Recommendations to the Division of Water Resources for Nutrient Load Management in the High Rock Lake Watershed

Presented by:

The High Rock Lake Steering Committee

April 9, 2024

This report was authored by members of the Division of Water Resources Nonpoint Source Planning Branch staff and underwent several rounds of review by the High Rock Lake Nutrient Management Strategy Steering Committee.

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Summary

High Rock Lake is currently exceeding North Carolina's site-specific chlorophyll-a water quality standard established for the lake and has been included on the State's 303(d) list of impaired water bodies since 2004. To reduce algal productivity, limit potentially harmful algal blooms, bring the lake back into compliance with this standard, and meet designated human and ecological uses, the Department of Environmental Quality (DEQ) is tasked with developing an enforceable regulatory framework, commonly called a nutrient management strategy, that will reduce nutrient loading in the streams and rivers that drain to High Rock Lake.

A Steering Committee of stakeholders who live and work in the High Rock Lake watershed was convened in 2022 and met with the Division of Water Resources (DWR) Nonpoint Source (NPS) Planning Branch seven times between November 2022 and December 2023. Technical Advisory Groups (TAGs) were formed to advise the Steering Committee on rule concepts from the agricultural, wastewater, and stormwater sectors. An additional TAG was formed to inform the Steering Committee on riparian buffer protection issues. The various TAGs met twenty-two times between December 2022 and December 2023, and discussed various proposals for nutrient load reduction. To improve information sharing, several Steering Committee members volunteered to serve on each TAG. These stakeholder committees were charged with providing input and guidance for DWR's rulemaking process, including reporting back on progress to the broader network of watershed stakeholders.

Steering Committee members reviewed both the lake and watershed models produced for DEQ by Tetra Tech in 2012 and 2016, respectively. To achieve an overall load reduction sufficient to achieve the site-specific chlorophyll-a standard, Steering Committee members agree to recommend overall watershed nutrient load reduction goals of 49% phosphorus and 25% nitrogen chosen from a range of potentially effective nitrogen-phosphorus combinations.

Technical Advisory Groups provided detailed recommendations for reductions in both nitrogen and phosphorus. Various rule concept proposals were discussed, but some rule concept proposals did not achieve consensus approval among TAG members. Steering Committee members are generally supportive of recommendations from each TAG, but herein offer additional recommendations to be considered by DWR during rule drafting. Stakeholders recommended the following rule concepts:

Wastewater – Steering Committee members unanimously support TAG recommendations that tiered discharge nitrogen and phosphorus concentration limits should be added to NPDES discharge facility permits, with progressively stringent limits for larger facilities. Phosphorus requirements should be applied at the earliest permit renewal after rules go into effect, and nitrogen requirements should be applied at the following permit renewal to give operators time to plan for upgraded treatment technologies. Recommended limits would be sufficient to achieve a 57% reduction in phosphorus loading and a 25% reduction in nitrogen loading from point sources, which would amount to a 14% and 4% reduction in overall delivered phosphorus and nitrogen load, respectively, to High Rock Lake.

DWR NPS staff believes, instead, that dischargers should be required to reduce loading as much as is feasible in the short term (an approximately 70% reduction), which includes a 0.5 mg/L phosphorus discharge concentration limit for the largest 6 facilities which are responsible for the largest amount of point source loading to the lake.

Agriculture – Steering Committee and TAG members discussed multiple regulatory options, including best management practice implementation targets. Neither group reached consensus on targeted practice implementation metrics. Members recommend that a centralized watershed oversight committee should submit agricultural nutrient reduction reporting to the Division of Water Resources at set intervals based on data availability. We are supportive of reports summarizing conservation practice implementation and agricultural trends and tasking the oversight committee with reporting recommendations for optimizing and improving conservation adoption and implementation in the watershed. However, there was significant uncertainty even among agricultural stakeholders about how compliance with a regulatory mandate should be measured, monitored, and enforced.

DWR recommends setting collective implementation targets for exclusion of livestock from surface waters and codifying individual compliance measures that would trigger if collective targets were not achieved.

Riparian Buffers – Steering Committee members could not come to a consensus on an appropriate riparian buffer protection rule recommendation. After significant disagreement and discussion, a majority of TAG members proposed a 70-foot width while a minority recommended a 50-foot width in rule, but neither proposal garnered enough support to generate consensus. Despite preference, in some cases, for a much wider or narrower protection zone, members of the majority and minority both agreed that a minimum streamside riparian buffer of 50 feet should be protected from incursion and development, with exemption for existing and ongoing uses and limited forest harvest allowances within the buffer. However, there remains significant disagreement about the types of forestry practices which are allowable within the protected area, as well as how land use exemptions should be specified and enforced.

DWR concurs with the recommendation to protect 50-feet of riparian area from incursion and development, which aligns with buffer protection rules from other nutrient management strategies.

Stormwater from Newly Developed Lands – Neither Steering Committee nor TAG were able to come to a consensus on the most appropriate regulatory regime for stormwater management, in part due to the technical complexity of stormwater treatment requirements across the state. We recommend that, at a minimum, more stringent post-construction stormwater treatment requirements should be required of all local government jurisdictions in the High Rock Lake Watershed to provide administrative consistency and ensure that development pressure is not disproportionately increased into jurisdictions that are least prepared to manage it. Uncertainty remains regarding potential implications of technically complex volume reduction and hydrologic control provisions which were presented for discussion, and those provisions were tabled for further analysis and modeling.

DWR NPS staff recommends that hydrologic and volumetric control be explicitly incorporated into stormwater treatment requirements--including applying those controls at lower density thresholds than current state and federal statutes require—in light of the severity of ongoing sedimentation problems in the watershed and High Rock Lake.

Stormwater from Existing Development – Steering Committee and TAG members came to a consensus that nutrient loads from existing developed lands should be managed by allowing investment

commitments from local governments. To achieve those reductions, local governments should be allowed to form a coalition to prioritize and fund load reduction programs and practices, load increase prevention measures, and other actions that protect or improve watershed health. However, the specifics of how, exactly, this kind of investment commitment can be mandated in rule remain under development. Interest in collaborative, cross-sector solutions was significant and persistent, and we strongly encourage DWR to identify ways to incorporate One Water and adaptive management into rule design. Because post-construction stormwater consumed most of the Stormwater TAG's time, management of loads from existing development had the least time available for rule concept development.

Stakeholder Engagement Process

Phase I stakeholder engagement meetings and dates are listed below:

September 29, 2022 – All Stakeholders
November 17, 2022 – Steering Committee
December 1, 2022 – Steering Committee
December 12, 2022 – Agriculture and Wastewater Technical Advisory Groups
January 25, 2023 – Agriculture Technical Advisory Group
January 26, 2023 – Stormwater Technical Advisory Group
February 8, 2023 – Wastewater Technical Advisory Group
February 27, 2023 – Buffer Technical Advisory Group
February 28, 2023 – Steering Committee
March 1, 2023 – Stormwater Technical Advisory Group
March 10, 2023 – Agriculture Technical Advisory Group
March 15, 2023 – Wastewater Technical Advisory Group
March 29, 2023 – All Stakeholders
April 4, 2023 – Stormwater Technical Advisory Group
April 26, 2023 – Steering Committee
April 27, 2023 – Buffer Technical Advisory Group
May 4, 2023 – Wastewater Technical Advisory Group
May 8, 2023 – Agriculture Technical Advisory Group
May 31, 2023 – All Stakeholders
June 7, 2023 – Stormwater Technical Advisory Group
June 21, 2023 – Buffer Technical Advisory Group
July 28, 2023 – Steering Committee
August 17, 2023 – Wastewater Technical Advisory Group
August 25, 2023 – Buffer Technical Advisory Group
September 26, 2023 – Stormwater Technical Advisory Group
September 27, 2023 – Steering Committee
October 10, 2023 – Agriculture Technical Advisory Group
November 6, 2023 – Stormwater Technical Advisory Group
November 11, 2023 – Agriculture Technical Advisory Group
November 28, 2023 – Stormwater Technical Advisory Group
December 12, 2023 – Steering Committee

Members of the Steering Committee and their affiliations are shown below:

Member	Affiliation
Ann Marie Clark	High Rock Lake Association
Dr. Bill Davis	Wilkes Soil & Water Conservation District
Allie Dinwiddie	NCDA&CS Division of Soil & Water Conservation
Keith Huff	City of Winston-Salem
Bill Kreutzberger	Independent Consultant
Keith Larick	NC Farm Bureau
Grady McCallie	NC Conservation Network
Andy McDaniel	NC Department of Transportation
Grace Messinger/Danica Heflin*	Piedmont Triad Regional Council
Edgar Miller	Yadkin Riverkeeper
Chris Millis	NC Homebuilders Association
David Saunders	Yadkin Pee Dee River Basin Association
Justin Somers	Yadkin Soil & Water Conservation District
Judy Stalder	Triad Real Estate & Building Industry Coalition
Jonathan Williams	Town of Spencer
Helen Simonson (non-voting)	Downstream Interest

* Member changed due to staff turnover

Members of each Technical Advisory Group and their affiliations are shown below:

Agriculture Technical Advisory Group	
Member	**Affiliation**
Brent Barnes	Farmer
Randy Blackwood	Natural Resources Conservation Service
Allison Brown	Alexander Cooperative Extension Service
Ryan Coe	Surry Cooperative Extension Service
John Cothren	Wilkes Cooperative Extension Service
Allie Dinwiddie	NCDA&CS Division of Soil & Water Conservation
Taylor Darnell	Forsyth Cooperative Extension Service
Bill Davis	Wilkes Soil & Water Conservation District
Mark Ferguson	Natural Resources Conservation Service
Danica Heflin	Piedmont Triad Regional Council
Julie Henshaw	NCDA&CS Division of Soil & Water Conservation
Adam Hilton	Davidson Soil & Water Conservation District
Lee Holcomb	Natural Resources Conservation Service
Joe Hudyncia	NCDA&CS Agronomic Services**
Keith Larick	NC Farm Bureau
Dwayne Livengood	Farmer
Andy Miller	Davidson Soil & Water Conservation District
Edgar Miller	Yadkin Riverkeeper
Seth Nagy	Caldwell Cooperative Extension Service
Brad Newsome	Farmer
Lance Parker	Natural Resources Conservation Service
Frankie Singleton	Davie Soil & Water Conservation District
Justin Somers	Yadkin Soil & Water Conservation District
Dwayne Tate	NCDA&CS Agronomic Services
Bailey Wood	Surry Cooperative Extension Service

Riparian Buffer Technical Advisory Group	
Member	**Affiliation**
Rabih Abou-Rizk	Blue Ridge Trout Unlimited
Rob Baldwin	Wilkes Soil & Water Conservation District
Richard Cockerham	NCDA&CS NC Forest Service
Keith Larick	NC Farm Bureau
Grace Messinger/Danica Heflin*	Piedmont Triad Regional Council
Edgar Miller	Yadkin Riverkeeper
Chris Millis	NC Homebuilders Association
George Morris	Wild Ones Central North Carolina Chapter
Stormwater Technical Advisory Group	
Member	**Affiliation**
Kelsie Burgess	City of High Point
Brent Cockrum	FEI Consulting
Danica Heflin	Piedmont Triad Regional Council
Kelway Howard	Stimmel Associates PA
Keith Huff	City of Winston-Salem
Scott Leonard	Davidson County
Zach MacKenzie	City of Lexington
Andy McDaniel	NC Department of Transportation
Edgar Miller	Yadkin Riverkeeper
Chris Millis	NC Homebuilders Association
Benjamin Parker	City of Salisbury
Wastewater Technical Advisory Group	
Member	**Affiliation**
Bill Brewer	Winston-Salem Forsyth County Utilities
Kevin Haynes	Tyson Foods Inc.
Doug Lassiter	NC Septic Tank Association
Grace Messinger/Danica Heflin*	Piedmont Triad Regional Council
Bill Kreutzberger	Independent Consultant
David Saunders	Yadkin Pee Dee River Basin Association
Andy Smith	City of Statesville

* Member changed due to staff turnover

** Member changed positions within NCDA&CS during the stakeholder process

Steering Committee Findings

Overall Steering Committee Recommendation: For High Rock Lake to achieve its site-specific chlorophyll-a standard, a reduction of 49% of overall riverine inflow phosphorus loading and 25% of overall riverine inflow nitrogen loading is necessary. Major source sectors should be required to achieve and maintain these levels of load reduction now and into the future, and requirements for each sector should be staged according to achievability and cost. The area above W. Kerr Scott Reservoir was not originally modeled but should be regulated under the same nutrient strategy rules as the remainder of the watershed due to ongoing eutrophication in the reservoir.

Steering Committee members reviewed the modeled chlorophyll-a output which would result from various reductions in nitrogen and phosphorus loading to High Rock Lake over time. Members agree that a primary focus on phosphorus management aligns with existing research which suggests that phosphorus is the limiting nutrient in freshwater ecosystems. At the same time, we recognize concurrent management of nitrogen must be included, even if to a lesser degree, in order to maintain a relatively consistent N:P ratio with current conditions and avoid changing water chemistry to favor proliferation of other, potentially more toxic algal species.

Members are generally in agreement that reducing overall 2006 baseline nitrogen and phosphorus loading by 49% and 25%, respectively, is a reasonable nutrient reduction combination to pursue to achieve the site-specific chlorophyll-a measurement of 35 ug/L at monitoring station YAD152C in the reservoir, which typically has the highest chlorophyll-a concentrations in the reservoir. We have reached the conclusion that early prioritization of phosphorus load reductions, coupled with meaningful reductions in nitrogen loading to be achieved in later years, is the most cost-effective approach to reducing algal productivity in receiving waters. Importantly, we encourage all stakeholders to acknowledge that the process of achieving overall reduction goals and improving water quality in High Rock Lake will take time due to the previous decades of sediment and nutrient accumulation in stream and lake beds.

The Division of Water Resources presented an analysis that suggested applying these reduction percentages variably according to the measurability and achievability of each sector's load reductions, but Steering Committee members remain concerned that disproportionate or unequal burdens could potentially undermine stakeholder buy-in or derail the ongoing emergence of trust between parties. Other nutrient management strategies in North Carolina require equivalent achievement of overall watershed reduction goals from each sector, and members appreciate the value in maintaining numerically equal shared responsibility among all regulated sectors. Steering Committee members recommend that rulemakers seek an equitable balance among various user groups and source categories in the watershed, especially given the significant levels of investment that are likely necessary to achieve the Lake's water quality standard now and into the future.

Strategy Goals

Reduce overall watershed phosphorus loading by 49% from a 2006 baseline
Reduce overall watershed nitrogen loading by 25% from a 2006 baseline

Rule Applicability

All areas upstream of the High Rock Lake Dam, including the area which drains from the headwaters of the Yadkin River to W. Kerr Scott Reservoir

Reference Station

The nutrient loading reduction targets for the site-specific chlorophyll-a standard for High Rock Lake are based on modeling analyses for lake monitoring station YAD152C, which is located just north of the Second Creek arm of High Rock Lake and typically exhibits the highest levels of chlorophyll-a in the lake

Site-Specific Chlorophyll-a Standard

15A NCAC 02B .0211(4)(a): Not greater than one exceedance of a growing season geometric mean of 35 ug/L in the photic zone within a three-year period

Process Comments

Overall, the Steering Committee needed a longer stakeholder engagement process and more time for full analysis and vetting of regulatory concepts. Individual TAG progress would have benefitted greatly from a larger number of staff to coordinate each technical discussion, along with a more structured and potentially even condensed meeting schedule. Some Steering Committee members believe more time should have been allotted for communication between each sector, given the importance of identifying opportunities for cross-sector collaboration and partnership.

In general, members appreciate DWR's well prepared documents and analysis and believe third party facilitators were critical in moving each group forward toward productive decisions and informing stakeholders of the need for improved nutrient management. Others note that the information that was made available reflected very old data and should have been packaged more efficiently to ensure quick progress during initial stakeholder meetings, especially given the amount of time each TAG needed to fully analyze and understand DWR's individual rule concept proposals. In some cases, such as with highly technical stormwater discussions, more data and analysis should have been presented earlier to underpin DWR's arguments for particular, and in some cases more stringent, regulatory requirements. Some data was referenced during discussion and debate, but stakeholders would have preferred better access to research findings. Other members note that DWR made a concerted effort to communicate internal priorities and recommendations in a way that fostered a great deal of trust and reflected an ongoing commitment to transparency.

Division of Water Resources Recommendation: Goal Equity

High Rock Lake is experiencing a persistent water quality problem that is more severe than the eutrophication problems facing other nutrient strategy watersheds in North Carolina. The coupling of a multi-decadal chlorophyll-a impairment with persistent pH and turbidity impairments suggests the need to consider an "all of the above" approach to pollution abatement that prioritizes feasible, cost-conscious and sustainable load reduction programs and practices as determined over both the short run and longer term.

DWR NPS Planning staff understand the importance of distributing load reduction goals fairly across the various point and nonpoint sources in the watershed. In the decades since the first nutrient strategies took effect in North Carolina, the idea that reduction percentage goals should be mathematically proportional across the point and various nonpoint sources has prevailed. However, implementation of other nutrient management strategies has revealed clear challenges and potential real-world limitations on the ability of different nonpoint sectors to achieve large-scale load reductions, at least in the near-term. Based on this experience, NPS staff introduced the idea primarily to the Wastewater TAG of rethinking fairness to focus more on overall practical feasibility, including cost and funding considerations, in lieu of simply assigning equal mathematical proportions to each source type. For point sources, this would involve evaluating the load reduction potential of feasible technology-based limits in comparison to strategy percentage goals, and potentially calling for ultimate load assignments that exceed those percentages. Staff recognizes that TAG discussion time was limited on this subject and more so for the Steering Committee. Comments are welcome on the subject as the Division moves into rules development. Additional description is provided here to facilitate further discussion and analysis.

As recognized above, the various nonpoint sectors face an array of challenges associated with securing, achieving and sustaining such load reductions, significantly greater real-world costs associated with these efforts than those nominally ascribed to practices being utilized, which are often based on study trials, and increasing unit costs as more readily available opportunities are taken. These nonpoint source implementation challenges vary by sector but include: legislated prohibitions or limitations on mandating certain actions; reliance on landowner willingness; frequently fragmented responsibility for property use among parties, e.g. owners, renters, and managers; various practical limitations on physical availability of implementation opportunities; limitations on practice nutrient performance given landscape uses and necessary reliance on passive, untended natural processes; increasing and greater relative vulnerability to climate-driven variability in system inputs and to practice integrity; greater relative exposure to unanticipated human disturbance vectors; and limited technical support resources for ensuring continued, long-term performance of the large numbers of dispersed practices necessary to achieve sizable reductions.

In other nutrient sensitive watersheds, point sources have exceeded load reduction targets due to the relative achievability of optimization and treatment improvements by dedicated, single-purpose facilities with centralized, operable engineered controls, straightforward facility ownership, dedicated operational staff providing real-time performance monitoring, and established public funding streams.

For these reasons, NPS Planning staff believe that a management strategy with the best promise of achieving long-term water quality improvement in in this and perhaps other nutrient over-enriched watersheds is through use of all practically feasible improvements in the short term while also building in meaningful nonpoint source reductions in the longer term. It is therefore appropriate to distribute reduction goals across sectors according to achievability, rather than strictly according to mathematical proportionality.

