

Path Forward Committee Meeting

Hybrid Format: Butner Town Hall with
Remote Option (next slide); June 7, 2022



Remote Option Meeting Access

Equipment Type	Access Information	Notes
Computers with microphones and speakers	Join Microsoft Teams Meeting Please mute your microphone unless you want to provide input.	Press control and click on this link to bring up Microsoft Teams through the internet. You can view the screen share and communicate through your computer's speakers and microphone
Computers without audio capabilities, or audio that is not working	Join Microsoft Teams Meeting (888) 404-2493 Passcode: 371 817 961# Please mute your phone unless you want to provide input.	Follow instructions above Turn down your computer speakers, mute your computer microphone, and dial the toll-free number through your phone and enter the passcode
Phone only	(888) 404-2493 Passcode: 371 817 961# Please mute your phone unless you want to provide input.	Dial the toll-free number and enter the passcode

Remote Access Guidelines

- This meeting will open 30 minutes prior to the official meeting start time to allow users to **test equipment** and ensure communication methods are working
- If you dial in through your phone, mute your microphone and turn down your speakers to **avoid feedback**
- Unless you are speaking, please mute your computer or device microphone and phone microphone to **minimize background noise**

Agenda

- Opening Comments, Agenda Review/Revisions
- IAIA Status of Submittal to DWR
- Discussion of the Joint Symposium with the NC Policy Collaboratory
- Draft Modeling, Regulatory Support, and Communications Scope of Work for FY2023
- Modeling and Regulatory Support Status
- MRSW Workgroup Reports
- Plan for Statistical Model Development and Regulatory Options for the Site-Specific Chlorophyll-a Water Quality Standard Proposal
- DWR 2022 Integrated Report and 303(d) Assessments
- Communications Outreach and Preparation
- Future Meeting Protocols

**Status of Interim Alternative
Implementation Approach (IAIA)
Submittal to the Environmental
Management Commission
(EMC)**

Status of Interim Alternative Implementation Approach (IAIA) Submittal to the Environmental Management Commission (EMC)

- During their March meeting, the Board voted to amend the UNRBA Bylaws to allow the Town of Stem to join the UNRBA.
- The Compliance Group Committee (CGC) voted to allow the Town of Stem to join the IAIA Program and voted to amend the Program Document to add Stem and make other updates.
- The CGC also voted to allow the Chair of the CGC to execute an updated resolution to the EMC to add the Town of Stem and update the Program Document.
- The Chair executed the resolution and signed a submittal cover letter on May 2, 2022, for submittal to the State.
- The revised package was submitted to the Division of Water Resources (DWR) and the EMC on May 12, 2022.
- **First-year investment commitments under the IAIA are required to be reflected in the FY 2021-2022 IAIA annual report. This report is due to DWR and the UNRBA by September 30, 2022.**

Discussion of the Joint Symposium with the NC Collaboratory

Discussion of the Joint Symposium with the NC Collaboratory

- The second joint symposium with the NC Policy Collaboratory was held on April 7, 2022.
- This in person meeting was very successful with substantive discussions about the challenges facing Falls Lake.
- A summary of the discussions and questions posed will be provided on the following slides for a few key topics.
- The UNRBA would like to thank the NC Policy Collaboratory and the UNC Institute for the Environment for coordinating and hosting this important event.

Nutrient Loading and Lake Processes

- Complex relationships in the lake and watershed
- No “smoking gun” as cause for the impairment
- Falls Lake is like a big stormwater control measure protecting downstream estuary
- Organic nitrogen loads are likely to increase due to climate change
- Hydrologic conditions drive loading, and some land uses store up nutrients during dry periods
- Internal lake releases will be more important during dry years
- Potential to use bioreactors downstream of septics and discussions about how significant loading from septics is relative to other sources
- Denitrification is an important part of the nitrogen balance and should be encouraged

Algal Toxins, Chlorophyll-a, and Zooplankton

- Nutrients don't always correlate to chlorophyll-a
- Chlorophyll-a doesn't correlate to toxin levels in Falls Lake
- Upper lake has higher chl-a but lower lake has higher toxin levels
- Though toxin levels in Falls Lake are low, some participants expressed concerns about their presence
- Comment that high frequency periods of data collection to better understand day to day variability would be helpful.
- Understanding what conditions favor different algal groups.

