Tom Gerow, NCFS (chat question)) Has the concept of implementing different types of mitigation, based on watershed location, been used before? It is an interesting idea to maximize functional uplift.

(Emily Wells, USFWS) The Mitigation folks always try to choose the best fit for the sites but have sometimes steered away from areas that are near T&E species in the past. Our goal is to let folks know that there are many options for doing mitigation, and one type might be a better fit than others when there are T&E species near or downstream. We want to get the functional improvement in the watershed while still being careful in regards to the species needs and in-water work.

(Jack Meadows, Siler City) Planning and development ordinances in place that provide flexibility with conserving space, open space with smaller lots in residential neighborhoods, etc.

Additional examples include:

- Allow accessory apartments on single-family residential properties;
- Voluntary requirement adopted that 40% built-upon on certain residential areas;
- Ordinances in place for high-density to avoid sprawl and cluster subdivisions;

- Require drainage swales rather than curb and gutter;
- Reduce right-of-way and street pavement with requirements;
- Opportunities for compact car parking lots, satellite parking, minimum number of parking lot, etc.;
- No development in flood hazard areas;
- Rocky River buffer requirements;
- Erosion control managed by DEQ;
- Protection of large trees and shade trees in new parking lots, streetscapes, etc.;
- Active brownfield redevelopment program (through EPA grant);
- Ordinance enforcement program (responds to all complaints);
- Main participation in Loves Creek Watershed Stewards.

(Roy Lynch, Siler City) Completed project Lincoln Heights sewer replacements and manhole covers. Two separate projects (1) sewer (identified all assets and needs for the future, identify problem areas and help prioritize projects and (2) total optimization plan with the WWTP on data collections, improve efficiencies, etc.

(Catherine Deininger, Biocenosis, LLC & Loves Creek Watershed Stewards) Active stakeholder group that meets quarterly. Loves Creek impaired for biological communities (benthic and now fish). Receives NPS from upstream of the WWTP. It is a catchment that covers approximately 8 mi^2. Majority of the population is Latino and Hispanic. Creating informational brochures that in Spanish to share with the community.

Several projects have been implemented since 2014. Funding has been provided by EPA 319, EPA 205(j), CWMTF, NCLWF. Examples: stormwater outfalls disconnected and directed towards wetlands; four properties removed trash, demolished house, removed invasive species, floodplain restoration; stormwater projects in the "Piggly Wiggly" catchment active until 2023. Meet regularly with the town to provide updates on projects and identify areas for future projects.

Next Steps

Convene a smaller work group of resource specialist to develop a path forward plan and expand on the table Tom presented above. Consider identifying potential monitoring needs and if there is a need for an instream target standard.

Follow up meeting information/summaries will be posted on the Rocky River website. https://deq.nc.gov/node/90619

Nora has a goal to meet with the Rocky River Management Team within the next six months. Would prefer an in person meeting in the watershed if possible.