High Rock Lake Watershed: Agriculture

Overall Technical Advisory Group Recommendation: A centralized oversight committee should report on agricultural practice implementation to characterize how the sector is achieving the watershed nutrient load reduction goals. Reports should be submitted to the Division of Water Resources following a schedule that aligns with the publication of state and federal agricultural datasets. Livestock and waste management should be more carefully evaluated during rulemaking.

Agricultural stakeholders discussed multiple options for reducing overall nutrient loading from pasture and cropland in the watershed. Various rule concepts stimulated lengthy discussion about feasible means of encouraging more responsible storage, distribution, and application of fertilizers and waste materials. Members of the TAG presented the following recommendations to the Steering Committee:

1. A centralized oversight committee should be formed to guide data collection and reporting for ongoing best management practice implementation and planning with respect to agricultural nutrient management.
2. This committee should submit two reports every five years to the Division of Water Resources, alternating biennial and triennial reports which quantify and document conservation practice implementation (biennial) and provide broader implementation recommendations for improving nutrient management on agricultural lands and advancing conservation adoption and implementation in the watershed (triennial).

Members of the TAG discussed conceptual proposals to regulate livestock operation stream access but ultimately could not reach a consensus position on how such a regulation should be structured or implemented. There are notable challenges associated with defining a suitable compliance target for livestock exclusion in a way that is achievable and measurable, and one of the more vexing challenges with defining a compliance threshold for exclusion systems is significant uncertainty about baseline exclusion system presence on the landscape. Stakeholders expressed an interest in discussing animal waste management in more detail and were encouraged to learn that during rule drafting DWR intends to form a separate workgroup to investigate potential new rule provisions in light of current regulatory requirements and limitations.

Steering Committee Analysis

The Steering Committee received no firm and specific load management proposal from the TAG. Most recommendations put forward to date cannot be put into rule or are already part of voluntary programs. A majority of the Steering Committee holds the position that the agriculture sector needs to make additional commitments to achieve the load reductions necessary to meet the site-specific standard. Members acknowledge that agriculture stakeholders ran out of time to reach consensus on a specific approach and target for livestock exclusion implementation for load reduction but remain committed to participating in strategy development. Some members observe that the rapid growth of the poultry industry may indicate a significant underestimation of overall watershed-scale nonpoint source nutrient loading, and unless progress can be made in identifying viable regulatory paths forward, the burden of strategy compliance may fall disproportionately to other sectors and property owners.

In general, members consider livestock stream access management an important component of any strategy to reduce waste delivery to surface waters, even if new requirements allow significant flexibility for the kinds of exclusion systems that will comply, such as allowing a single strand of electrified wire that the producer agrees to maintain. We are encouraged that exclusion systems are the most common cost shared practice under state and federal programs in this watershed, and we recommend moving forward with whatever compliance structure allows this prioritization to continue. It will be crucial that cost share incentive programs remain fully funded to

assist with rule compliance and improve conservation practice adoption and implementation. Given the ongoing success of cost share programs in this and other parts of the state, most members would like to see more achievable and measurable goal setting for the sector.

Division of Water Resources Recommendation: Agricultural Compliance

In the decades since the first nutrient strategies took effect in North Carolina, staff have worked with experts across the state to review the effects of agricultural nutrient strategy requirements. A number of limitations were identified with existing collective compliance requirements for crop and pasture systems across the state.

In other nutrient strategy watersheds, the agricultural sector as a whole is responsible for complying with collective nutrient loss reduction targets, and no individual producer is required to change their operation to comply with the requirement. Over time, data is collected to retroactively assess whether agriculture has achieved the required target reduction. In the event of noncompliance, rules specify that the Environmental Management Commission "may conduct additional rulemaking to require a more specific implementation plan". To provide a more meaningful regulatory construct, NPS Planning staff recommend implementation of an initial collective implementation target in the watershed, where in the event of noncompliance after a stated implementation period, individual operators that meet certain applicability criteria would be required to implement conservation practices on a specified and perhaps staged schedule.

The preponderance of pasture and poultry systems in the watershed, combined with stakeholder interest in prioritizing phosphorus and sediment control from nonpoint sources, suggest that these animal systems should be the primary focus of any agricultural compliance target. The most administratively straightforward means of reducing both direct delivery of waste to surface waters and bank destabilization with associated sediment export, is the exclusion of livestock from rivers and streams in the watershed. A collective-then-individual compliance target should therefore be designed around exclusion of livestock from surface waters, with the fallback compliance option targeted at the largest operations which are contributing to persistent (and outsized) downstream sediment and nutrient delivery.

Additionally, watershed field data and research have shown that agricultural fields are receiving excess phosphorus, and average soil test phosphorus values have the potential to increase nutrient loading through runoff. Researchers have asserted that specific fields with high soil test P and high phosphorus application rates (generally from animal waste) are likely to have potential phosphorus losses from medium to very high (Osmond 2015). Generation and inconsistent transportation of animal waste tends to concentrate repeated waste application in certain areas and may be leading to ongoing phosphorus soil enrichment. Because most phosphorus is non soluble, any excess application to soils in the area is likely to cause phosphorus content to accumulate over time, which leaves very few options for physical removal except uptake by planted crops, which can take many decades to result in more normal phosphorus levels. These over-application "hot spots" have the potential to disproportionately influence downstream delivery of nutrients to High Rock Lake, and any potential rule frameworks should be designed to specifically gauge and address this kind of problematic over-application via animal and human wastes.

High Rock Lake Watershed: Riparian Buffers

Overall Technical Advisory Group Recommendation: A majority of TAG members recommend that 70 feet of riparian vegetation should be protected from land use change. Additionally, timber harvest should be restricted within the first 50 feet of riparian buffer. A minority of TAG members recommend that 50 feet of riparian vegetation should be protected from land use change, with timber harvest restricted within the first 30 feet. TAG members unanimously recommend that existing and ongoing uses within the protected area should be allowed to continue, and that land use triggers and exemptions should be examined carefully during the rule drafting process.

Stakeholders participating in the Riparian Buffer TAG discussed various riparian protection proposals but did not reach a consensus decision. Lengthy discussion accompanied each proposal, and members held differing positions about the extent to which some riparian areas should be protected or restored. A majority of TAG members reached agreement that DWR should restrict land use changes within 70 horizontal feet of all surface waters in the watershed, with some exceptions and exemptions. This majority argued for an expansion of buffer width compared to the widths prescribed in buffer rules in other nutrient management strategies in North Carolina because the steep topography and highly erodible soils of the High Rock Lake Watershed necessitate more rigorous protection from erosion and nutrient-laden sediment delivery. A minority of TAG members proposed an alternative rule that mirrors riparian buffer protection provisions in other nutrient sensitive watersheds, whereby land use changes would be restricted within 50 horizontal feet of all surface waters in the watershed, with some use exceptions and exemptions and timber harvest restrictions in areas closest to surface waters.

Majority Proposal: Protect 70 feet of riparian area adjacent to surface waters, limit timber harvest within the closest 50 feet, and prohibit exposed soil in the outer 20 feet. Allow existing uses to continue but apply buffer protection requirements with any change in land use.

Minority Proposal: Protect 50 feet of riparian area adjacent to surface waters, limit timber harvest within the closest 30 feet, and prohibit exposed soil in the outer 20 feet. Allow existing uses to continue but apply buffer protection requirements with any change in land use.

Steering Committee Analysis

The Steering Committee discussed each proposal at length, and ultimately did not reach a consensus decision on which proposal to recommend to DWR. A majority of Steering Committee members favor the 50-foot minority opinion of the TAG, and a minority of Steering Committee members favor the 70-foot majority opinion of the TAG. Based on this split decision, members of the Steering Committee at a minimum can recommend 50 feet of buffer protection, which maintains critical consistency with other rules and ensures continuation of messaging from resource professionals that operate in other nutrient sensitive watersheds. At the same time, several members observe that as distance from stream increases, the implementation and opportunity costs of additional protected widths potentially exceed the water quality pollution prevention benefits, and expanded protection would risk negatively impacting stakeholder buy-in during rulemaking. We support ongoing availability of incentive cost share programs that encourage voluntary restoration and enhancement of buffer areas beyond what a protection rule can accomplish, and we support ensuring that these programs continue to be appropriately funded with sufficient staff capacity to enable program delivery across the watershed.

From an administrative perspective, several members caution that additional clarity is needed on how buffer protection rules apply to hydrologically connected surface water features and how timber is allowed to be felled and processed on logging decks in areas with steep topography. Most members support the idea of exempting existing and ongoing uses but note that improved education and outreach will be critical for ensuring a smooth transition for regulated landowners. In some cases, there remains confusion about the extent to which protection rules may apply to ephemeral channels and other, more isolated water bodies. Several members have an interest in exempting agricultural uses from buffer protection change-in-use triggers, but others are concerned that doing so would represent a significant departure from the implementation history of other buffer rules and could potentially undermine the overall effectiveness of these protections in limiting stream degradation. Notably, Steering Committee members note that no member of the TAG argued for less buffer protection width than has been implemented in other nutrient sensitive watersheds, and several Steering Committee members are hopeful that this important level of consistency is not undermined during later stages of rulemaking.

Division of Water Resources Recommendation: Buffer Protection

A majority of TAG members and minority of Steering Committee members believe the intensity of water quality impairment and much steeper topography necessitate protection of a 70-foot riparian area adjacent to surface waters. Current buffer protection rules in other nutrient sensitive watersheds protect a 50-foot, 2-zone riparian area from land use change and degradation.

NPS Planning staff certainly note that poor soils and erosive conditions across the watershed have precipitated a more severe state of hypereutrophication in High Rock Lake than in most other receiving waters in the state. The importance of sediment management in controlling downstream nutrient delivery to the Lake cannot be overstated, and riparian protection is a key component of a strategy to protect against further deterioration of river and lake water quality. For that reason, it is certainly appropriate that 50 feet be protected from further degradation. However, NPS Planning staff finds the case for increasing buffer widths beyond the 50-foot standard problematic. In recommending a complex change in land management at the watershed scale, consistency across various landscapes and in different regions will go a long way toward increasing adoption and compliance by private landowners. Producers and landowners across the State have grown accustomed to standardized buffer rule formats in the largest nutrient-sensitive watersheds. Over the decades since the first nutrient strategies were adopted, various stakeholders and interest groups have improved their outreach and engagement materials to defend the value of a 50-foot buffer to property owners, and administrative consistency improves the efficiency of customer service by land and water management agencies at the state and local level.

The buffer protection template utilized in the Neuse, Tar-Pamlico, and Jordan Lake nutrient strategies has undergone decades of peer review, stakeholder input, and agency revisions. These rules have been honed over time to provide an optimized balance between landowner needs and watershed-scale water quality protection, and existing statutes even provide allowances for local governments who are interested in protecting more than the minimum required by state law (§ 143-214.23A(d)). Beyond the traditional 50-foot width required in other watersheds, the cost effectiveness of protection decreases, as increasing widths provide a decreasing pollutant reduction value per additional foot of protection. For these reasons, NPS Planning staff find it difficult to argue for protection of more than a total of 50 feet.

High Rock Lake Watershed: Stormwater

Overall Technical Advisory Group Recommendation: More stringent post-construction stormwater treatment requirements should be applied to all newly developed lands within municipal and county jurisdictions in the High Rock Lake Watershed. Additionally, ongoing nutrient load reductions from previously developed areas should be required of all jurisdictions, and compliance with these requirements should provide the option for jurisdictional investment that allows for local governments to prioritize cost-effective load reduction programs and practices. The specifics of new post-construction stormwater requirements should be more carefully evaluated during rulemaking.

Members of the Stormwater TAG extensively discussed current post-construction stormwater requirements across the watershed, some of which are mandated by the State and others of which are mandated by local jurisdictions. Some TAG members shared their experiences with post-construction stormwater requirements implemented as part of other nutrient strategies. To meaningfully improve stormwater management in the watershed, TAG members reached agreement that any new post-construction treatment requirement implemented by the State should apply equally to all jurisdictions in the watershed. This consistency will ensure fairness among all local governments, as well as avoid forcing development to concentrate in areas that are subject to fewer post-construction stormwater requirements. Administrative consistency from rule effective date will guard against the emergence of additional stormwater runoff hotspots in otherwise unregulated parts of the watershed.

Various post-construction treatment concepts were proposed, and TAG members were unable to reach consensus in recommending any in their current form. Most members felt they lacked the time necessary to weigh in on highly technical revisions to complex stormwater control regulations and provide alternative rule proposals. Most TAG members recommend additional expert review to develop workable performance standards for in the watershed. In general, however, TAG members expressed support for more stringent post-construction stormwater requirements than are currently required in the watershed, as well as application of these requirements at lower density thresholds than those required in most areas under Water Supply Watershed statutes, to limit nutrient load increases on newly developed lands.

Additionally, the challenge of improving stormwater management on the landscape of existing roadways, homes, businesses, and other hardened structures generated significant discussion. Nutrient loading from the existing developed landscape, most of which when built did not involve capture and treatment of stormwater runoff, presents local governments with a significant challenge to identify feasible means of reducing overall loading to High Rock Lake. Ultimately, TAG members reached agreement that the most viable means of encouraging improvements in existing development storm runoff is likely a structure that requires specified levels of financial investment in runoff and nutrient load improvement programs by local governments. This kind of approach would allow each jurisdiction to prioritize the most cost-effective solutions for their landscape, infrastructure, and residents.

1. In order to avoid administrative complexity and avoid burdening unregulated areas with increased development pressure, post-construction stormwater treatment requirements should apply equally to all local government jurisdictions within the High Rock Lake Watershed.
2. Any requirement that local jurisdictions reduce their overall existing development nutrient loading should include an investment-based compliance option that allows local governments to prioritize cost-effective load reduction programs and practices.
3. On-site wastewater loading will be managed above baseline levels by including septic system education, outreach, inspection, maintenance, and repair in an existing development reduction program.

Steering Committee Analysis

Many Steering Committee members feel they lack the expertise necessary to weigh in on technically complex stormwater proposals. In that sense, most members encourage DWR to work with subject matter experts to more carefully examine post-construction treatment proposals which seem to be attempting to correct for ongoing limitations of such requirements in other nutrient sensitive watersheds. Consistency of jurisdictional obligation across the entire watershed is widely supported, given the manner in which downstream erosive flows accumulate incrementally across the entire landscape. Sedimentation and erosion are regional problems which will require regional consistency, and downstream users and landowners often bear a disproportionate and costly burden from unmanaged storm flows in upstream areas.

Members of the Steering Committee are generally in favor of lowering development densities which require stormwater treatment, and many note fact that local jurisdictions will be tasked with carrying a heavy workload as these permitting requirements take shape across the watershed. In general, members support exemption of post-construction stormwater treatment requirements for low density, single-family residences that are not part of a larger common plan of development, especially in light of the critical need to ensure that treatment structures are actively maintained into perpetuity. The density threshold for single-family exemptions from other nutrient sensitive watersheds should be carefully reexamined for adoption under a High Rock Lake mandate due to more rural development patterns in the area and the watershed-wide applicability of stormwater treatment requirements, which may necessitate a higher exemption threshold to provide landowner flexibility.

Many Steering Committee members support TAG recommendations as valuable starting points for ongoing discussions but acknowledge that much more work is needed to hone treatment requirements to ensure that erosion and nutrient delivery are appropriately managed in areas of rapid population growth.

This is especially important for local governments in managing load from existing developed areas, where members have voiced support for an investment-based compliance program similar to the one currently being implemented in the Falls Lake Watershed. Local jurisdictions should be allowed to comply with existing development rule mandates by opting to invest in load reduction practices and programs or pursuing a structured program for retrofitting existing sites. Steering Committee members support the idea of using existing development mandates to facilitate cross-sector partnership and collaboration, especially in a way that allows flexibility for local communities to prioritize the load reduction programs and practices that work best for them. We note, however, that the hitherto untested idea of collaborative partnerships for watershed-scale rule compliance warrants additional analysis during rule drafting.

Some members note that loading from on-site wastewater systems has likely been underestimated in model development and recommend additional investigation and improved enforcement from local city and county governments. We support the incorporation of on-site wastewater system education, inspection, and repair into existing development load reduction programs and mandates but note that ongoing local capacity presents a persistent limitation to the elimination or replacement of malfunctioning or failing systems. A voluntary coalition of local partners can facilitate strengthened delivery of this kind of management program.

Division of Water Resources Recommendation: Post-Construction Treatment Requirements

In other nutrient sensitive watersheds, a focus on nutrient pounds counting has resulted in a complex calculation process which aims to keep post-development nutrient export below a calculated value for each watershed. Producing this value for each watershed requires a number of simplifying mathematical assumptions, the objective of achieving strategy reduction goals on a project basis involves assumptions that have not necessarily borne out, and compliance with these rates has added administrative complexity to the development approval process, including the resource-intensive component of offsite load reduction measures as part of compliance. In recommending a transition to hydrologic control standards, NPS Planning staff proposes to learn from post-construction stormwater treatment requirements employed by other states. The proposal shifts from the nutrient performance basis used in the Neuse, Tar-Pamlico, Falls Lake, and Jordan Lake nutrient strategies, to a hydrologic performance basis that is designed to address both site nutrient control and receiving stream channel protection. Staff believes this transition will provide greater familiarity, predictability and simplicity for developers and engineers.

Additionally, most nutrient strategy new development rules and state stormwater rules trigger stormwater treatment requirements at a high-density threshold of 24% BUA. This threshold is significantly higher than the 10% watershed-scale impervious threshold where streams have been shown to destabilize and experience reductions in ecological integrity, and 24% is in a range where aquatic life and nutrient cycling is significantly degraded, and unstable channels have become sediment and nutrient sources. Experience in other watersheds tells us that a certain amount of post-construction lot alterations are to be expected as property owners make improvements that add impervious surfaces. This means that a watershed where treatment requirements are triggered at 24% is likely to have significant portions of the developed landscape that exceed this threshold and have inadequate or no stormflow controls. NPS Planning staff believes that a 12% high density BUA threshold is reasonable and appropriate for purposes of protecting receiving streams' integrity, preventing them from becoming sediment and nutrient sources, and minimizing increases in nutrient loading.

It appears that in watersheds where state stormwater controls are implemented, streams still tend to become destabilized, widen, downcut, migrate and exhibit poor biological health. The typical requirement to detain and treat runoff from 1" of rainfall does not appear to sufficiently reign in the increased flashiness of the post-development runoff hydrograph. A previous attempt by the state to address this hydrologic impact issue by adding a pre/post peak flow rate match requirement was found through studies to potentially exacerbate stream channel impacts and was discontinued. Investigation of approaches used in other states finds that various, more protective measures are frequently required to mitigate the hydrologic impacts of development on runoff. Two elements used in comparable physiographic regions of Chesapeake Bay states involve recharging a portion of the water quality volume and using a modified pre/post peak rate match for larger storms in the stream channel bankfull discharge range. NPS Planning staff believe similar criteria are suitable for the High Rock watershed and will accomplish the intended stream protection and nutrient objectives while not being overly burdensome on the development community.