Nutrient Management

- Management options
 - Lake operations, discussions with USACE
 - Lake sediment removal to reduce internal loading
- Maintenance issues with SCMs
 - Convert existing and new infrastructure into utilities rather than HOA's or other groups responsible
 - Improving existing infrastructure
 - Incentivizing and crediting O&M
 - Better information transfer from developers to owners

Financing and Implementation

- Funding sources
 - Federal money under the infrastructure bill could be used to build large practices and regional SMCs
 - Revenued is a good idea
 - Everyone should pay
 - Environmental and social justice should be factored in
 - Some portion of water bills should go to watershed protection, not just water treatment (e.g., UNCWI)
 - IAIA is a good idea
 - Flexible approach with multi-benefit projects that should be an acceptable compliance tool
 - Should be considered as part of the new rule

Designated Uses

- Recreation is an important use for Falls Lake
- The upper area is quieter and lends itself well to kayakers
- Water clarity is important
- There is more water quality data for this lake than there is recreational data (not unusual)
- Potential toxin levels and water clarity may change people's perception of when to do certain recreational activities.
- It may be helpful to know the impact of stories on toxin levels on recreation use
- Just because the fishable use is met, doesn't mean other uses are met

Draft MRS and Communications Scope of Work for FY2023

Review Process for the Draft Scope of Work

- The Executive Director and Chair of the MRSW have reviewed the draft scope of work and their comments have been incorporated into the draft scope of work
- The MRSW reviewed the draft scope of work during their May meeting and the PFC will review today
- Board will review and act during the June 15, 2022, meeting
- The total budget is proposed at \$815,000
 - BC (labor and miscellaneous expenses): ~\$332,300
 - Systech Water Resources (WARMF): ~\$148,500
 - Dynamic Solutions (EFDC): ~\$223,400
 - KDV (Statistical, Bayesian, Decision Support): ~\$65,000
 - Brindle Creek (economist): ~\$45,700

Task 350 (~\$136,800)

- Finalize calibration of WARMF Lake and EFDC lake models to address subject matter expert and DWR input
- Unspent money to be shifted to subsequent tasks

Task 351 (~\$133,300)

- Sensitivity analyses and scenario evaluation

Task 352 (~\$117,800)

- Statistical/Bayesian/Decision Support tool development
- Re-examination data analysis support

Task 353 (~\$141,800)

- Iterative reporting and production of draft lake model report
- Generation of meeting slides for status meetings, technical workshops, etc.

Task 354 (~\$6,100)

- Update the work plan and develop scope for FY2024

Task 355 (~\$65,000)

- Regulatory support for the re-examination (meetings, workshops, assistance with framework development, etc.)
- IAIA Program Support

Task 356 (~\$60,000)

- Continued management and coordination of UNRBA's communications team
- Implementation and revision (as needed) of the UNRBA Communications Plan
- Preparation of materials to support meetings with regulatory agencies, commissions, and NGOs; technical stakeholder workshop; and symposia or forums
- Coordination with communications staff at local governments to leverage existing resources, platforms, and distribution lists and better reach the general public concerning the re-examination goals and recommendations

Task 410 (~\$63,700)

- Cost benefit analyses to support the re-examination
- Integration with work of the UNC Environmental Finance Center

Task 500 (~\$20,000)

- Compile data inputs, model files, executables, and final reports for submittal to DWR
- Provide these materials, as required, to other regulatory agencies, such as EPA
- Respond to comments and inquiries from the agencies to clarify any questions

Task 610 (~\$70,500)

- Project management
- Meeting attendance: working calls, workshops, status meetings, symposium

Proposed Revisions to the Meeting Plan

- Target no more than two meetings or workshops per month to achieve schedule
- Transition back to PFC meetings in the Fall with MRSW members invited
- Utilize reserved monthly meetings times for alternative purposes to achieve schedule
 - Technical Stakeholders Workshop
 - Workshop with UNRBA members' communication staff
 - Workshop with DWR/NC Policy Collaboratory/NGOs regarding stakeholder feedback on a revised strategy
 - Spring Symposium
- Note: July 5th is the first Tuesday of the month and follows the July 4th Holiday; Executive Director and Chair of MRSW have cancelled this meeting