High Rock Lake Watershed: Wastewater

Overall Technical Advisory Group Recommendation: NPDES Wastewater permits should be amended during the first renewal cycle to require a phosphorus discharge limit of 0.75 mg/L for large facilities and 1 mg/L for smaller facilities, both of which will be applied at permitted flow. Permits should also be amended to require a nitrogen discharge limit of 6 mg/L for large facilities and 10 mg/L for smaller facilities at the second permit cycle after nutrient strategy rules take effect, also at permitted flow.

Members of the Wastewater TAG brought forward recommendations that were outlined in the work completed by the Yadkin-Pee Dee River Basin Association and outside consultants. These recommendations apply a more rigorous treatment standard to facilities that discharge at least 1 million gallons per day for phosphorus, and at least 5 million gallons per day for nitrogen. This reflects both that the wastewater facilities for the largest communities discharge a majority of the loading contribution in the watershed and also the potentially limited resources available to upgrade treatment facilities for much smaller communities and neighborhoods. Members expected the wastewater sector to perform significantly better than their mandated reductions much like dischargers subject to other nutrient strategy regulations but have made clear the importance of allowing operators to trade these excess achievements to other sectors (especially existing urban areas served by the same local governments that own the wastewater facilities) who have differing capacities to reduce overall nutrient loading, via a comprehensive watershed-scale trading system. The specifics of the proposal are as follows:

At 1st permit renewal after rule effective date

- A 0.75 mg/L phosphorus equivalent concentration at permitted flow will be applied to all facilities with permitted flow larger than 0.99 million gallons per day
- A 1.0 mg/L phosphorus equivalent concentration at permitted flow will be applied to all facilities larger than 0.10 MGD but equal to or smaller than 0.99 million gallons per day

At 2nd permit renewal after rule effective date

- A 6.0 mg/l nitrogen equivalent concentration at permitted flow will be applied to all facilities with permitted flow larger than 4.99 million gallons per day
- A 10.0 mg/l nitrogen equivalent concentration at permitted flow will be applied to all facilities with permitted flow larger than 0.10 MGD but equal to or smaller than 4.99 million gallons per day

Steering Committee Analysis

The Steering Committee supports TAG recommendations that show a willingness to shoulder a significant burden for compliance with strategy goals. We commend TAG members for providing data that showed the relative cost-effectiveness of aggressive phosphorus management. Reductions in both phosphorus and nitrogen are likely to be realized over a very short time frame, and the permit limits proposed will demonstrate measurable and achievable success. Members recognize TAG willingness to meet and exceed proposed reduction goals.

At the watershed scale, however, overall success is likely to remain undetectable due to the lack of firm commitments or short-term achievable reductions from nonpoint source sectors, many of which represent a larger portion of overall nutrient loading to High Rock Lake. To maintain strategy fairness, nonpoint source stakeholders should continue to strengthen regulatory commitments, especially in the agricultural and stormwater sectors.

Most Steering Committee members recognize the value of providing a group permitting option for members of a proposed wastewater compliance association, but some Steering Committee members caution that DWR should work diligently to ensure that such a group compliance option doesn't allow "hot spots" to emerge where smaller facilities are allowed to discharge into tributaries without nutrient controls. This is especially important in areas with high concentrations of package plants and residential on-site wastewater systems. We recognize and support that DWR intends to continue working with industrial dischargers during rule drafting to identify a viable path toward permitting those facilities in a way that respects their different technological challenges than typical publicly owned treatment works (POTW) and other facilities treating primarily domestic wastewater.

Division of Water Resources Recommendation: Point Source Controls

Implementation of other nutrient management strategies has demonstrated not only the difficulty, and even doubtful capability, of achieving and maintaining significant load reductions from nonpoint sources, but also the relatively high cost burden associated with each reduced pound of nutrient loading in nonpoint sectors. This cost burden is disproportionately high for nonpoint sources, in part, because nonpoint source pollution is generated across landscapes with significantly more complicated land and property ownership. Nonpoint source pollution control requires coordination with a large number of different landowners, and control practices must be implemented on private property, which in other watersheds has proven challenging. For this reason, the achievability and pound-for-pound cost-effectiveness of point source load reductions is significantly greater than that of nonpoint source load reductions.

Large NPDES discharge facilities which treat wastewater for larger municipalities in the High Rock Lake Watershed are responsible for a significant share of overall point source nutrient loading delivered to surface waters. As a result, the scale of achievable nutrient load reductions that can be realized from treatment upgrades at these larger facilities is significantly greater than that which can be achieved from upgrades at all smaller dischargers in the watershed, combined.

NPS Planning staff observe that in other nutrient sensitive watersheds in North Carolina, point sources have not only consistently exceeded load reduction targets for both nitrogen and phosphorus, but in doing so facilities frequently or routinely meet or exceed widely understood limits of the best available treatment technologies, including cases with small customer bases and limited population growth. In the High Rock Lake watershed, preliminary cost estimates from NPDES staff and dischargers' consultants appear to project similar capital cost and net present value between meeting phosphorus limits of 1.0 mg/L and 0.5 mg/L for generic wastewater operations, and only modest increases in O&M costs in moving from 1.0 to 0.5 mg/L. (Additional clarifications from dischargers' consultants appears to suggest significant cost increases between 1.0 and 0.5 mg/L. Further analysis will be necessary during rulemaking.)

More broadly, EPA analyses find that dischargers can regularly achieve phosphorus concentrations of at or below 0.1 mg/L with a combination of chemical additions and tertiary filtration. It has been stated that facilities in the High Rock Lake watershed currently lack this filtration, and that adding it would represent an unknown additional cost, recognizing that filtration needs are facility specific and depend entirely on-site constraints. Without knowing this cost, based on all of the above, it would nevertheless preliminarily appear to staff that large dischargers may be well positioned to meet a more stringent phosphorus limit without incurring significant additional per volume costs. If implemented as suggested, such a permit limit for the largest dischargers would result in an estimated 10% additional overall phosphorus loading reduction to High Rock Lake from point sources, which would be significant in staff's view.

Appendix A: High Rock Lake Stakeholder Engagement Process Charter

The purpose of this charter is to outline the state's vision for a High Rock Lake Stakeholder Engagement Process to develop draft rules and recommendations intended to remedy nutrient-driven impairment of High Rock Reservoir. The stakeholder process is to be launched September 2022. It is intended to occur in two steps spanning a total of approximately 15 months including a several-month pause where state staff will draft rule text. This Charter provides a structure and meeting timeline for the process, including purposes and authorities of different stakeholder teams, their coordination, interactive protocols, and a decision-making approach, and it also provides relevant background information and context for participants. The products of this process will be captured in a report that will guide the NC Division of Water Resources through formal rulemaking pursuant to the NC Administrative Procedures Act, Ch. 150B. This Charter is intended to provide a transparent foundation for an inclusive and mutually respectful process of rules development.

Water Quality History

High Rock Lake was built almost 100 years ago for the generation of hydroelectricity. The reservoir became a popular regional recreational amenity, and now has a history as a productive freshwater fishery, where anglers visit from across the state to pursue trophy largemouth bass. In addition, several drinking water intakes have become established along the Yadkin and South Yadkin Rivers, as well as one below the spillway of the dam.

More recently, since at least the 1970s, High Rock Lake has been recognized as eutrophic, that is supporting high levels of aquatic plant growth, and a 1992 survey of state lakes declared it one of North Carolina's most eutrophic lakes. Since reservoirs can have unnaturally large watersheds and intercept large amounts of sediment and nutrients, eutrophication is not necessarily unexpected; nevertheless, it can create problems. This has become the case for High Rock Lake. While algae is a foundation for the lake's food web, high nutrient inputs drive both excessive algal growth, which creates stressful conditions for fish and other aquatic life, and shift algal species composition toward undesirable types. Excessive growth creates large daily swings in available oxygen and depletes oxygen as algae dies and decays, which stresses or kills more susceptible aquatic organisms. Many blue-green algal species favored by high nutrient levels are undesirable as food sources. These conditions narrow and degrade the food web in highly enriched lakes. In addition, algal mats can be unsightly, give off odors, and impede passage. They can also shift pH into the basic range, giving the water a "slippery" feel on the skin. Excessive algal growth around drinking water intakes can increase treatment costs for communities and potentially produce undesirable compounds. Finally, some blue-green species can produce toxins that are harmful to other aquatic life, wildlife, domestic animals, and in sufficient quantity even humans.

Beginning in 2004, state water quality monitoring found the lake to be "impaired" due to excessive chlorophyll-a levels and high pH readings throughout the lake, as well as excessive turbidity in the upper lake, all exceeding state standards for these parameters. Chlorophyll-a is the primary measure of algal productivity, and high pH here is also driven by too much algae. The lake now experiences algal blooms in every season except winter, year after year. The main algal species observed and reported by local residents is black mat algae (Lyngbya wollei), a blue-green species that is frequently reported to create

an aesthetic, swimming and boating liability, but can potentially also cause skin rash and trigger respiratory problems.

Regulatory Background

Following the 2004 impairment determination on High Rock Lake, the Division of Water Resources (the Division) engaged stakeholders to form a technical advisory committee (TAC) to guide monitoring and modeling of the lake and its watershed to support development of a nutrient strategy. The TAC guided an intensive monitoring program between 2005 and 2010 to collect a baseline of water quality conditions. The consulting firm Tetra Tech used the resulting data, together with other watershed data, to develop a watershed model that characterized all land and water uses in the watershed, both point and nonpoint source, and their effects on water flows and associated nutrient loading to High Rock Lake. Tetra Tech then developed a lake nutrient response model that characterizes how lake ecology, especially algal production, has responded to incoming nutrient loading and will respond to reduced nutrient inputs. A "curve" was then developed using the lake model to quantify the percentage that each nutrient (phosphorus and nitrogen) must be reduced to achieve chlorophyll-a levels at or below the state standard. These percentage reductions provide goals on which to base a nutrient management strategy. The stakeholder TAC provided feedback on products at each stage of the process.

The federal Clean Water Act of 1972, as well as state statute, requires that when a water body is determined to be impaired, the State shall take action to remedy the impairment. Nutrient-driven impairments like High Rock Lake's stem from multiple sources throughout its watershed and call for the most comprehensive type of management approach, one that is done in a "fair, reasonable and proportionate manner" (NCGS 143-215.8B.). The NC Environmental Management Commission is charged with adopting rules to carry out such management strategies (NCGS 143B-282(a)-(d)). Such regulatory nutrient strategies have been implemented for the Neuse and Pamlico estuaries and more recently for Jordan and Falls Lakes.

Stakeholder and Rulemaking Processes

The Division is responsible for developing a comprehensive set of rules to address the nutrient-driven impairment of High Rock Lake, and for taking those rules through a formal rulemaking process before they can become effective. Given the regulatory mandates described above along with the complex nature of watershed restoration strategies, the Division considers it important to involve watershed stakeholders to the greatest extent possible in nutrient management strategy design. Nutrient loading includes both "point" sources, which are any kind of discharge that originates from a single, concentrated location, and "nonpoint" sources, or any activity that carries pollutants into streams and lakes via stormwater runoff and other diffuse pathways. Thus, we seek to engage people involved with all sources, and those who benefit from the resource, in developing solutions for the lake.

As planned by the Division, the entire High Rock rulemaking process will occur in two parts - first is the informal, collaborative strategy development process with watershed stakeholders, which will be followed by the more formal, structured state-mandated rulemaking process. Since the remainder of this document will lay out the first, informal stakeholder process, here is a brief description of the second part. The formal rulemaking process follows the requirements of the NC Administrative Procedures Act, Ch. 150B. Once the Division has draft rules in hand and receives preliminary approval to proceed from the Water Quality Committee of the NC Environmental Management Commission, staff will develop a

fiscal analysis of proposed rules' costs to affected parties and benefits, and seek approval of that analysis by the Office of State Budget and Management. For these rules, this step takes months to complete. The full Environmental Management Commission then also approves the rules and fiscal note and gives staff approval to proceed. Public hearings are then held during a 60-day comment period. Hearing Officers appointed by the EMC (usually EMC members) will review all oral and written comments provided during the comment window and work with DWR staff to revise the rules as they deem appropriate based on that input. This stage is also likely to take several months. The EMC then receives a report summarizing public comment and providing the Hearing Officers' recommended changes to the rules. The EMC has the authority to take any action they deem appropriate with the draft rules, including calling for further revisions. If the rules are substantially revised, another comment period is required. Once the EMC adopts rules, they must be approved by the NC Rules Review Commission based on a review of statutory authority, ambiguity and reasonable necessity. The formal rulemaking process can vary greatly in length but for complex rule sets supporting a nutrient strategy, may be expected to take roughly 2 years. Through this formal process, opportunities for public input are intended to be limited to the designated comment period.

Purpose of the Stakeholder Process

In order to enter the formal rulemaking with a workable, well-supported set of rules, the Division intends to provide the fullest opportunity for public engagement through the professionally facilitated stakeholder process outlined in this Charter. This stakeholder process is expected to span approximately 15-18 months. In total, the entire rulemaking process encompassing this stakeholder process and the formal rulemaking is likely to run into at least 2025.

It is the intent of the Division to work with stakeholders over the next year or more to identify the most mutually satisfactory set of draft regulations that will achieve the objective of reducing nutrient inputs to High Rock Lake over time. Similar processes were conducted in the Neuse and Tar-Pamlico River Basins, as well as the Falls Lake and Jordan Lake Watersheds, leading to comprehensive nutrient strategies. Once a draft strategy has been developed, it will be taken through the state's formal rulemaking process described above. The purpose of this stakeholder engagement process is two-fold. One is for interested parties to have the opportunity to gain a deeper understanding of: the water quality need identified by the state; the state's legal mandate to take action; and the components of a strategy considered necessary to improve water quality at High Rock Lake. The second is for stakeholders to have the opportunity to work together and with the Division to develop a set of draft proposals for fair, reasonable and proportionate strategies to reduce phosphorus and nitrogen inputs into the High Rock Lake watershed, and to provide a report containing these proposals to the Division of Water Resources as a recommended basis for rulemaking.

Stakeholder Meeting Process and Teams

For the purposes of meeting process objectives, stakeholders are organized into three types of interdependent groups, each with a different charge and level of responsibility: All Stakeholders, the Technical Advisory Groups (4), and the Steering Committee.

All Stakeholders

As the name suggests, this group consists of all interested parties, including those who will take a more hands-on role in one of the working teams. This group will have only a few meetings and will provide relatively limited input to the process. The primary purposes of the All Stakeholders group are: to gain a shared understanding of the nutrient-driven water quality issues in High Rock Lake, and the associated need for watershed management actions, from the state and from each other; to raise issues and ideas for the working teams to consider; and to comment on the potential impacts of draft working team recommendations on everyone in the watershed.

Composition Open. Consistent participation across all meetings encouraged.
Methods Several avenues of communication will be available to the interested public. First, several all-parties meetings will be held, with both in-person and hybrid options made available as necessary. In addition, a comment form will be made available on the DWR website for all stakeholders to comment on the process, goals, methods or specifics of the strategy. This form will provide commenters the ability to identify their target audience - Steering Committee, a specific TAG, the Division, or the Facilitation Team. In addition, contact information will be publicly posted for members of the Steering Committee, TAGs, the Division, and Facilitation Team. Any stakeholder who wishes to take a more active role will be encouraged to request membership on either the Steering Committee or a TAG, depending on their expertise and level of commitment.

Schedule: Meeting 3-4 times, roughly every 4-5 months.

Technical Advisory Groups

The Technical Advisory Groups (TAGs) will have primary responsibility for generating recommendations to the state on regulations and other actions needed in their subject areas to improve the water quality of High Rock Lake. With guidance from the Steering Committee and the Division, these TAGs will submit initial draft recommendations to the Steering Committee and All Stakeholders for consideration. Weighing All Stakeholders' comments, the Steering Committee will develop written feedback identifying concerns and offering change recommendations to the TAGs. In turn, the Technical Advisory Groups will review this feedback and revise recommendations as they see fit for inclusion in a final report from the Steering Committee to the Division.

Constitution: Four areas, each with its own team: Agriculture; Wastewater; Stormwater; Riparian Buffers. Sign up only.

Composition: Consistent participation through process requested. All perspectives, with weight toward stakeholders who have most knowledge &/or investment in rule outcomes. Subject Matter Experts may be members of TAGs or be sought by TAGs for consultation at points in the process.

Methods: Virtual meetings, 2 hours each.

Schedule: 4-8 virtual meetings of each group, roughly monthly over 6-8 months, beginning late October.

Steering Committee

The Steering Committee will be responsible for drafting nutrient management strategy goals for the watershed, which includes recommendations for relative weighting of nitrogen and phosphorus

reduction magnitudes for control purposes to achieve long-term water quality improvement. The Steering Committee will have guidance and oversight responsibility over the Technical Advisory Groups. In light of All Stakeholders input and based on modeling guidance from the Division, it will provide initial recommendations to the TAGs at the outset of their meeting processes and again after reviewing initial draft TAG proposals and considering feedback from All Stakeholders. The Steering Committee will be responsible for development of a report to the Division recapping the meeting process and outlining conceptual rule proposals and other action recommendations toward meeting lake nitrogen and phosphorus loading goals.

Constitution: Maximum 15 individuals. Members to be selected from sign-up list by DWR with input from DSC to balance interests and perspectives.

Composition: Consistent membership that strives to be inclusive of all interests in the lake. Experience with similar management initiatives, professional knowledge and skills in a related area preferred. May also serve on a TAG.

Methods: Mixture of in-person and virtual meetings. Start with in-person meeting if possible. Initial 3-4 hour meeting, then 2 hour meetings thereafter.

Schedule: 5-8 meetings; grouped at start, midpoint and end of TAGs processes, otherwise ad hoc per identified need.

Additional Groups

To support the activities of the three stakeholder teams outlined above, three other groups are integral to this process: Division of Water Resources staff; Subject Matter Experts enlisted as needed; and the Facilitation Team (aka “Crew”).

Division of Water Resources

The Division of Water Resources has as its primary purposes to listen to stakeholders, to assist with development of recommendations, to provide policy and technical guidance based on experience as applied to this watershed, to advise stakeholders where proposals appear fundamentally problematic from a staff standpoint, and to offer potential alternatives for consideration. Preceding the latter stage of the informal stakeholder process, DWR staff intends to draft rules content, possibly including options, for further consideration by the Steering Committee and stakeholders. At the conclusion of the informal process, Division staff will present the stakeholders’ report to the NC Environmental Management Commission.

Composition: Joey Hester, Rich Gannon, others as necessary.

Schedule: Relevant team members attend and facilitate all meetings, virtual and in-person.

Subject Matter Experts (SMEs)

Subject Matter Experts (SMEs) will be important throughout the process to provide technical grounding and insights from a content standpoint. SMEs may or may not weigh in on policy recommendations, depending on their expertise, but they typically don’t participate in decision-making actions. SMEs will be invited from agricultural agencies, university researchers, state on-site wastewater staff, state

stormwater agency staff, DWR wastewater permitting, modeling, standards, and Buffer permitting staff, and any other professionals or researchers with relevant expertise identified as useful by DWR or stakeholders during the process.

Facilitation Team

The Facilitation Team is a group of experienced professionals who act as a neutral convener for the process. The Facilitation Team will work with all stakeholders to design meetings and processes that value everyone's time, maintain momentum and work toward process goals. Other key roles include ensuring equitable participation, keeping to stated guidelines/guardrails and supporting teams in upholding working agreements. The facilitators will help implement a consensus approach to decision-making by the Steering Committee and TAGs (see Decision Process below). The Facilitation Team will also record the process and provide stakeholders the opportunity to share input along the way via post-meeting surveys.

Composition: A team of 4 professional facilitators from DSC.

Schedule: Relevant team members attend and facilitate all meetings, virtual and in-person.

Roles and Responsibilities of Participants

1. Make all reasonable efforts to attend all meetings that are scheduled with adequate notice.

2. In meetings, explain interests openly and fully, and look for mutually beneficial solutions.

3. Follow through on commitments, such as providing contact information on potential stakeholders for teams, gathering information, doing background reading, and reviewing draft rule language.

4. Report back to the groups they represent. Explain and support any consensus agreements reached by the team. Bring their organization's feedback or unresolved issues to the relevant team or Steering Committee.

5. Steering Committee members provide constructive input on draft recommendations developed by the Technical Advisory Groups.

Members of each team or committee are encouraged to work within their realms of influence and in their organizations to contribute to successful implementation of adopted recommendations and rules even after the informal engagement process has concluded.

Decision-Making Process

The intent for this process is that the Steering Committee and the Technical Advisory Groups will strive to make decisions by consensus whenever possible. Part of DSC's role will be to facilitate the implementation of this approach. Consensus requires the active participation of everyone in the group and an atmosphere where disagreements are respected. When someone disagrees, the goal of the group shall be to discover the reason for the objection and to find a way to work toward meeting that need in a revised agreement. Consensus is being defined as at a minimum, "I can live with and support the decision."

Consensus agreements reached in one team meeting should not be reconsidered in a subsequent meeting without the consent of all participants in attendance.

If the group is unable to reach consensus within the time constraints of the rulemaking process, the difference may be solved several ways depending on the situation. If two or three feasible options are proposed, then the list may be narrowed by a vote of the group to the smallest number of options as is reasonable.

As both a participant in the process and the recipient of the stakeholders' recommendations, DWR has a unique role. DWR staff will commit to voicing their views and concerns throughout the process to provide as much transparency as possible. If ultimately DWR staff cannot support a significant element of stakeholder recommendations, they will make such views known and will include such positions in the final report. In such a case, DWR staff may recommend an alternative proposal for inclusion in the recommendations.

Ground Rules

- Stick to the tasks and topics on the agenda and keep discussion focused; one subject at a time.
- Discuss all relevant information and issues, even difficult ones.
- Keep discussion open and balanced.
- Participate, show up, share your thinking as much as you can.
- Strive to make decisions by consensus.
- Look beyond positions to interests.
- Disagree openly and respectfully.
- Put personal differences aside in the interests of a successful team.
- Jointly design ways of testing disagreements and look for mutually beneficial solutions.
- Follow through on commitments.
- Share information discussed in team meetings with your organization and reflect its position back to the team.
- While participants are free to discuss the process outside of official meetings, decisions will be made during meetings themselves.

Appendix B: Agriculture Technical Advisory Group Final Report to Steering Committee

The High Rock Lake Agriculture Technical Advisory Group (TAG) consists of several farmers from across the watershed and representatives from the following organizations:

- Davie, Davidson, Yadkin, and Wilkes Soil and Water Conservation Districts (SWCDs)
- Natural Resources Conservation Service (NRCS)
- Alexander, Caldwell, Forsyth, Surry, and Yadkin County Cooperative Extension Service (CES)
- NC Department of Agriculture & Consumer Services (NCDA&CS) Division of Agronomic Services (AS)
- NCDA&CS Division of Soil and Water Conservation (DSWC)
- NC Farm Bureau (NCFB)
- Piedmont Triad Regional Council (PTRC), and
- Yadkin Riverkeeper.

The Agriculture TAG met with representatives from the Division of Water Resources (DWR) five times between December 2022 and December 2023. This report presents background information about agricultural and conservation program trends in the High Rock Lake watershed as well as the TAG's considerations for nutrient strategy development and sector collaboration. Agriculture TAG discussions and member perspectives, both consensus views and differing positions among members, have been catalogued in this report for consideration by the High Rock Lake Steering Committee.

Background – Agriculture in the High Rock Lake Watershed

Due to the dispersed and varied nature of agriculture across the landscape, identifying watershed wide opportunities for sector improvements can be challenging. Between 2012 and 2014, a statistically valid survey was completed to provide High Rock Lake watershed-specific information about agricultural cropping systems, soil types, Best Management Practices (BMPs), livestock types, and farmers. Key findings from this agricultural characterization watershed study include:

- Almost half of farmers do not farm full-time;
- Pasture and hay land are the dominant agricultural land uses and most is under-fertilized;
- Dominant pastured livestock are cattle and horses;
- Crops other than hay generally receive appropriate agronomic nitrogen (N) fertilizer rates (hay is mostly under-fertilized);
- Cattle stocking rates are generally at recommended levels (with some exceptions);
- Weighted average soil test phosphorus index (P-I) values for most counties in the High Rock Lake watershed were High or Very High (P-I>60). Soil test P-I values indicate the probability of a crop response to fertilizer. Phosphorus loss potential from agricultural lands is a function of soil test P-I and the amount of soil loss and runoff. Average High or Very High soil test P-I values seen in this watershed increases the potential risk of soluble phosphorus loss through runoff, although certain BMPs and other factors affecting soil loss and runoff can mitigate this risk. Phosphorus loss potential from agricultural fields is calculated using the Phosphorus Loss Assessment Tool

(PLAT) which considers soil test results and crop response along with mitigating practices and other parameters;[1]

- Approximately 40% of fields sampled in the High Rock Lake watershed were fertilized with phosphorus (P). Of these fields, 14% were over fertilized and 29% needed fertilizer and received it;
- Soil testing is frequently completed although soil test recommendations for applied P are generally not matched when fertilizer is applied. Most fertilization is occurring at an agronomic rate for N, which can result in overapplication of P;
- Predominant organic fertilizer applications are varying types of chicken waste and dairy waste;
- 89% of farmers did not have a nutrient management plan (11% of farmers did have a management plan). Of those without a nutrient management plan, 75% individually determined nutrient recommendations, 13% did not apply commercial fertilizer, 6% received recommendations from a fertilizer dealer and 6% used recommendations from other sources (NRCS, other farmers, etc.). For fields with nutrient management plans, 32% used commercial and animal waste fertilizer, 13% used only animal waste fertilizer, and 55% had commercial fertilizer applied. Most nutrient management plans were written by NRCS and fertilizer dealers;
- There is a high frequency of riparian buffers on agricultural fields (with some exceptions); and
- Generalized PLAT ratings based on averaged or weighted mean county data and simplifying assumptions indicate low phosphorus (P) loss potential from most buffered and unbuffered crop, pasture, and hay land in the watershed. This conclusion does not negate that specific fields with High or Very High soil test P-I values and high P application rates have the potential to have medium to very high P losses.[2]

Agriculture TAG members largely found study conclusions coincided with experience and current knowledge of local management. The TAG members went on to collect and discuss additional management and practice information. Some TAG members reported, based on anecdotal evidence, that many large cropland farmers in their county have transitioned, without cost share assistance, to precision nutrient management due to market forces. Precision nutrient management involves variable fertilizer application based on high resolution spatial data resulting in concentrated applications only in locations with nutrient deficiency. TAG members have reported that precision nutrient management is rapidly becoming industry standard given high costs of fertilizer inputs and labor shortages. Technology is also rapidly advancing resulting in precision application becoming more accurate. TAG members also reported that poultry litter is frequently used as a fertilizer in the watershed, although certain counties and regions have more access to litter than others. Litter is frequently analyzed for nutrient content and is commonly applied at an agronomic rate for nitrogen. This fertilization approach often builds phosphorus reserves in the soil. TAG members have reported that fields nearest poultry houses and

[1] The phosphorus index (P-I) provided on a soil test reflects the level of phosphorus found in soil. An average P-I for a county in Dr. Osmond's study was calculated by summing all P-I from individual soil tests and dividing by the number of tests. A weighted P-I for a county was calculated by factoring field acreage as a 'weighting factor' for P-I values from individual soil tests. Accuracy of county P-I averages depend on the quantity and quality of soil tests conducted.

[2] Osmond, D. and K. Neas. 2015. *Delineating Agriculture in the High Rock Lake Watershed*. NC State University Department of Soil Science and United States Department of Agriculture National Agricultural Statistics Service. https://content.ces.ncsu.edu/delineating-agriculture-in-the-high-rock-lake-watershed

barns tend to receive more litter than fields that are more difficult to access or are a further distance away.

Representatives from DSWC and NRCS provided information on practices implemented in the High Rock Lake watershed since 2006. The DSWC found over 60% of conservation practices implemented were for pastured systems (livestock exclusion fencing, heavy use area protection, watering tanks, pasture renovation, and stream protection wells). Similarly, NRCS funded significant amounts of fencing, stream crossings, access control, and prescribed grazing on pastured systems in the watershed since baseline. The NRCS also funded large, more expensive practices such as waste storage facilities, along with nutrient management, cover crop, and tillage management acreage. All told, since 2006, over 46 million was spent on cost-share assistance in the 12 counties with acreage in the High Rock Lake watershed.

Data from the National Agricultural Statistics Service (NASS) was pulled and agricultural trends in the 12 counties with significant acreage in the High Rock Lake watershed were identified. The NASS publishes two independent sets of data containing county crop and livestock information: censuses and annual surveys. Censuses are conducted every five years and completely account for all crops and livestock produced on all farms for the census year. Annual surveys provide county estimates based on reports from a sample of farms and are completed for select commodities (major crops and livestock types) determined federally and by individual state departments of agriculture.

Linear trendline analyses on annual survey data display a slight reduction in cattle and swine since 2000 (Figure 1). Trend analyses on agriculture census data for swine and cattle from 2002 to 2017 also show slight reductions in inventory totals over time (Figure 2). Layer and pullet annual inventory data indicate an increasing trend since 2007 (Figure 3) and annual broiler production data from 2006 indicates a slight increase trend as well (Figure 4). When comparing Figure 3 and Figure 4 note that production values signify total birds produced annually, which differs from inventory values, which are birds being raised at a given moment that year. Poultry agriculture census data from 2002 to 2017, combining broiler, layer, pullet, and rooster inventory totals do not exhibit a clear increase or reduction trend (Figure 5). Bird inventory totals remained largely static during the last four census periods (Figure 5). Agriculture TAG members reported an increase in poultry production due to larger houses being built and utilized, and more efficient production of flocks. However, members also shared that poultry litter material (shavings) are becoming harder to procure and the current economic investment (and risk) associated with entering the poultry market is likely to deter interest in the short-term. Longer-term growth in the industry is harder to predict and dependent on market conditions.

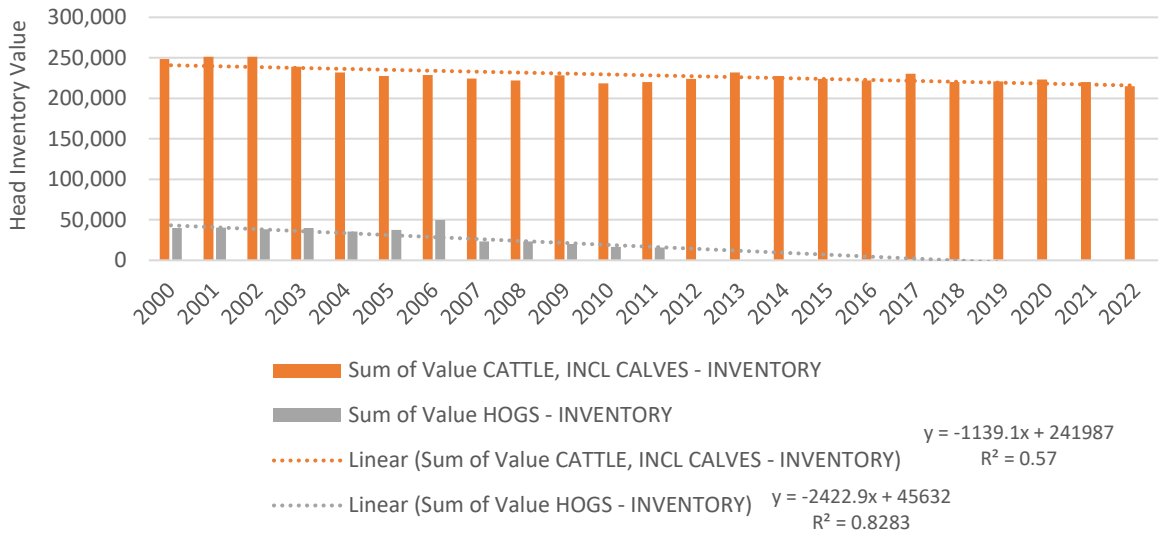

Figure 1 - Annual NASS Survey Data for Cattle and Swine: A sum of annual inventory totals for cattle and swine provided by NASS are graphed above for the twelve counties with acreage in the High Rock Lake watershed. County values were not adjusted by the percentage of each county lying within the High Rock Lake watershed.

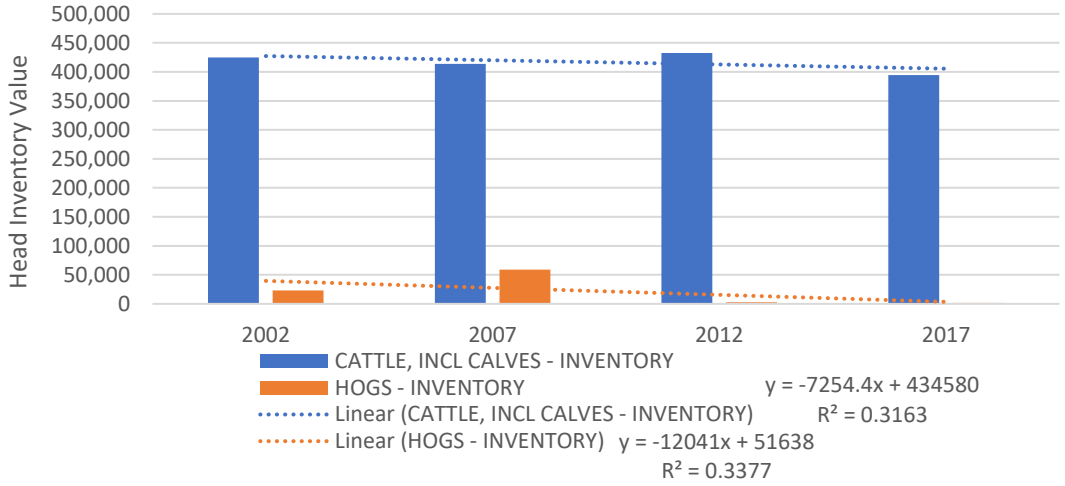

Figure 2 - NASS Census Data for Cattle and Swine: A sum of census year inventory totals for cattle and swine provided by NASS are graphed above for the twelve counties with acreage in the High Rock Lake watershed. County values were not adjusted by the percentage of each county lying within the High Rock Lake watershed.

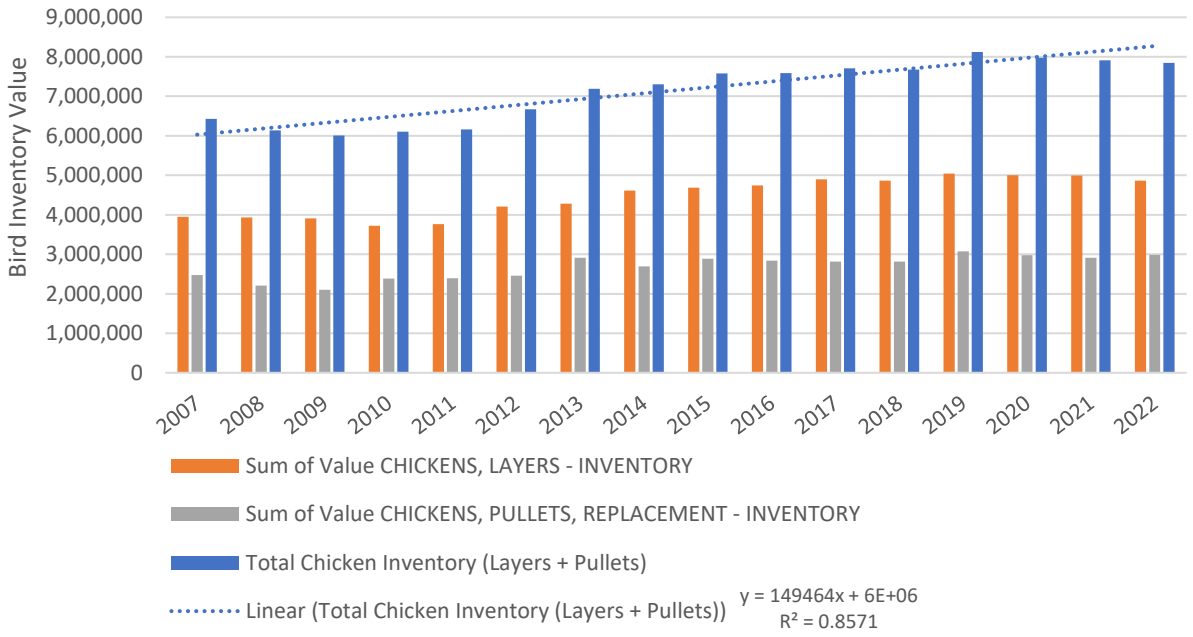

Figure 3 - Annual NASS Survey Data for Layer Chickens, Pullets, and Replacements: A sum of annual inventory totals for layer, pullet, and replacement chickens provided by NASS are graphed above for the twelve counties with acreage in the High Rock Lake watershed. County values were not adjusted by the percentage of each county lying within the High Rock Lake watershed.