PFC Discussion of Draft Contract and Scope of Work

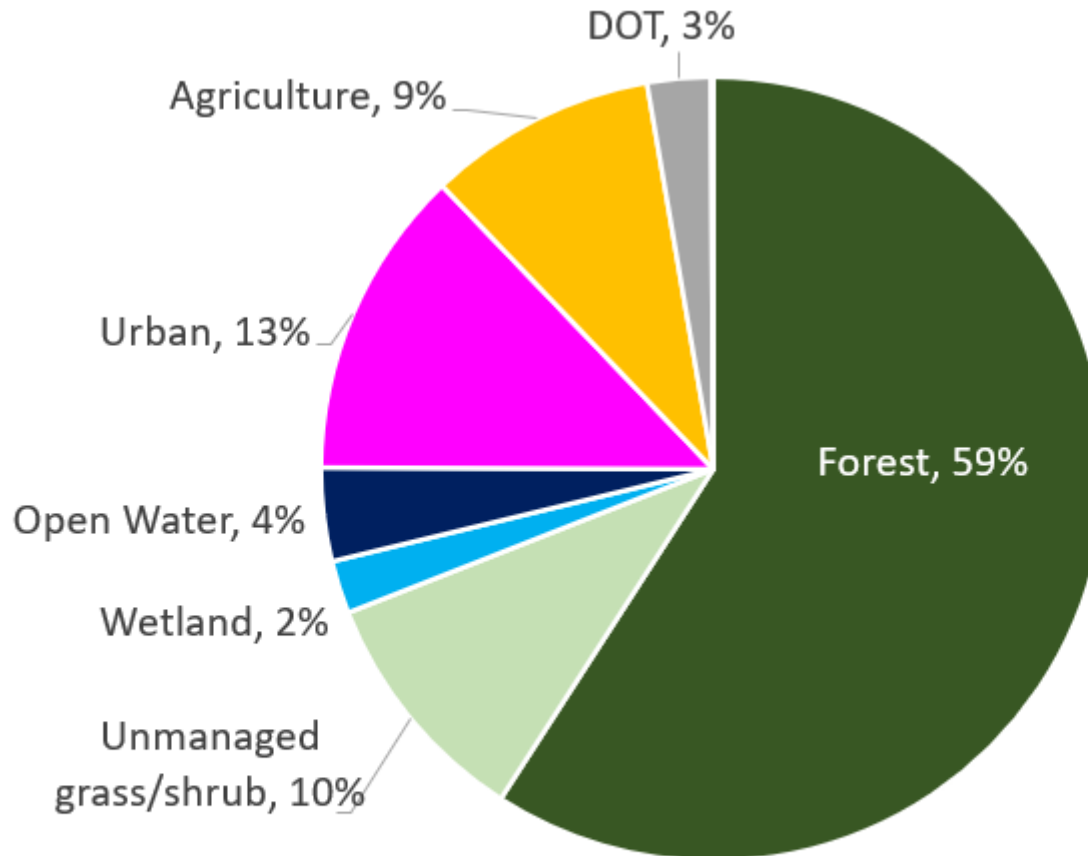
Modeling and Regulatory Support Status

Estimation of Jurisdictional Loads

Processing Steps

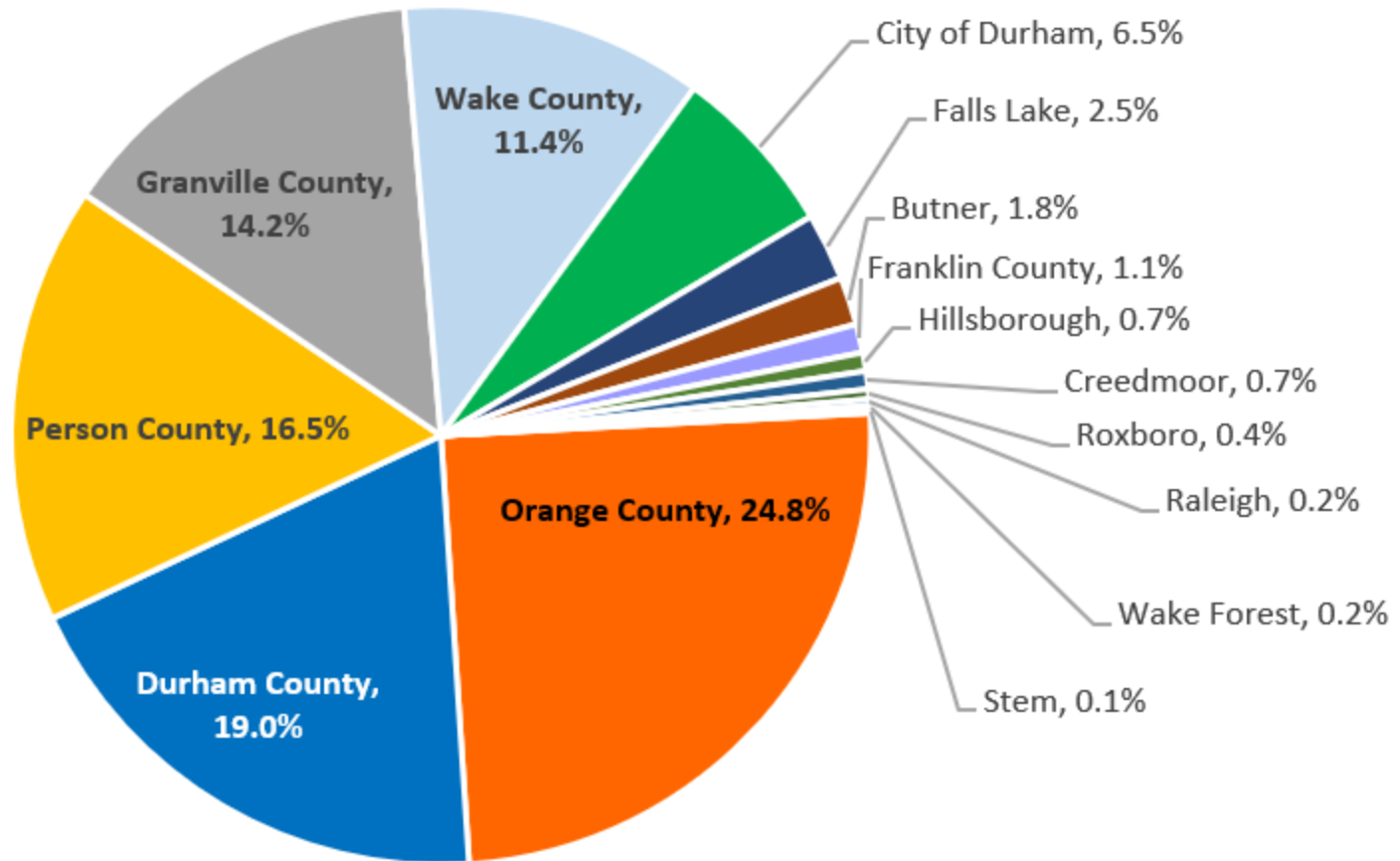
- Uses the method approved by the MRSW at the [May 2022](#) meeting to allocate delivered loads at the county level
 - Tracks the load from forests crossing the county line and compares to the load reaching Falls Lake
 - The ratio of these two loads generates delivery factors by county that are applied to the other land uses
 - Estimates include loads from all jurisdictions within the county
- Allocate these county-level loads among the jurisdictions by applying ratios based on
 - Land use areas (actual, not based on modeling catchments)
 - All agriculture assigned to the county
 - New development and interim development assigned to the municipality in the subwatershed (or the county if no municipality)
 - Lengths of streams in each jurisdiction used to allocate loads from stream bank erosion and initial system mass
 - Type and location of onsite wastewater treatment systems
 - Nutrient inputs of point sources: WWTPs, SSOs and DSF

Land Use Composition of the Falls Lake Watershed (492,000 acres)

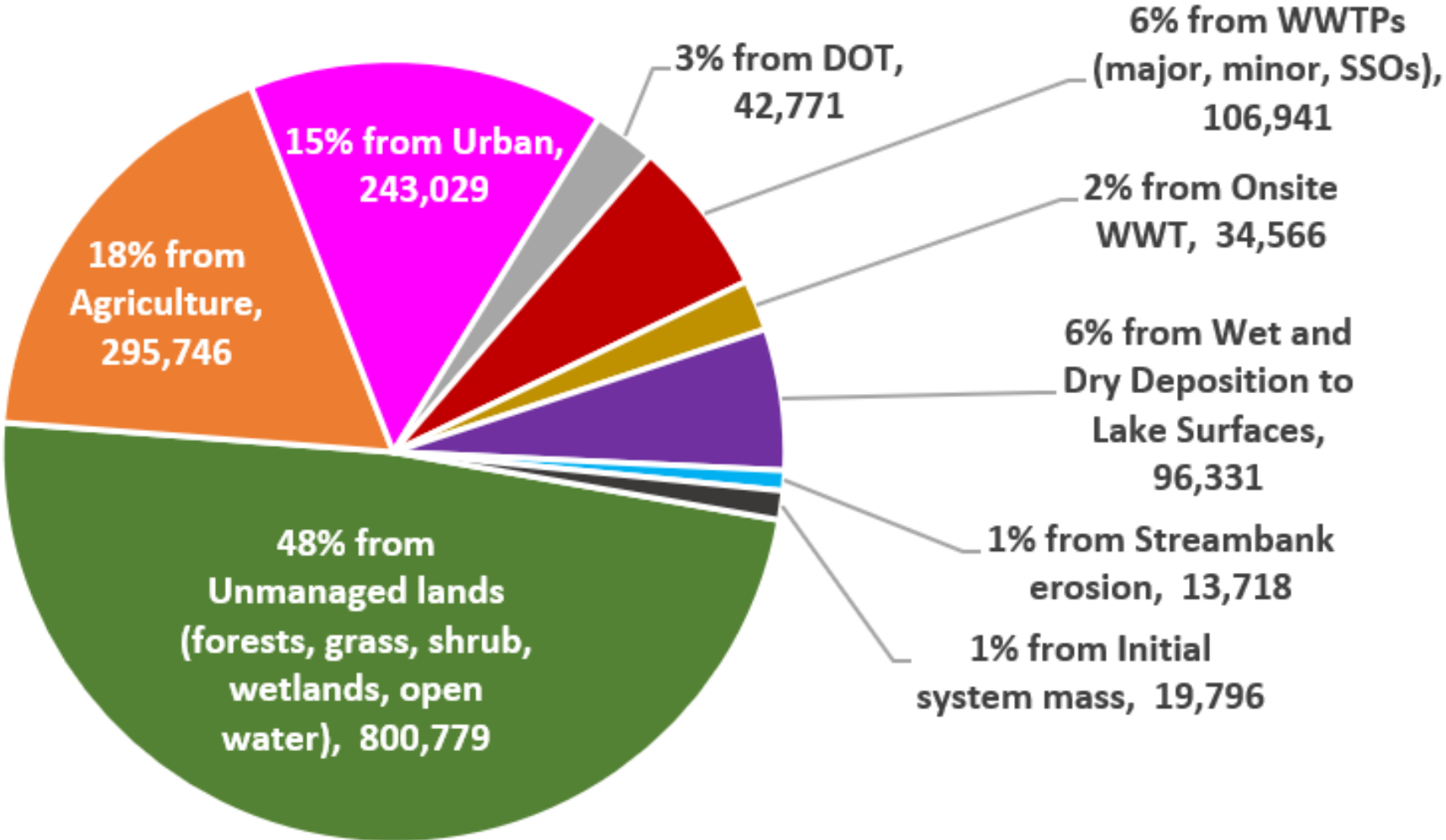


75 percent of the watershed area is in unmanaged land uses: forests, grassland, shrubland, wetlands, or open water.