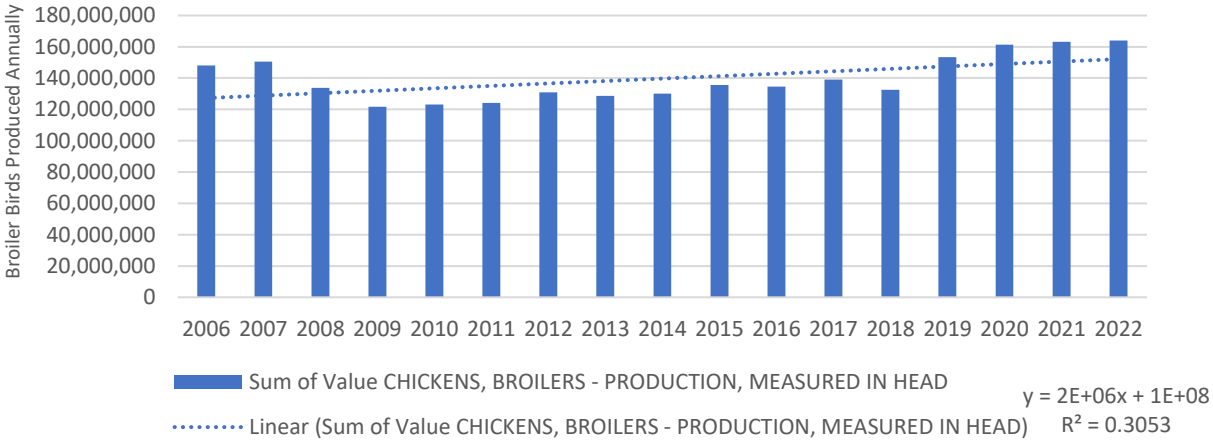

Figure 4 - Annual NASS Survey Data for Broiler Chickens Produced: A sum of annual production totals for broiler chickens provided by NASS are graphed above for the twelve counties with acreage in the High Rock Lake watershed. County values were not adjusted by the percentage of each county lying within the High Rock Lake watershed. Production values signify total broilers produced annually, which differs from inventory values, which are birds being raised at a given moment that year. The NASS does not provide annual inventory data for broilers.

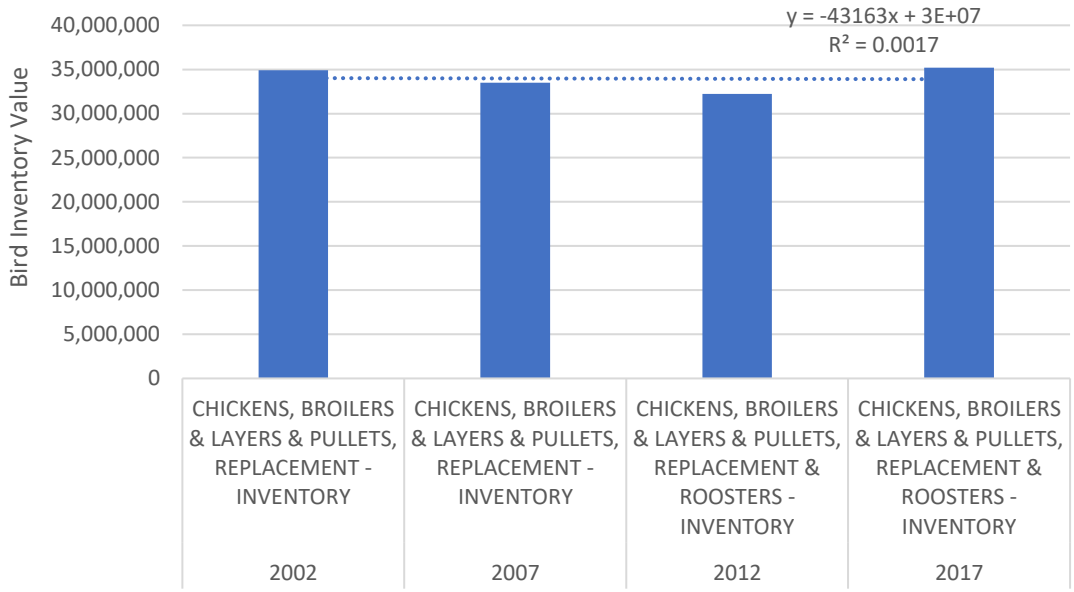

Figure 5: NASS Census Data for Chickens (Broilers, Layers, Pullets, and Roosters): A sum of census year inventory totals for chickens provided by NASS are graphed above for the twelve counties with acreage in the High Rock Lake watershed. County values were not adjusted by the percentage of each county lying within the High Rock Lake watershed. Rooster totals were only available in the 2012 and 2017 censuses.

Considerations – Sector Collaboration and Strategy Development

The Agriculture TAG acknowledges that agricultural activity is a nonpoint source contributor to water quality impairments in High Rock Lake. The TAG also recognizes there is significant benefit for maintaining the agriculture sector's relevance and profitability within the watershed. Agriculture land, most basically, is pervious land. Sustainably managed pastures and crop fields can contribute to the longevity of nutrient management in stressed watersheds by maintaining watershed hydrologic processes and hydraulic continuity. The Agriculture TAG was committed to discussing strategy development and collaborative work that would result in meaningful nutrient reduction benefits for High Rock Lake, while preserving the feasibility and profitability of farming in the watershed.

Non-regulatory Considerations

Agriculture TAG members discussed many recommendations for reducing nutrient losses from agricultural land in the High Rock Lake watershed, several of which a nutrient strategy rule package will likely not address due to regulatory feasibility or other factors. Non-regulatory recommendations include:

- Keep (and expand) existing conservation cost share programs (state Agriculture Cost Share Program (ACSP) and federal Environmental Quality Incentives Program (EQIP)). Providing funding support is critical to implement necessary conservation on private lands including expanding precision nutrient management, excluding additional livestock, encouraging appropriate

stocking, and closing waste lagoon systems. An important caveat is farmers who have previously participated in state and federal cost share programs may have already reached lifetime funding caps and cannot qualify for more funding. Program policies are continuously reviewed and changing to meet the needs of a majority of farmers.

- Increase targeted education and technical assistance to inform small farmers of proper nutrient management and yield/profitability optimization, the cost effectiveness of livestock exclusion from surface waters and stocking livestock at appropriate rates, and the benefits of enrolling environmentally sensitive land in the Conservation Reserve Program (CRP) or the Conservation Reserve Enhancement Program (CREP).
- Expand staff capacity to provide necessary education and technical assistance and hire additional certified nutrient management specialists and certified conservation planners. A stronger talent pipeline between colleges and universities and local/state/federal government is necessary to ensure continued staff capacity and organizational expertise.
- Encourage local and larger market opportunities for poultry litter to expand the distribution range of application toward areas with phosphorus deficient soils.
- Regularly reassess soil rental rates to reduce distortion of local rental markets and ensure CRP and CREP remains competitive and economically viable for farmers. Rental rates can be highly variable between locations and the price setting process is largely standardized.
- Incentivize submitting waste for analysis before application.
- Require or incentivize government and commercial entities to complete nutrient management training.
- Increase inspection of facilities with required waste utilization plans and take necessary enforcement measures as appropriate.
- Pursue tax credits to increase adoption of precision nutrient management, livestock exclusion, and riparian buffer establishment.
- Increase rural broadband access and cellular service for farmers to incorporate the next generation of agriculture technologies, including digital precision agriculture, to enable productivity and profitability for small farmers.

Regulatory Considerations

Agriculture Rule Concept – Reporting

In May, the DWR brought forward a reporting concept for inclusion in a watershed-specific Agriculture Rule detailed below:

- Overall nutrient management strategy percentage reduction goals established for the watershed would apply. Reduction goals are proposed to apply as an overall target; however, accounting for reductions in N and P will not be a mandatory measure of compliance.
- Agriculture representatives would submit two reports every five years. One report would be created at the end of year two in the five-year period, focusing on BMP implementation, soil test phosphorus results, and cost share program expenditures. The second report would be created at the conclusion of the five-year period. This report would primarily function as a planning and strategy document providing ongoing recommendations for the agriculture sector. The report would include a summary of trends from Census of Agriculture publications (animal numbers, pasture acres, and crop acres) as well as BMP implementation and cost share program

expenditures, easement enrollment, and soil test phosphorus results. Nitrogen loss accounting through the Nitrogen Loss Estimation Worksheet (NLEW) tool, used for accounting in other basins and watersheds with nutrient management strategies and Agriculture Rules, would not be required to be completed and included in iterative reporting.

- A centralized oversight committee consisting of farmers and agency and organization representatives would be created to review and approve reports and complete periodic strategic planning on mitigating agricultural resource concerns in the watershed. No other local committees would be required to be established or meet as part of the Agriculture Rule.

The Agriculture TAG discussed the reporting concept recommendation outlined above and ultimately reached consensus in supporting the incorporation of the reporting concept as outlined above in the final Agriculture Rule. In the discussion, the burden of data collection on existing staff was noted as well as the benefits of conducting third party, statistically significant and rigorous studies every five to ten years characterizing agricultural activity and management in the watershed. Funding for conducting such third-party studies is currently not secured, but Agriculture TAG members strongly note the importance and benefits such work would have for local and watershed-wide strategic planning and adaptive management to address persisting and emerging agricultural resource concerns.

Agriculture Rule Concept – Livestock Exclusion Implementation Target

In May and September, the Agriculture TAG discussed including livestock exclusion implementation targets in the High Rock Lake Agriculture Rule. The DWR shared existing precedent set in active Agriculture Rules in other watersheds, which provide a collective compliance option for the agriculture sector and a backstop that additional rulemaking can commence if collective compliance is not achieved.

In September, the DWR described two potential concepts to the Agriculture TAG for including livestock exclusion implementation targets in the proposed Agriculture Rule for High Rock Lake watershed. The first concept was to set an individual compliance mandate, where all farmers meeting certain criteria would be required to exclude livestock from surface waters as specified in Rule. The second concept was to provide a collective compliance target for livestock exclusion from surface waters with a backstop that an individual compliance measure, to be specified in the same Rule, be activated if collective compliance was not achieved by the period set in Rule.

The DWR was not supportive of an Agriculture Rule concept that would set a collective compliance target for livestock exclusion with a backstop that additional rulemaking could commence if collective compliance was not achieved (the existing precedent for other active Agriculture Rules). Deterrence of this concept was in part due to the assertion that collective compliance with the backstop of additional rulemaking is not enforceable, thereby such a concept could be accomplished without rulemaking. The DWR also shared concerns that the Rules Review Commission, which must approve the Agriculture Rule and the overall nutrient strategy, may not approve an Agriculture Rule including a concept for additional rulemaking if collective compliance is not achieved, because the Rule is non-enforceable. The DWR also contended that practice implementation in other watersheds and basins with Agriculture Rules utilizing such a collective compliance concept is influenced more so by funding availability than in response to rulemaking.

After describing the potential concepts for including livestock exclusion implementation targets in the watershed's Agriculture Rule, and rulemaking concerns to consider, the DWR ultimately proposed the second concept (collective compliance with individual compliance backstop set in Rule) to the TAG for inclusion in the High Rock Lake Agriculture Rule.

The Agriculture TAG discussed all the conceptual recommendations outlined above, particularly the second concept that DWR ultimately proposed for inclusion in the Agriculture Rule. The Agriculture TAG did not reach consensus on this proposal. No member was opposed to additional consideration of this concept; however, some TAG members considered the recommendation premature until more information could be gathered and additional details on the overall concept could be discussed more thoroughly, particularly backstop individual compliance requirements. Additional time was not able to be provided due to the DWR's and the Facilitation Team's schedule and many TAG members ultimately could not support this broad conceptual approach without additional consideration and delineation. Several TAG members were in support of moving forward with the proposed Rule concept with minor or moderate reservations. Several Agriculture TAG members, including some that were in support of moving forward with the proposal, noted the following concerns with the concept proposal:

- Exclusion system requirements - types of systems (and fencing) that could count toward a livestock exclusion implementation target - were only briefly discussed. There was an openness to consider simpler, less expensive exclusion systems (single strand electric wire, watering ramps, etc.) to discourage livestock access to most (if not all) sections of streams running through stocked pastures. Much remains to be discussed regarding the advantages and disadvantages of counting exclusion systems that do not meet state or federal cost share program technical standards and policies, specifically with regards to their water quality benefits and accounting for their implementation and long-term maintenance.
- Applicability of exclusion system implementation targets to livestock types were only briefly discussed. The TAG did not have time to discuss whether this target for exclusion would apply to only cattle or other types of pastured livestock (including horses, sheep, goats, etc.).
- Specifics on variances to exclusion system implementation, including site difficulty, economic barriers, emergency situations, livestock types, etc. were only briefly discussed. More consideration is needed to clarify reasonable exceptions.
- The DWR has limited staff to inspect farms and measure compliance.
- No comprehensive data is available to quantify the extent of livestock exclusion in the strategy's intended baseline year (2006) or the current extent of livestock exclusion in the watershed (2023). This presents significant difficulties in determining a reasonable and feasible collective target for livestock exclusion system implementation to set in Rule. There is a significant likelihood that a target set without more understanding of livestock exclusion implementation in the watershed could result in a Rule that has already been met. Conversely, the target set in Rule could prove to be totally infeasible for farmers to collectively meet in the set period given current staff capacity to provide necessary technical assistance. In which case, the Rule, though providing a collective compliance option, would in effect function to require individual farmer compliance.
- Any rule concept that is, or has the capacity in effect, to function as individual compliance presents a number of concerns to TAG members:

- **Perceived threat to livelihood** - Individual compliance can foster negative narratives and sentiments among farmers around the strategy, the Agriculture Rule, and other stakeholders.
- **Disrupted cost effectiveness and farm economics** – Individual compliance does not recognize the benefits of excluding livestock from locations where it is significantly more cost-effective to initially install and maintain long-term.
- **Shifting resource concerns** – An uneven regulatory landscape can drive farmers to switch to other commodity types with less regulatory cost burdens that cause differing resource concerns.
- **Added cost-share program funding uncertainty** – Practice implementation requirements, and subsequent perception by outside parties that implementation is now a fixed business expense, can create funding uncertainties for conservation programs.

Remaining Considerations

The Agriculture TAG did not consider any regulatory concepts or proposals specifically addressing waste application (animal waste and biosolids) in the High Rock Lake watershed. Agriculture TAG members invited local animal agriculture farmers to attend a November meeting to begin discussions regarding regulatory (and non-regulatory) concepts for addressing waste application-related resource concerns in the watershed. The November meeting was ultimately canceled. In 2024, the DWR intends to convene a technical committee consisting of technical experts from NCDA&CS, USDA, and other organizations to discuss waste generation from various source sectors and application management options to encourage nutrient management and reduce over-enrichment of phosphorus in soils. The formation of a technical committee was opted for in part due to the complicated regulatory framework that governs applications of animal waste and biosolids. The DWR seeks additional time to solicit department legal counsel before consulting with partners and opening any regulatory concepts impacting waste application for public review.

Conclusion

Agriculture is a diverse and robust sector in the High Rock Lake watershed and its continued relevance and profitability is important to many communities and citizens that work, recreate, and live within the watershed. The agriculture sector understands the unique responsibility it holds to remedy long-standing impacts on natural resources and the important role it can play in safeguarding resources and watershed function for future generations. Over the last year, the Agriculture TAG has met five times to discuss various approaches to achieve meaningful nutrient reduction benefits for High Rock Lake. Regulatory and non-regulatory recommendations and considerations resulting from these preliminary discussions have been described thoroughly in prior sections of this report. The Agriculture TAG remains committed to continuing the conversation on the various approaches already discussed to improve management of agricultural nonpoint source pollution in the High Rock Lake watershed.

Date Approved: 12/6/2023

Report Approved by:

Name	Representative/Affiliation
Allie Dinwiddie	NCDA&CS – DSWC
Julie Henshaw	NCDA&CS – DSWC
Keith Larick	NC Farm Bureau
Adam Hilton	Davidson SWCD
Allison Brown	Alexander CES
Andy Miller	Davidson SWCD
Bailey Wood	Surry CES
Brad Newsome	Farmer
Brent Barnes	Farmer
Dwayne Livengood	Farmer
Bill Davis	Wilkes SWCD
Edgar Miller	Yadkin Riverkeeper
Frankie Singleton	Davie SWCD
Jennifer Bedrosian	PTRC
John Cothren	Wilkes CES
Joe Hudyncia	NCDA&CS – AS
Justin Somers	Yadkin SWCD
Lance Parker	NRCS
Lee Holcomb	NRCS
Mark Ferguson	NRCS
Dwayne Tate	NCDA&CS – AS
Randy Blackwood	NRCS
Ryan Coe	Surry CES
Seth Nagy	Caldwell CES
Taylor Darnell	Forsyth CES
Danica Heflin	PTRC

Addendum: DWR Policy Recommendation

DWR Planning staff understand the importance of distributing load reduction goals fairly across the various point and nonpoint sources in the watershed and recognize the inherent challenges in seeking strategy numeric goal-proportionate reductions from the agriculture sector. In the decades since the first nutrient strategies took effect in North Carolina, staff have worked with experts across the state to review the effects of agricultural nutrient strategy requirements. A number of limitations were identified with existing collective compliance requirements for crop and pasture systems across the state. Staff developed alternative proposals for High Rock watershed to address these limitations, many of which were introduced as described above, and elicited extensive feedback.

Issue 1 – Alternatives should be considered to collective compliance mandates without meaningful enforcement mechanisms

In other nutrient strategy watersheds, the agricultural sector as a whole is responsible for complying with collective nitrogen loss reduction targets, and no individual producer is required to change their operation to comply with the requirement. Over time, data is collected to retroactively assess whether

agriculture has achieved the required target reduction. In the event of noncompliance, rules specify that the Environmental Management Commission "may conduct additional rulemaking to require a more specific implementation plan". To provide a more meaningful regulatory construct, Planning staff have proposed implementation of an initial collective pasture exclusion implementation target in the High Rock Lake Watershed, where in the event of noncompliance after a stated implementation period, individual pasture operators that meet certain applicability criteria would be required to remove cattle from streams on a specified and perhaps staged schedule.

Staff also believe a watershed agricultural indicator tracking and reporting process can be more flexibly achieved than currently done under existing watershed approaches with institutional agreements between DEQ and the Department of Agriculture and Consumer Services, which avoids unnecessary time and resource expenditure via the rulemaking process.

Issue 2 – High Rock Lake has significantly more animal operations, including pasture, than traditional row crop systems

The preponderance of pasture and poultry systems in the watershed, combined with an interest in prioritizing phosphorus and sediment control from nonpoint sources, suggest that these systems should be the primary focus of any agricultural compliance target. Pasture nitrogen loss targets are currently in effect for the Falls Lake and Jordan Lake Watershed, and Planning staff consider a similar pasture-based phosphorus compliance focus to be more feasible than a row crop compliance target for achieving long-term improvement in agricultural nutrient management in the watershed.

Issue 3 – A focus on phosphorus improvement necessitates a requirement that more specifically addresses erosion and sediment loss and P application

Given ongoing prolific sediment delivery problems both in the Yadkin River system and to High Rock Lake itself, and also the focus of other stakeholders on aggressively managing phosphorus in the early stages of implementation, Planning staff consider pasture management a vital component of a viable agricultural regulation. The most administratively straightforward means of reducing both direct delivery of waste to surface waters and bank destabilization with associated sediment export, is the exclusion of livestock from rivers and streams in the watershed. Multiple benefits can be achieved with what is already a very popular practice under both state and federal cost share systems. The most significant hurdle to implementation of livestock exclusion systems is funding, as such systems present numerous logistical and financial challenges for producers. Planning staff recognize ongoing implementation by NRCS and Soil & Water Conservation District staff and is optimistic that this implementation will continue. Moreover, Planning staff would like to incentivize and enable increased implementation given the magnitude of direct, multiple benefits provided by removing cattle from streams.

Additionally, waste application has been documented as resulting in ongoing phosphorus enrichment of soils in the High Rock Lake Watershed. Watershed field data from 2015 has shown that 57% of fields which are fertilized with phosphorus do not need it, and average soil test P values have the potential to increase soluble P loss through runoff. Notably, researchers have asserted that specific fields with high soil test P and high phosphorus application rates (generally from animal waste) are likely to have potential phosphorus losses from medium to very high (Osmond 2015). This points to a variable landscape where farmers in certain areas have ready access to animal waste which they are sometimes over-applying, and farmers in other areas either do not have ready access or are

applying in accordance with agronomic recommendations. Stakeholders have pointed out that application of animal waste tends to follow the path of least resistance due to resource constraints, and poultry producers who apply their own waste tend to apply it to fields close to the houses where the waste is generated rather than on fields which are farther away or harder to access. This behavior tends to concentrate repeated waste application in certain areas and is likely leading to ongoing phosphorus soil enrichment. Because most phosphorus is non soluble, any excess application to soils in the area is likely to cause phosphorus content to accumulate over time, which leaves very few options for physical removal except uptake by planted crops, which can take many decades to result in more normal phosphorus levels. These over-application "hot spots" have the potential to disproportionately influence downstream delivery of nutrients to High Rock Lake, and any potential rule frameworks should be designed to specifically address this kind of problematic over-application.

Issue 3 – Poultry industry growth necessitates additional discussion

Although Planning staff sought to develop proposals to address concerns raised by stakeholders regarding the rapid growth and evolution of the poultry industry in the High Rock Lake Watershed, the regulatory complexity of deemed permitting and animal waste management proved too cumbersome for a meaningful proposal to be presented to TAG members within the allotted time. Ultimately, Planning staff decided to take additional time to convene a workgroup of internal and external regulatory experts, each of whom will be intimately familiar with current regulations, to identify what, if any, amendments to current practice may be feasible. This process will be conducted starting in early 2024 and will inform concurrent rule drafting.

Appendix C: Riparian Buffer Technical Advisory Group Final Report to Steering Committee

The High Rock Lake Riparian Buffer Technical Advisory Group (TAG) met with representatives from the Division of Water Resources (DWR) four times between February and August of 2023. DWR brought forward a proposal to implement a riparian area protection rule in the watershed that mirrors the rules implemented in the Neuse, Tar-Pamlico, and Jordan Lake watersheds. This proposal defines a 50-foot, two-zone buffer area as protected from encroachment by development, with exceptions granted for ongoing uses and certain forest harvest practices. Buffer TAG members identified a number of factors that differentiate the High Rock Lake watershed from other areas regulated under nutrient management strategy rules, and which necessitate a different approach to riparian protection. Members were unable to come to a unanimous decision, and so this report will present the consensus view of a majority of TAG members, as well as a consensus view of the remaining minority. This report to the Steering Committee first provides a technical foundation for the need for riparian area protection to address ongoing excess nutrient loading in the watershed, followed by individual majority/minority opinions which outline supporting arguments for different proposals to achieve a sufficient level of protection.

Buffer TAG Findings

Overarching Premise – Buffer Protection is Important for Water Quality Protection: In order to protect against further degradation of water quality in the area and to stabilize sediment and limit nutrient delivery from streambanks and upland runoff, streamside riparian vegetation should be protected from encroachment by changing land uses. The value of streamside vegetation for nutrient control has been repeatedly demonstrated. Riparian protection zones improve nitrogen cycling via root interception of shallow groundwater, as well as phosphorus sequestration via controlled erosion and deposition of sediment via stormwater filtration. The EPA estimates that buffers similar to those implemented in other nutrient sensitive watersheds in North Carolina can remove over 90% of total suspended solids and over 90% of total phosphorus from discharge (Schmitt, 1999; Lee K. H., 2000; Lee K. H., 2003). These benefits are not universal, however, as overall width of the protected area has significant impact on the ability of herbaceous or woody streamside vegetation to improve nutrient cycling and sequester pollutants.

If riparian areas are allowed to be removed, altered, or significantly compromised by land use changes, the water quality problems facing High Rock Lake are likely to worsen. With increased sedimentation and nutrient delivery comes an increase in the cost of managing watershed-scale cleanup. Significant negative impacts to fish communities have been demonstrated to occur with increased sedimentation as a result of riparian forest removal in southern Appalachian streams (Dale Jones III, Helfman, Harper, & Bolstad, 1999). This is especially important in light of High Rock Lake's status as a trophy bass fishery and therefore significant generator of regional tourism revenue.

High Rock Watershed Has a Sediment Problem: A significant portion of the nutrient delivery problems facing High Rock Lake stems from poor soils, destabilized streambanks, and upland erosion, all of which are exacerbated by degraded streamside vegetation. The upper portion of High Rock Lake has consistently violated North Carolina's statewide turbidity standard since 2004, and the Yadkin River has been known for delivering huge amounts of sediment downstream since as early as the 1950s (Richter, Korfmacher, & Nau, 1995). Recent sampling indicates that the South Yadkin regularly exceeds the North

Carolina turbidity water quality standard between 10% to 20% of annual sampling events (NCDEQ, Yadkin-Pee Dee River Basinwide Water Resources Management Plan, 2022). In turn, this transported sediment delivers large quantities of nutrients (both nitrogen and phosphorus) to High Rock Lake on an almost continuous basis.

As judged by the establishment of turbidity TMDLs, erosion and sedimentation are widespread problems through much of the watershed. Since 2004 approximately 1.8 million acres in the High Rock Lake Watershed have been regulated by DEQ under EPA-approved Total Maximum Daily Loads (TMDL) for exceeding the State's turbidity water quality standard, which is a result of decades of uncontrolled downstream sediment delivery. This includes areas that drain to Abbotts Creek, Ararat River, Hunting Creek, Second Creek, South Deep Creek, South Yadkin River, Third Creek, Muddy Creek, Salem Creek, Grants Creek, Fourth Creek, and the mainstem of the Yadkin River, all of which comprise approximately 73% of the area that drains to High Rock Lake.

Buffers are Cost-Effective Nutrient Controls: Riparian buffer protection has been shown to provide nutrient load control benefits at less than half of the cost per pound of traditional wastewater treatment technologies (EPA, 2012), and also to lower drinking water costs for water users (NCFS, 2017). This includes communities whose intakes lie along the main stem of the Yadkin and South Yadkin Rivers. Buffer TAG members, therefore, consider riparian protection one of the most cost-effective means for managing nutrient delivery in the High Rock Lake watershed and a long-term cost saver for residents in the watershed.

Furthermore, global meta-analyses have found that remediation and recovery of eutrophic lake systems can take many decades to show results (McCrackin, Jones, Jones, & Moreno-Mateos, 2017). This means that the future cost of riparian losses in the High Rock Lake watershed is considerably higher than the cost of protecting those areas from deterioration in the short term. The continued use of High Rock Lake for recreation, fishing, and swimming suggests that near-term stream stability is a critical and irreplaceable component of an overall water quality management strategy, especially on smaller perennial and intermittent headwater streams that contribute outsized pollutant management capacity and thermal regulation.

Majority Report

Synopsis: The majority proposal for riparian protection carries forward the existing buffer protection approach used in most other Nutrient Strategy Watersheds in North Carolina but expands zone 1 from 30 to 50 feet and adds additional limitations to forest harvest zones.

Overall Width: 70 feet

Zone 1: 50 feet, woody vegetation, limited forest harvest

Zone 2: 20 feet, herbaceous or woody vegetation, forest harvest allowable

The Majority believes the current buffer protection rule in other nutrient sensitive watersheds in North Carolina to be inadequate for protection of freshwater resources in the High Rock Lake watershed given several key differences in this watershed.

Steeper Slopes, More Erosive Soils, Need for Greater Phosphorus Control: Notable differences exist between the topography and soil hydrology in this watershed compared to the more eastern and low-

lying Neuse and Tar-Pamlico River Basins in the coastal plain. The Yadkin River's reputation as a significant delivery mechanism for sediment and sediment-bound phosphorus highlights the need for more rigorous streamside protection of vegetation and soils. Stormwater velocity is likely significantly higher in this watershed than in others, and so increased buffer widths are critical for allowing sufficient time and space for surface and subsurface filtration to occur. DWR and other stakeholders have noted the importance of phosphorus management in the High Rock Lake watershed, and TAG members believe the buffer protection standard in place in other watersheds in the State is insufficient to control erosive flows in the western piedmont region, especially as precipitation is expected to intensify in the coming decades.

More Severe Lake Impairment: Additionally, the notoriously erosive soils of the High Rock Lake watershed have created a water quality problem that is more severe than the eutrophication problems facing other watersheds and river basins. The coupling of a multi-decadal chlorophyll-a impairment with persistent pH and turbidity impairments necessitates an "all of the above" approach to pollution abatement that recognizes the intensity of downstream sediment and nutrient loss and prioritizes stabilization of streambanks as the last line of defense against continued ecological breakdown. Decades of riverbed and lakebed sediment buildup are clear effects of generations of mismanagement, and the only way to turn the tide on sediment loss is to remove the feedback loop that has consistently allowed rivers and streams to become their own perpetual sources of pollution.

Continued deposition of sediment to High Rock Lake from destabilized upstream catchments has created an ongoing problem both for recreational lake users and also lakeside residents who are increasingly unable to access certain parts of the lake due to sediment accumulation and shoaling (Petryniak & Loveless, 2013). Similar sedimentation and shoaling has been noted by the US Army Corps of Engineers in W. Kerr Scott Reservoir (US Army Corps of Engineers, 2012) and lakeside landowners in various bays in the northeast and southwest parts of High Rock. Additionally, in recent decades the City of Salisbury has had to expend considerable time, energy, and money to keep their drinking water intake on the Yadkin River free of excess sedimentation. Excessive sediment accumulation not only disrupts water intakes, but it also increases treatment costs for water users, even to the point where some municipal governments are being forced to abandon existing intakes for new locations where sediment deposition is less pronounced.

Wider Zone 1 Addresses High Rock's Needs: Research has shown that improved nutrient management and cycling requires a minimum buffer width of 30 feet, and sediment control and filtration requires a minimum buffer width of 50 feet (Palone, 1997). For this reason, and given the importance of sedimentation control in the High Rock Lake Watershed, an intact wooded riparian zone of at least 50 feet is critical in the High Rock Lake Watershed. Additionally, the steep topography of the High Rock Lake Watershed seems ill-suited for the buffer width standard which has been implemented in the coastal plain areas of North Carolina. Flow velocities are high entering the riparian area, especially in the headwaters of the watershed where streams originate in the Blue Ridge Mountains, and higher flow velocities increase the risk of storm flow bypass during increasingly heavy precipitation events. This bypass scours riparian sediments and delivers accumulated leaf litter and organic matter directly into receiving streams, and if left unchecked or allowed to increase, riparian zones can transform into nutrient sources via the mobilization of sediment that has been allowed to accumulate over time (Dodd, 2016). This has been happening over many decades since the High Rock dam was constructed, and the

only way to meaningfully reduce this delivery is to ensure that healthy streamside buffers are not allowed to be eliminated.

Furthermore, recent retrospective reports from DWR have highlighted the frequency at which buffer variances have been granted in other nutrient sensitive watersheds, which has the potential to fragment riparian systems across the landscape and therefore impact their overall effectiveness. Buffer TAG members expect similar magnitudes of buffer impacts to be allowable even under a strict management strategy, and so TAG members believe it critical to establish sufficiently wide protection areas to counteract this expected fragmentation and maintain filtering capacity.

Maintenance of a 2nd Zone Protects Against Flow Bypass: Buffer TAG members also acknowledge that a two-zone system is necessary in the High Rock Lake watershed. EPA's Office of Water recommends a 3-zone minimum buffer concept where the inner zone is designated for bank stabilization, habitat, stream shading, and flood protection, the middle zone promotes mature riparian forest, and the outer zone acts to intersect, slow, and filter stormwater discharge. Like in other nutrient sensitive watersheds in NC, maintenance of an outer zone of filtering herbaceous cover is critical in conjunction with a largely undisturbed inner forested area. The vegetated outer zone protects against the emergence of preferential surface flow paths which allow stormwater to bypass the riparian area altogether once canopy shade inhibits the growth of thick understory.

Early successional growth within a riparian area is efficient at trapping and depositing sediment-laden stormwater via a complex network of woody and herbaceous vegetation, and an outer zone of permanently managed herbaceous cover ensures that stormwater filtration can continue even after the canopy of zone 1 closes at maturity and the understory naturally thins. For this reason, TAG members acknowledge the importance of allowing forest harvest in an outer zone of the protected area.

Recommendations: Based on these findings, members of the majority recommend that DWR protect existing vegetated riparian areas within 70 feet of and adjacent to intermittent and perennial streams, lakes, and ponds in the High Rock Lake watershed. The first 50 feet adjacent to waters should be largely undisturbed forest, while the outer 20 feet may be managed vegetation. Existing, ongoing activities within buffers should be allowed to continue, while a change in land use from rule effective date should trigger new protections. DWR should communicate to Local Governments their authority to request permission from the Environmental Management Commission to require more stringent buffer protection measures according to § 143-214.23A(d) when necessary to protect local resources. Certain uses of land within the buffer should be identified as exempt, allowable, or allowable with mitigation. TAG members recommend including the existing Table of Uses provided in 15A NCAC 02B .0714(11) as a reference point for future public comment and review by the NC Environmental Management Commission as to their applicability in the High Rock Lake Watershed. All uses not specified in the Table of Uses should be prohibited.

All uses not specified in the Table of Uses should be prohibited. The rule should allow for mitigation where no practical alternatives exist, specify variance requirements and forest-harvesting limitations, and ensure that new developments either avoid or mitigate buffer impacts. DWR should make mitigation options available for certain activities based on avoidance and the following minimization criteria: 1) payment to the riparian buffer restoration fund administered by the Division of Mitigation Services, 2) donation of property, or 3) restoration or enhancement of a non-forested buffer.

Majority Rule Proposal

The riparian buffer protection rule should:

1. Apply equally to all areas of the watershed.
2. Apply to all intermittent and perennial streams, as well as to features that are hydrologically connected to intermittent and perennial streams and to features that fall within the protected riparian buffer area.
3. Protect an area that extends 70 feet horizontally from surface waters.
    a. On intermittent and perennial streams, the protected area should begin at the most landward limit of the top of the bank or the rooted herbaceous vegetation and extend landward a distance of 70 feet on all sides of the surface water
    b. On ponds, lakes, and reservoirs, the protected area should begin at the most landward limit of the normal water level or the rooted herbaceous vegetation and extend landward a distance of 70 feet, measured horizontally on a line perpendicular to a vertical line marking the edge of the surface water or rooted herbaceous vegetation.
4. Delineate zone 1 to protect the first 50 feet, measured horizontally, on either side of a surface water feature.
    a. From 0 feet to 9.99 feet:
        i. No tracked vehicles should be allowed.
    b. From 0 feet to 19.99 feet:
        i. On land that has a certified forest harvest management plan or that is enrolled in the Present Use Value program:
            1. Removal of individual high value trees should be allowed.
            2. Removal of trees with exposed roots on the streambank should not be allowed unless those trees are diseased or at risk of causing damage.
    c. From 20 feet to 49.99 feet:
        i. On land that has a certified forest harvest management plan or that is enrolled in the Present Use Value program:
            1. Harvest of 50% of trees with DBH greater than 5 inches should be allowed.
            2. Harvest should be allowed no more frequently than every 15 years except on tree plantations, where it should be allowed no more frequently than every 5 years.
5. Delineate zone 2 to protect the first 20 feet, measured horizontally, beginning at the outer edge of zone 1.
    a. From outer edge of zone 1 to 20 feet (overall 50 feet to overall 70 feet):
        i. Forest harvest should be allowable with ground cover reestablishment
        ii. Grading with revegetation should be allowed, as long as vegetation in zone 1 is not compromised.
6. Given significant physiographic differences between the High Rock Lake Watershed and other nutrient sensitive watersheds, the following activities should be scrutinized during the rule drafting stage to determine ongoing allowability in the 70 foot buffer:
    a. Soil disturbing site preparation
    b. Logging decks and sawmills
7. The following activities should be allowed anywhere in the 70 foot buffer:

a. Removal of invasive exotic species
b. A one-time application of fertilizer at agronomic rates to establish planted vegetation

8. The "Table of Uses" from 15A NCAC 02B .0714 should be preliminarily incorporated during rulemaking but carefully reviewed by DWR to ensure adaptability to the needs of High Rock Lake Watershed stakeholders.

Approved by:

TAG Member	Affiliation
Robby Abou-Rizk	Blue Ridge Trout Unlimited
Danica Heflin	Piedmont Triad Regional Council
Edgar Miller	Yadkin Riverkeeper
George Morris	Wild Ones Central North Carolina Chapter

Minority Report

Synopsis: The minority proposal carries forward the existing buffer protection approach used in most other Nutrient Strategy Watersheds in North Carolina with no major changes.

Overall Width: 50 feet

Zone 1: 30 feet, woody vegetation, limited forest harvest

Zone 2: 20 feet, herbaceous or woody vegetation, forest harvest allowable

The minority concurs with the arguments put forward by the majority that erosive conditions across the watershed have precipitated a more severe state of hypereutrophication in High Rock Lake than in most other receiving waters in the state. The importance of sediment management in controlling downstream nutrient delivery to the Lake cannot be overstated, and riparian protection is a key component of a strategy to protect against further deterioration of river and lake water quality.

Fifty Feet is Needed: Close examination of North Carolina's buffer rules suggests that protecting a streamside riparian zone any narrower than 50 feet would result in continuous and irreversible declines in water quality across the nutrient sensitive waters of the State (Burchell, 2016; NCDEQ, 2016). This reiterates the importance of stemming the loss of sediments and nutrients across the broad area of notoriously erosive soils in the headwaters of the Yadkin River. Research has shown that buffer widths of less than 50 feet are significantly more difficult to maintain than wider buffers, and narrow buffers are inadequate for filtration of nutrients and sediment on all except the smallest high-order streams (Palone, 1997). These trends are increasingly important in the western piedmont where steep topography makes the risk of erosion more severe, especially in higher elevations. Given the importance of sedimentation control and phosphorus management in the High Rock Lake Watershed, it is appropriate that 50 feet be protected from further degradation.

Fifty Feet is Accepted and Understood: The minority finds the case for increasing buffer widths beyond the 50-foot standard less compelling. In recommending a complex change in land management at the watershed scale, the minority strongly believes that consistency across various landscapes and in different regions will go a long way toward increasing adoption and compliance by private landowners. Producers and landowners across the State have grown accustomed to standardized buffer rule formats

in the largest nutrient-sensitive watersheds. Over the decades since the first nutrient strategies were adopted, various stakeholders and interest groups have improved their outreach and engagement materials to defend the value of a 50-foot buffer to property owners, and administrative consistency improves the efficiency of customer service by land and water management agencies at the state and local level.

The buffer protection template utilized in the Neuse, Tar-Pamlico, and Jordan Lake nutrient strategies has undergone decades of peer review, stakeholder input, and agency revisions. These rules have been honed over time to provide an optimized balance between landowner needs and watershed-scale water quality protection, and existing statutes even provide allowances for local governments who are interested in protecting more than the minimum required by state law (§ 143-214.23A(d)). Beyond the traditional 50-foot width required in other watersheds, the cost effectiveness of protection decreases, as increasing widths provide a decreasing pollutant reduction value per additional foot of protection (Mayer, 2007). For these reasons, the minority finds it difficult to argue for protection of more than a total of 50 feet.

Recommendations: Members of the minority recommend that DWR protect existing vegetated riparian areas within 50 feet of and adjacent to intermittent and perennial streams, lakes, and ponds in the High Rock Lake watershed. The first 30 feet adjacent to waters should be largely undisturbed forest, while the outer 20 feet may be managed vegetation. Existing, ongoing activities within buffers should be allowed to continue, while a change in land use from rule effective date should trigger new protections. DWR should communicate to Local Governments their authority to request permission from the Environmental Management Commission to require more stringent buffer protection measures according to § 143-214.23A(d) when necessary to protect local resources. Certain uses of land within the buffer should be identified as exempt, allowable, or allowable with mitigation. TAG members recommend moving forward with including the existing Table of Uses provided in 15A NCAC 02B .0714(11) as a reference point for future public comment and review by the NC Environmental Management Commission as to their applicability in the High Rock Lake watershed. All uses not specified in the Table of Uses should be prohibited.

The rule should allow for mitigation where no practical alternatives exist, specify variance requirements and forest-harvesting limitations, and ensure that new developments either avoid or mitigate buffer impacts. DWR should make mitigation options available for certain activities based on avoidance and the following minimization criteria: 1) payment to the riparian buffer restoration fund administered by the Division of Mitigation Services, 2) donation of property, or 3) restoration or enhancement of a non-forested buffer.

Minority Rule Proposal

The riparian buffer protection rule should:

1. Apply equally to all areas of the watershed.
2. Apply to all intermittent and perennial streams, as well as to features that are hydrologically connected to intermittent and perennial streams and to features that fall within the protected riparian buffer area.
3. Protect an area that extends 50 feet horizontally from surface waters.

    a. On intermittent and perennial streams, the protected area should begin at the most landward limit of the top of the bank or the rooted herbaceous vegetation and extend landward a distance of 50 feet on all sides of the surface water
    b. On ponds, lakes, and reservoirs, the protected area should begin at the most landward limit of the normal water level or the rooted herbaceous vegetation and extend landward a distance of 50 feet, measured horizontally on a line perpendicular to a vertical line marking the edge of the surface water or rooted herbaceous vegetation.
4. Delineate zone 1 to protect the first 30 feet, measured horizontally, on either side of a surface water feature.
    a. From 0 to 9.99 feet:
        i. No tracked vehicles should be allowed within the first 10 feet of zone 1.
        ii. On land that has a certified forest harvest management plan or that is enrolled in the Present Use Value program:
            1. Removal of individual high value trees should be allowed.
            2. Removal of trees with exposed roots on the streambank should not be allowed unless those trees are diseased or at risk of causing damage.
    b. From 10 feet to 29.99 feet:
        i. On land that has a certified forest harvest management plan or that is enrolled in the Present Use Value program:
            1. Harvest of 50% of trees with DBH greater than 5 inches should be allowed.
            2. Harvest should be allowed no more frequently than every 15 years except on tree plantations, where it should be allowed no more frequently than every 5 years.
5. Delineate zone 2 to protect the first 20 feet, measured horizontally, beginning at the outer edge of zone 1.
    a. From outer edge of zone 1 to 20 feet:
        i. Forest harvest should be allowable with ground cover reestablishment
        ii. Grading with revegetation should be allowed, as long as vegetation in zone 1 is not compromised.
6. Given significant physiographic differences between the High Rock Lake Watershed and other nutrient sensitive watersheds, the following activities should be scrutinized during the rule drafting stage to determine ongoing allowability within the 50 foot buffer:
    a. Soil disturbing site preparation
    b. Logging decks and sawmills
7. The following activities should be allowed anywhere in the 50 foot buffer:
    a. Removal of invasive exotic species
    b. A one-time application of fertilizer at agronomic rates to establish planted vegetation
8. The “Table of Uses” from 15A NCAC 02B .0714 should be preliminarily incorporated during rulemaking but carefully reviewed by DWR to ensure adaptability to the needs of High Rock Lake Watershed stakeholders.

Approved by:

TAG Member	Affiliation
Richard Cockerham	NC Forest Service
Keith Larick	NC Farm Bureau
Chris Millis	NC Homebuilders Association

Non-Regulatory Recommendations

All members of the Buffer TAG acknowledge that protection of buffers against a change of uses is only part of a broader strategy to improve nutrient management in the High Rock Lake Watershed. Additional protections and improvements can be obtained not just by protecting existing buffers, but also by expanding buffers into areas where uses are not expected to change in the near future or where existing pollutant sources can be eliminated. These types of buffer expansions must be achieved via voluntary measures and with significant cost share assistance from the State. Buffer TAG members recommend the following actions:

1. The General Assembly, Environmental Management Commission, and Department of Agriculture and Consumer Services should promote the Conservation Reserve Enhancement Program and ensure that it receives continued funding. The Division of Water Resources should assist in promoting the value of this program in providing a financial incentive for buffer establishment and preservation.
2. The Division of Water Resources should revise the current nutrient offset crediting procedure for buffer restoration in order to minimize or eliminate market distortions and assign nutrient offset credit that is scientifically defensible. This policy should be revised and adopted before the High Rock Lake Nutrient Management Strategy takes effect.
3. The Division of Water Resources should adopt temporary rules to ensure that mitigation banks are allowed to develop projects in advance of the rules taking effect. This will ensure that as unavoidable buffer encroachments take place after rule adoption, an existing bank of buffer credits will be immediately available to offset those impacts.
4. The Division of Water Resources should encourage the usage of native species for buffer establishment and enhancement, as well as encourage landowners to choose pollinator- and wildlife-friendly species alternatives.
5. The Division of Water Resources should support emerging One Water partnerships and enable and encourage cross-sector collaboration to achieve nutrient management improvements across the watershed.

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Appendix D: Stormwater Technical Advisory Group Final Report to Steering Committee

The High Rock Lake Stormwater Technical Advisory Group met with representatives from the Division of Water Resources seven times between January and November of 2023. DWR Planning staff brought forward several proposals to implement post-construction stormwater requirements for nutrient control, as well as load reduction goals for existing development across the watershed. These requirements built upon precedent established in the other nutrient strategy watersheds in the State, and adapted provisions based on lessons learned from the history of implementation.

On new development, rather than implement nutrient export rate targets, the proposed post-construction treatment requirement for High Rock Lake would prescribe treatment of runoff from specified storm sizes, progressive requirements based on impervious cover density thresholds, and hydrologic discharge control for the highest density projects. No consensus was achieved on whether or not to recommend this proposal for adoption.

Stormwater TAG members came to a consensus in recommending that post-construction stormwater treatment requirements should apply to all local jurisdictions in the High Rock Lake Watershed. Additionally, tentative consensus was achieved to recommend that single-family lots below a certain BUA threshold should be exempt from post-construction stormwater treatment requirements, though members were unable to agree on a specific BUA threshold and recommended further analysis. Tentative consensus was achieved to recommend ongoing SCM maintenance into perpetuity, though members expressed concerns about existing and future local capacity to perform this maintenance. Tentative consensus was also achieved to recommend that public linear transportation projects should be exempted from post-construction stormwater treatment requirements, and that road-only and sidewalk-only projects should not require post-construction stormwater treatment and should be allowed to comply with rule requirements exclusively via offset payments. All of these consensus items align with existing requirements and exemptions in other nutrient sensitive watersheds.

Regarding existing development, DWR Planning staff brought forward a conceptual proposal for an investment-based requirement that holds local governments accountable for devoting a specified amount of money toward a series of load reducing and good housekeeping nutrient practices, including but not limited to on-site wastewater inspection, repair, and education, stream restoration and enhancement, green infrastructure, state-approved Stormwater Control Measures (SCM), among others. This proposal mirrors a program currently being implemented by stakeholders in the Falls Lake Watershed. TAG members reached consensus in support of this type of investment-based model for existing development.

New Development

With the exception of local flood management ordinances, stormwater was relatively unmanaged in the High Rock Lake watershed after the impoundment of the Yadkin River in the 1920s and before the implementation of EPA's NPDES MS4 Permitting Program. This lengthy lag time has resulted in widespread alterations to the area's hydrologic regime. Significant ongoing sediment and nutrient

delivery to High Rock Lake highlight that future load increases from new development should be limited to the greatest practical extent.

DWR Planning Staff Recommendations

Planning staff understands the importance of distributing load reduction goals fairly across the various point and nonpoint sources in the watershed. In the decades since the first nutrient strategies took effect in North Carolina, staff has worked with experts across the state to review the effects of new development stormwater treatment requirements. A number of limitations were identified with existing post-construction stormwater treatment requirements in both conventional state stormwater programs and nutrient stormwater rules. Staff developed an alternative proposal for High Rock watershed to address these limitations. The limitations are described here as the foundation for discussions, along with staff's general recommended approach for addressing them. Further details of DWR's proposal are provided in the sections that follow along with the TAG's responses.

Issue 1 – Nutrient export rate target approach is involved and doesn't consistently address hydrologic impacts

First, a focus on nutrient pounds counting has resulted in a complex calculation process which aims to keep post-development nutrient export below a calculated value for each watershed. Producing this value for each watershed requires a number of simplifying mathematical assumptions, the objective of achieving strategy reduction goals on a project basis involves assumptions that have not necessarily borne out, and compliance with these rates has added administrative complexity to the development approval process, including the resource-intensive component of offsite load reduction measures as part of compliance. In recommending a transition to hydrologic control standards, Planning staff proposes to learn from post-construction stormwater treatment requirements employed by other states. The proposal shifts from the nutrient performance basis used in the Neuse, Tar-Pamlico, Falls Lake, and Jordan Lake nutrient strategies, to a hydrologic performance basis that is designed to address both site nutrient control and receiving stream channel protection. Staff believes this transition will provide greater familiarity, predictability and simplicity for developers and engineers.

Issue 2 – Traditional high density break point for required treatment is too high, and stream impacts are realized at much lower thresholds

Most nutrient strategy new development rules and state stormwater rules trigger stormwater treatment requirements at a high-density threshold of 24% BUA. This threshold is significantly higher than the 10% watershed-scale impervious threshold where streams have been shown to destabilize and experience reductions in ecological integrity, and 24% is in a range where aquatic life and nutrient cycling is significantly degraded, and unstable channels have become sediment and nutrient sources. Additionally, experience in other watersheds tells us that a certain amount of post-construction lot alterations are to be expected as property owners make improvements that add impervious surfaces. This means that a watershed where treatment requirements are triggered at 24% is likely to have significant portions of the developed landscape that exceed this threshold and have inadequate or no stormflow controls. Planning staff believes that a 12% high density BUA threshold is reasonable and appropriate for purposes of protecting receiving streams' integrity, preventing them from becoming sediment and nutrient sources, and minimizing increases in nutrient loading.

Issue 3 – The conventional state treatment and discharge standard does not appear to adequately protect receiving streams from degradation

It appears that in watersheds where state stormwater controls are implemented, streams still tend to become destabilized, widen, downcut, migrate and exhibit poor biological health. The typical requirement to detain and treat runoff from 1" of rainfall does not appear to sufficiently reign in the increased flashiness of the post-development runoff hydrograph. A previous attempt by the state to address this hydrologic impact issue by adding a pre/post peak flow rate match requirement was found through studies to potentially exacerbate stream channel impacts and was discontinued. Investigation of approaches used in other states finds that various, more protective measures are frequently required to mitigate the hydrologic impacts of development on runoff. Two elements used in comparable physiographic regions of Chesapeake Bay states involve recharging a portion of the water quality volume and using a modified pre/post peak rate match for larger storms in the stream channel bankfull discharge range. Planning staff believe these criteria are suitable for the High Rock watershed and will accomplish the intended stream protection and nutrient objectives while not being overly burdensome on the development community.

TAG Consensus Items, New Development

Overarching Premise – All jurisdictions should be subject to the same requirements across the watershed

Stormwater TAG members concur with the recommendation put forward by DWR that administrative consistency will be key in encouraging buy-in and implementation of new nutrient strategy rules. Members expressed concerns that local capacity to implement stormwater programs is limited in MS4 Phase II communities, non-MS4 communities, and unincorporated county areas, but members ultimately concluded that a patchwork of requirements would likely incentivize development in areas without a post-construction stormwater requirement, which risks straining local jurisdictions even further. Additionally, many developers operate across multiple local jurisdictions, so uniformity will be key in ensuring that they quickly develop the skills needed to comply with local programs so that real improvements to receiving waters can be achieved. In order for a nutrient strategy to distribute regulatory obligations fairly among stakeholders, it is recommended that all local governments be subject to the same requirements.

Overarching Premise – Exemptions used in other nutrient strategies should also be included in the High Rock Lake new development rule

Stormwater TAG members concur with the recommendation put forward by DWR that certain exemptions should be adapted from the existing nutrient strategies. These include the following:

- Single-family lots below a certain BUA threshold should be exempt from post-construction stormwater treatment requirements. Though members were unable to agree on a specific BUA threshold, members were in agreement that requiring SCM installation and maintenance on small private lots would present an overwhelming administrative burden on private property owners, and that SCM treatment requirements are better suited for higher density projects or projects that are part of a larger common plan of development. TAG members recommended

further analysis on a suitable BUA threshold for single-family residential development exemption.

- Ongoing SCM maintenance should be performed into perpetuity. Though members expressed concerns about existing and future local capacity to perform this maintenance, DWR expressed a need to ensure ongoing inspection and maintenance for SCMs implemented on public and private property to ensure compliance with the overall load reduction goals of the nutrient strategy.
- Consistent with other nutrient strategies, public linear transportation projects that is subject to the jurisdiction of the Surface Transportation Board should be exempted from post-construction stormwater treatment requirements, and road-only and sidewalk-only projects should not require post-construction stormwater treatment and should be allowed to comply with rule requirements exclusively via offset payments. Transportation projects, by definition, are designed to maximize a ratio of impervious cover to pervious cover, and so would be disproportionately burdened by a BUA-based treatment requirement. TAG members expressed an interest in ensuring that in lieu of treatment requirements, buydowns are available to offset as much of the stormwater impact of transportation projects as is feasible.

TAG Non-Consensus Items, New Development

Post-construction treatment requirements tiered by BUA

DWR Planning staff presented a proposal for progressive stormwater treatment based on built upon area (BUA) thresholds for new development. These thresholds would define treatment requirements based on the existence of hardened stormwater collection systems and scale those treatment requirements by storm size as BUA intensity increases within new residential, commercial, and industrial development projects. DWR's proposal is shown below:

<table>
<tr><th></th><th>No Stormwater Collection System as defined in
15A NCAC 02H .1002(48)</th><th>Stormwater Collection System as defined in
15A NCAC 02H .1002(48)</th></tr>
<tr><td>BUA < 6%</td><td>• Vegetated conveyances only
• Disconnect impervious cover from conveyances
• Disperse IC-concentrated flows</td><td rowspan="2">• Treat site runoff from 1" storm w/ primary SCM, including volume reduction requirement (see below), calculated w/ curve number method
OR
• Treat site runoff from 90th percentile storm w/ primary SCM</td></tr>
<tr><td>6% ≤ BUA < 12%</td><td>• Vegetated conveyances only
• Non-transportation impervious cover
  ○ Disconnect from conveyances
  ○ Disperse concentrated flows
• Transportation impervious cover
  ○ Treat w/ primary SCM or runoff-reducing secondary SCM</td></tr>
</table>

12% ≤ BUA	**Stream Protection Criteria**	*Potential Options for Initial Discussion* • Control the 2yr/24hr post-development peak flow rate to 50% of the 2yr/24hr pre-development level OR • Control the 2yr/24hr post-development peak flow rate to the 1yr/24hr predevelopment level OR • Detain the volume difference between the post-development 1yr/24hr storm and the pre-development 1yr/24hr storm, releasing half the volume over no less than 24 hours
	Water Quality Treatment Criteria	• Treat site runoff from 1" storm w/ primary SCM, including volume reduction requirement (see below), calculated w/ curve number method OR • Treat site runoff from 90th percentile storm w/ primary SCM

Stormwater TAG members were unable to achieve consensus to recommend the BUA-tiered proposal put forward by DWR. First, some TAG members expressed concerns about applying different treatment requirements on developments that drain to stormwater collection systems (SCS), namely that some drain to pipes and other hardened infrastructure, and others drain to engineered treatment swales. Much more detail will be necessary to ensure that low density requirements within projects that drain to a SCS align with current allowances for a limited amount of channel or pipe conveyance. Second, most members expressed uncertainty regarding the extent to which single family residential requirements below 6% BUA might disincentivize low density development and be overly punitive on builders of single-family homes, but indicated an openness to consider the specified requirements if single-family residential exemptions were maintained and strengthened. Third, most TAG members noted the validity of a BUA density threshold for progressive treatment requirements, but some members were unable to concur with DWR's recommended percentage thresholds. Members noted that low density requirements that fall within private property boundaries will be difficult for local jurisdictions to inspect and/or enforce. Other members noted concerns that traditional density requirements are applied according to proximity to affected receiving waters, and that applying the specified density requirements across the entire watershed would be disproportionately impact low density areas far from High Rock Lake. Still other members expressed more high-level concerns that limited capacity may impact local government readiness. Other members supported DWR's proposal and recommended that it be reviewed for potential incorporation into a new development stormwater rule. All TAG members expressed general and tentative approval for high density requirements beginning at 12% BUA, with the exception of the stream protection criteria which will be discussed later.

Post-construction recharge-type volume reduction requirement for mid- and high-density areas that concentrate storm flows

Additionally, DWR put forward a proposal to begin offering two different stormwater treatment requirements for all development that drains to hardened stormwater collection systems. The first option required treatment of runoff from the 1" storm event, combined with specified portions of that

runoff which are required to be recharged via evapotranspiration, infiltration, or slow filtered discharge, called a "volume reduction requirement". Recharge portions of runoff from the 1" storm would be based on hydrologic soil groups. The second option required treatment of the 90th percentile storm event (the depth of rainfall which is not exceeded in 90 percent of all runoff-producing rainfall events in a year), with no recharge component. Developers would be free to choose either option.

Stormwater TAG members were unable to achieve consensus to recommend the volume reduction requirement option. All but one member expressed, at a minimum, that they could live with the proposal as outlined. One TAG member expressed support for requiring treatment of runoff from a storm equal to or greater than 1", especially for high density development, but indicated major concerns about the ability of High Rock Lake soils to allow for significant amounts of infiltration. This member also expressed concern at the significant ongoing maintenance costs that will be required to ensure infiltration and slow filtration practices continue to perform to design standards in perpetuity.

Post-construction stream protection criteria for high density development

For situations where new development projects surpass the highest BUA density threshold, DWR proposed an additional peak flow criteria (called a "stream protection criteria") intended to limit an increase in downstream erosive velocities caused by discharge from stormwater control measures (SCM). DWR Planning staff noted that in other nutrient strategies erosive flows were resulting from prolonged stormflow discharge at or above the critical erosive velocity that tends to destabilize streambanks.

Stormwater TAG members were unable to achieve consensus to recommend high density stream protection criteria. Some TAG members were unclear on the real-world implications of adding such a criterion to treatment requirements for high density development. Other members expressed concern that developments attempting to design to low density standards may incidentally surpass 12% BUA and trigger stream protection requirements which may be difficult for developers to accommodate.

Retain exemptions for public linear transportation projects, single-family residential development not part of a larger common plan of development with less than 6% BUA, redevelopment, and existing development

TAG members discussed these exemptions and expressed a consistent interest in maintaining the single-family lot exemption, but noted concern that many previously platted lots in the watershed are being developed with much larger homes and at much higher BUA densities than would have been constructed in the past. Members noted that the shape and configuration of some of these lots is likely to result in consistent exceedance of the 6% BUA threshold and recommended that further analysis be performed to identify a reasonable current estimate of average BUA percentage on single-family lots not part of a common plan of development. Such an analysis could inform an improved BUA % threshold for single-family residential exemptions, given member interest in avoiding a requirement that single family lot owners implement complicated and expensive SCMs that are not only nearly impossible for a single family to maintain, but may inadvertently incentivize much higher density development. Members recommended caution in ensuring that situations where single-family residential projects happen to trigger stormwater control should require treatment structures and practices that are compatible with the resource limitations and needs of a single family. Members expressed notably more openness to exemptions listed in the proposed language adapted from the Tar-Pamlico Nutrient Strategy as long as

they apply individually, and not collectively. DWR noted that exemptions apply individually, not collectively, but that rule language meant to apply these exemptions could be clearer.

Existing Development, Consensus Items

Overarching Premise – Existing development load reductions are most meaningfully achieved via an investment-based approach that allows local governments to prioritize cost effective solutions

The long-term burden of complying with the High Rock Lake chlorophyll-a standard requires reasonable distribution of regulatory burdens across all the major sources. Existing roads, buildings, parking lots, and structures contribute a significant portion of ongoing nutrient load to High Rock Lake. Current regulations do not allow local jurisdictions to require stormwater treatment on existing impervious surfaces that lie on private property, which means that meaningful load reductions must be achieved elsewhere, on land controlled and maintained by the local government or from other stakeholders and sources. Appropriately designing and sizing retrofits on land that local governments control presents administrative hurdles that have hampered load reduction progress in other nutrient sensitive watersheds. The same dynamic exists in the High Rock Lake Watershed, and so existing developed lands remain a significant source of nitrogen and phosphorus for which reductions from baseline are not only expensive, but logistically complex.

DWR Planning staff introduced the Interim Alternative Implementation Approach (IAIA), which is currently being utilized by the Upper Neuse River Basin Association for compliance with the Falls Lake Nutrient Strategy existing development requirements. In lieu of holding individual local governments accountable for achieving a nutrient load reduction from baseline, it requires that local governments commit a certain amount of funding each year toward a list of eligible programs, practices, and activities. Some programs and practices help achieve load reductions from baseline, while others prevent future load increases. Stormwater TAG members concur with DWR that an incentive- and funding-based approach to load reduction on existing developed lands is likely to yield the most long-term benefit at the lowest cost to local governments. Local jurisdictions should be encouraged to prioritize the programs and practices that are most viable based on their population and rate payer priorities, and a common pool of resources opens the door to cross-jurisdictional collaboration on load reducing practices and activities that go above and beyond what a single local government can accomplish. Capacity is limited to mobilize a regional compliance association that will be capable of shepherding such an initiative through the approval process in the High Rock Lake Watershed, but local governments seem to be in favor of the general concept, and stakeholders have begun laying the groundwork for a similar kind of compliance association to form, though members anticipate that it may not exactly mirror the IAIA's structure.

TAG members achieved a consensus in recommending that a funding-based compliance requirement is a viable path toward reducing nutrient loads from existing development.

Consensus recommendations approved by:

TAG Member	**Affiliation**
Kelsie Burgess	City of High Point
Brent Cockrum	FEI Consulting
Danica Heflin	Piedmont Triad Regional Council
Kelway Howard	Stimmel Associates
Keith Huff	City of Winston-Salem
Scott Leonard	Davidson County
Zack MacKenzie	City of Lexington
Andy McDaniel	NC Department of Transportation
Edgar Miller	Yadkin Riverkeeper
Chris Millis	NC Homebuilders Association
Benjamin Parker	City of Salisbury

Appendix E: Wastewater Technical Advisory Group Final Report to Steering Committee

The High Rock Lake Wastewater Technical Advisory Group met with representatives from the Division of Water Resources five times between December of 2022 and August of 2023. DWR Planning staff brought forward a proposal to implement point source nutrient reductions in the watershed that prioritizes significant early reductions of delivered phosphorus, with nitrogen improvements over time as facilities are able to plan for and acquire funding for treatment upgrades. To identify potential targets for end of pipe concentrations as reference points for plant performance needs, several steps were taken as follows:

- Point source discharge annual loads of P and N were quantified over the last 20 plus years including the baseline year of 2006 and current estimated loads.
- Delivery factors developed from the watershed model were used to estimate the delivered portion of these annual loads to High Rock Lake.
- Various technology endpoints for concentrations of P and N were evaluated to determine achievable reductions from the 2006 baseline loads.
- The reductions were compared to potential target reductions for P and N and used to develop a potential strategy for point source reductions.

Wastewater TAG members came to a consensus that limits should be based on discharge concentrations that achieve proportional load reductions from point and nonpoint sources over time. They also proposed that reductions beyond their proportion (their fair share of reduction) be made available for trading since DWR maintained that point source reductions were more cost-effective and easier to achieve than nonpoint source reductions. DWR Planning staff made the case that point source limits should instead be based on achievable, cost-effective performance levels, and their proposal reflected this premise. This report will present the consensus view of TAG members, as well as the alternative proposal from DWR Planning staff.

Wastewater TAG Proposal

Overarching Premise – All managed point and nonpoint source sectors should be responsible for the same proportions of nutrient reduction over time and that point source reductions beyond that fair share be available for trading

Wastewater TAG members concur with the recommendation put forward by the Yadkin Pee Dee River Basin Association that phosphorus should be prioritized for load reduction in the High Rock Lake Watershed. Members also concur with the recommendation put forward by the Division of Water Resources that some level of nitrogen management will be important in order to avoid unintended consequences from nutrient load imbalances in future years.

Wastewater TAG members have approved the following recommended NPDES permit revision schedule for facilities in the High Rock Lake Watershed. The term, “equivalent concentration” as used in this context means the single end-of-pipe concentration of a nutrient that would apply to all dischargers of a

stated class at a stated flow regime to achieve a stated collective annual mass load reduction when delivered to the lake:

At the 1st permit renewal after rule effective date, a collective 37% TP point source annual mass load reduction is proposed at the lake. This percentage reduction is expected to fall somewhere in the low to mid 50s when adjusted for unmanaged loads from forest and other sources. To achieve this, end-of-pipe annual mass loads will be assigned equating to the following:

- *A 0.75 mg/L phosphorus equivalent concentration at permitted flow will be applied to all facilities with permitted flow larger than 0.99 MGD*
- *A 1.0 mg/L phosphorus equivalent concentration at permitted flow will be applied to all facilities larger than 0.10 MGD but equal to or smaller than 0.99 MGD*

At the 2nd permit renewal after rule effective date, a collective 20% TN point source annual mass load reduction is proposed at the lake. To achieve this, end-of-pipe annual mass loads will be assigned equating to the following:

- *A 6.0 mg/l nitrogen equivalent concentration at permitted flow will be applied to all facilities larger than 4.99 MGD*
- *A 10.0 mg/l nitrogen equivalent concentration at permitted flow will be applied to all facilities larger than 0.10 MGD but equal to or smaller than 4.99 MGD*

Wastewater TAG members recommend adopting permitting, allocation and trading processes that mirror the Neuse Basin Nutrient Management Strategy and include the following:

1. *Annual nitrogen and phosphorus mass limit allocations derived from the overall point source load allocation will be distributed to all existing dischargers and calculated based on a reasonable assumed level of treatment and facility size*
2. *Facilities smaller than 0.10 MGD will be assigned annual mass allocations, but permits will not include actual corresponding limits*
3. *DWR will include an adaptive management provision recommending action if the collective allocation for all facilities smaller than 0.10 MGD is exceeded*
4. *Facilities constructed after the rule effective date will be required to meet reasonable minimum performance standards and purchase their resulting annual allocation from existing facilities*
5. *Large dischargers will be allowed to regionalize smaller facilities and combine their existing allocation with the allocation of the facility being regionalized*
6. *A watershed-based group NPDES permit will be optional for facilities who enter a formal compliance agreement to abide by its terms*
    a. *All dischargers who sign onto the compliance agreement will add their individual allocation to the group allocation*
    b. *The compliance coalition's allocation will be reduced by the allocation of any discharger who voluntarily leaves the compliance coalition*
    c. *All individual members of the compliance coalition will be deemed "in compliance" with the mandates of the point source management rule as long as the group remains in compliance with the watershed permit*
    d. *Exceedance of the group permit will trigger NPDES Branch enforcement of individual permit limits, which includes options for treatment upgrade or offset credit acquisition*

7. *Individual facilities will be allowed to trade allocation with other entities for rule compliance, and permits will be modified to reflect approved trades*
8. *Individual facilities will be allowed to purchase allocation from an existing permitted facility if expansion is expected to result in an exceedance of current permit allocations*
9. *Individual facilities will be allowed to purchase nitrogen or phosphorus offsets to add allowable load to their permitted allocation*
10. *Individual facilities will be allowed to sell or lease allocation to any new or existing discharger*
11. *Individual facilities will be allowed to sell allocation, term, or permanent credits to another regulated NPS entity for rule compliance*

TAG members agree that all major point and nonpoint sources should be held responsible for the same overall lake reduction goal percentages, and that cross-sector credit trading should be allowed to incentivize additional treatment and innovation. Given the relatively high and inherently volatile costs associated with wastewater facility upgrades, TAG members recommend that DWR continue to engage with point source stakeholders on the expected scale of preliminary reduction targets. Members also recommend that DWR prioritize adaptive management provisions that allow for flexibility as rules take effect and economic conditions change.

Given several important differences between Publicly Owned Treatment Works (POTW) and industrial wastewater treatment facilities, TAG members did not take a position on industrial permitting requirements under the nutrient strategy. DWR Planning staff have not determined a proposed course of action but have indicated an intention to pursue a separate discussion with industrial dischargers and agency permit writers which will help inform rulemaking. Additionally, Wastewater TAG members did not take a position on the need for additional on-site wastewater regulations in the High Rock Lake Watershed.

Approved by:

TAG Member	**Affiliation**
Bill Brewer	Winston-Salem/Forsyth County Utilities
Danica Heflin	Piedmont Triad Regional Council
Bill Kreutzberger	Independent Consultant
Andy Smith	City of Statesville
Abstentions	
Kevin Haynes	Tyson Foods Inc.
Doug Lassiter	NC Septic Tank Association

DWR Planning Staff Recommendations

Planning staff understands the importance of distributing load reduction goals fairly across the various point and nonpoint sources in the watershed. In the decades since the first nutrient strategies took effect in North Carolina, the idea that reduction percentage goals should be mathematically proportional for all point and nonpoint sources has prevailed. However, implementation of other nutrient management strategies has demonstrated not only the difficulty, and even doubtful capability, of achieving and maintaining significant load reductions from nonpoint sources, but also the relatively high cost burden associated with each reduced pound of nutrient loading in nonpoint sectors. This cost burden is disproportionately high for nonpoint sources, in part, because nonpoint source pollution is

generated across landscapes with significantly more complicated land and property ownership. Nonpoint source pollution control requires coordination with a large number of different landowners, and control practices must be implemented on private property, which in other watersheds has proven challenging. Additionally, the management of nonpoint source pollution on private property significantly complicates long-term maintenance, monitoring and enforcement.

In other nutrient sensitive watersheds, point sources have exceeded load reduction targets due to the relative cost efficiency of optimization and treatment improvements from large facilities with centralized controls and straightforward facility ownership. In addition, preliminary cost estimates from NPDES staff and independent consultants show similar capital cost and net present value between phosphorus limits of 1.0 mg/L and 0.50 mg/L. For this reason, Planning staff concludes that the additional cost burden on the largest dischargers in the watershed from compliance with a more stringent phosphorus limit would be relatively minor and help achieve a significant reduction in overall phosphorus loading to High Rock Lake.

Planning staff take the position that in order to implement a management strategy that has a meaningful hope of achieving long-term water quality improvement in areas with rapid land use change, load reductions must be quantifiable, measurable, and also cost effective. Given the limited scale of achievable nonpoint source load reductions, the inherent sensitivity of nonpoint sources to climate variability, in contrast to the demonstrated consistency of engineered point source improvements, staff support the idea that an equitable nutrient strategy must prioritize achievable and cost-effective improvements in the short term. A higher required load reduction from point sources in the watershed is therefore appropriate. TAG members do not agree with the Planning staff's conclusions or a proposal to hold point sources responsible for a higher reduction goal.

Appendix F: Septic System Load Management Proposal

Background

Older on-site wastewater systems constructed before the implementation of modern performance standards are more likely to experience malfunctions and require pump-outs or repairs than newer systems constructed with new development. Steering Committee members expressed concern that certain residential areas in the High Rock Lake Watershed were constructed up to and over a century ago, long before modern system design standards and technologies, which makes ongoing failure more and more likely as these areas age. This is especially true in rural areas located along the Yadkin River or the Lake itself.

Despite the ongoing potential for failure, these types systems have been documented as contributing approximately 1% of the overall nutrient load to High Rock Lake (Tetra Tech 2012). At their meeting on July 28, 2023, the High Rock Lake Steering Committee opted not to redistribute baseline on-site wastewater loads as "unmanaged" for the purpose of finalizing watershed nutrient load reduction goals. Members expressed concern regarding the degree to which redistribution would send a message that load reductions are either unachievable or unimportant. By a simple majority Steering Committee members voted to request draft regulatory options from DWR. DWR Planning staff engaged with staff from the DHHS Division of Public Health, Environmental Health Section to clarify current regulatory requirements for County health departments and private septic system owners.

Current Status

County health departments are required to perform on-site wastewater system maintenance for all systems installed after July 1, 1992 according to the schedule specified in 15A NCAC 18A .1961. Maintenance inspections are required on a rotating basis as systems are installed, and repairs are completed in the order in which needs are identified. Older developments with older on-site wastewater systems are not prioritized by County health departments, and so the obligation to inspect, maintain, and repair older systems falls primarily to private homeowners. Many counties in the state do not have sufficient local capacity to comply with required inspection schedules in 15A NCAC 18A .1961, and each department maintains their own processes and procedures for mapping and performing inspections. Some have digitized their inventories using GIS technology, and others have not.

EPA NPDES MS4 permit obligations include a requirement for illicit discharge detection and elimination (IDDE), and 14 MS4 Phase I/II jurisdictions in the High Rock Lake Watershed are currently implementing their MS4 programs, each of which are audited by DEQ on a rolling basis. MS4 IDDE programs require local jurisdictions to maintain and implement a written IDDE plan to detect and address illicit discharges, illegal dumping, and any non-stormwater discharges identified as significant contributors of pollutants to the MS4. These plans require area prioritization based on likelihood of failure and illegal discharge, as well as identification and repair of failing sewer and on-site wastewater systems. Non-MS4 communities must comply only with 15A NCAC 18A .1961.

Regulatory Options

With respect to the High Rock Lake Watershed, Steering Committee members expressed interest in encouraging and requiring some kind of failure tracking procedure in non-MS4 jurisdictions. DWR Planning staff considered the following options which could be incorporated via a wastewater rule within the nutrient management strategy:

1. Requirement that County health departments inspect privately-owned septic systems and either:
    a. Perform needed repairs, or
    b. Inform owner of repair obligations
2. Requirement that County health departments map existing residential and commercial areas not connected to centralized sewer services and track septic system inspections
3. Require that private owners of Type I-III systems specified in Table V(b) of 15A NCAC 18A .1961 perform inspections on a specified schedule
4. Requirement that County health departments educate private owners of their obligations to repair malfunctioning systems
5. Submit annual reports to DHHS DPH documenting education, inspection, and malfunction repair of on-site wastewater systems

DWR Planning Staff Recommendation

It is DWR Planning staff's understanding that the single most important factor that limits implementation of existing requirements, and would similarly limit implementation of new requirements, is staff capacity within each County. DWR Planning staff are concerned that without new resources, simply adding additional requirements is unlikely to meaningfully decrease system failure prevalence over time. Additionally, several regulatory options specified above either duplicate existing requirements (5) or conflict with statute (3). Planning staff believe an approach with the greatest potential for making progress is likely to be prioritizing increased education and outreach to private owners of older homes which were constructed during decades before current performance requirements took effect. These older systems are both more likely to experience failures, and also more likely to be owned by someone who purchased the home long after construction and who is unfamiliar with system maintenance requirements.

DWR Planning staff believe that without the development of new funding streams, a new mandate to educate and inform private homeowners on their system's requirements is probably beyond the current capacity of County health departments, many of which struggle even to perform required inspections on newer systems. It may also result in a disproportionate logistical burden relative to nutrient benefit for County governments to shift resources to comply with the above kinds of actions on such a small proportion of overall nutrient loading to High Rock Lake. Staff believe that a more desirable and potentially effective path forward would be allowing individual county choice while incentivizing such an education program via crediting mechanisms like those developed in other nutrient strategy watersheds, namely through existing development. On-site wastewater systems are a component of the ongoing nutrient load from existing development, and reductions of loads from failing septic systems would meaningfully improve nutrient loading from older residential areas. Considering the difficulty of identifying and implementing nutrient load reduction retrofits in the existing development landscape, it is critical to allow local governments the flexibility to identify cost-effective solutions that align with

existing resources and capacity and with potential new funding sources suited to a given county. As such, a voluntary prioritization of septic system repair will be a valuable tool for County governments to consider individually toward compliance with their existing development obligations. Such a program would be creditable to the extent it is increased after the baseline period, but under this recommended approach, it would not be required for all Counties. Precedent exists in other nutrient sensitive watersheds to credit "onsite wastewater treatment system inspection programs, maintenance tracking, repair, replacement, and pump-out programs, education of owners regarding proper maintenance, and training of professionals who inspect and repair onsite systems" (IAIA 2022), and DWR Planning staff recommend a similar crediting program in the High Rock Lake Existing Development Rule.

Such an approach, in addition to providing counties autonomy in choosing the most workable options for achieving load reductions from ED, would avoid regulatory mandates that may well yield administrative and reporting burdens that don't lead to meaningful load reductions. It would also avoid challenges associated with determining whether, and through what statutory mechanisms, further onsite regulatory mandates would be feasible and practically workable on a watershed basis and would avoid prompting objections to such mandates where progress may be achieved as well or better through the recommended alternative. DWR Planning staff also encourages local government representatives to take advantage of training materials recently published by the National Onsite Wastewater Recycling Association (NOWRA) to educate property owners with an onsite wastewater treatment system. Concepts covered include the importance of wastewater treatment, an overview of treatment in an onsite system, typical onsite system features, final treatment and dispersal, management, maintenance, safety, and system troubleshooting.