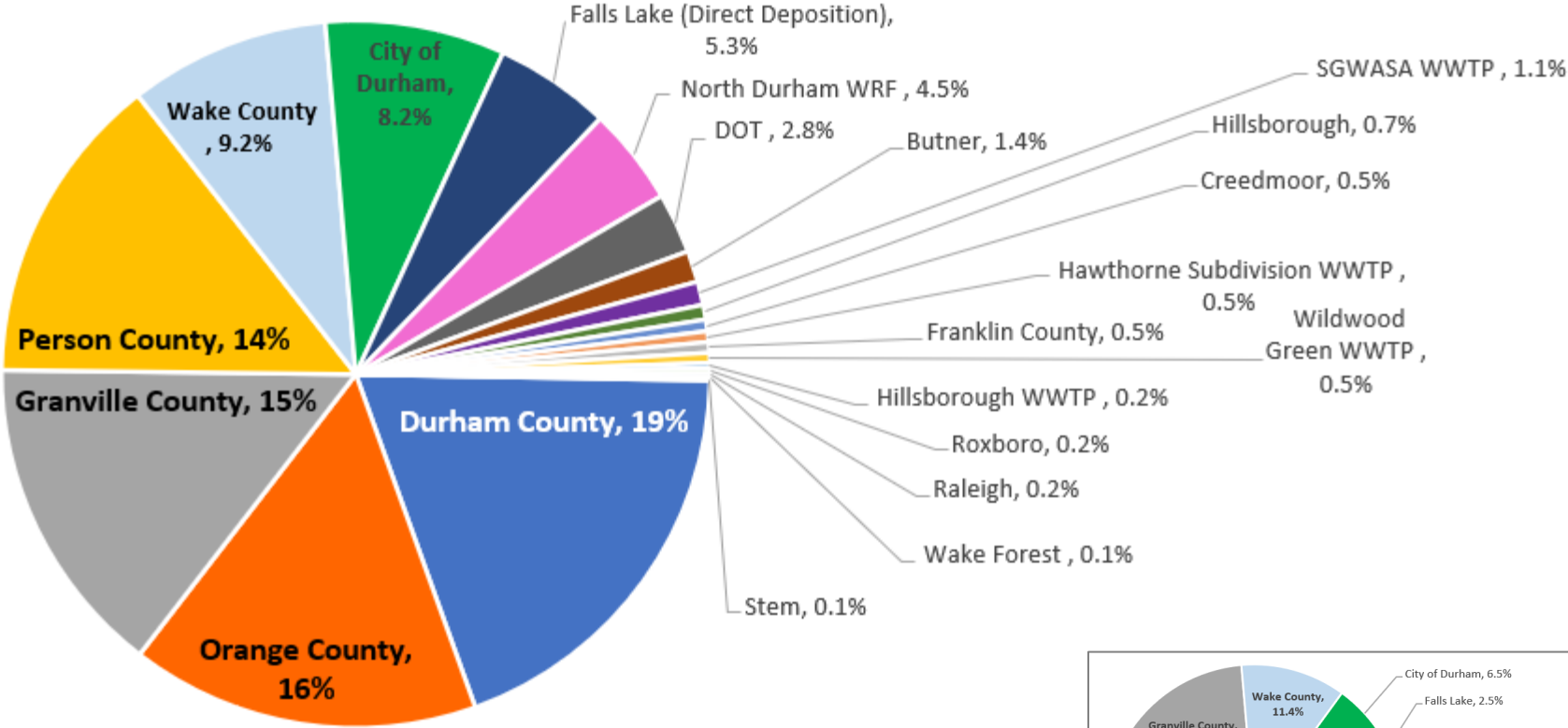
Percent of Land Area by Jurisdiction



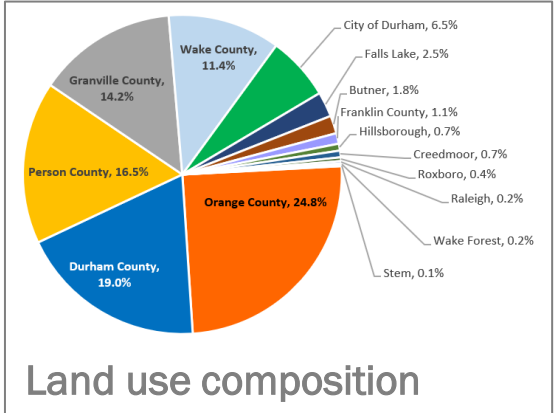
Sources of Delivered Total Nitrogen Load (1.65 million pounds per year)



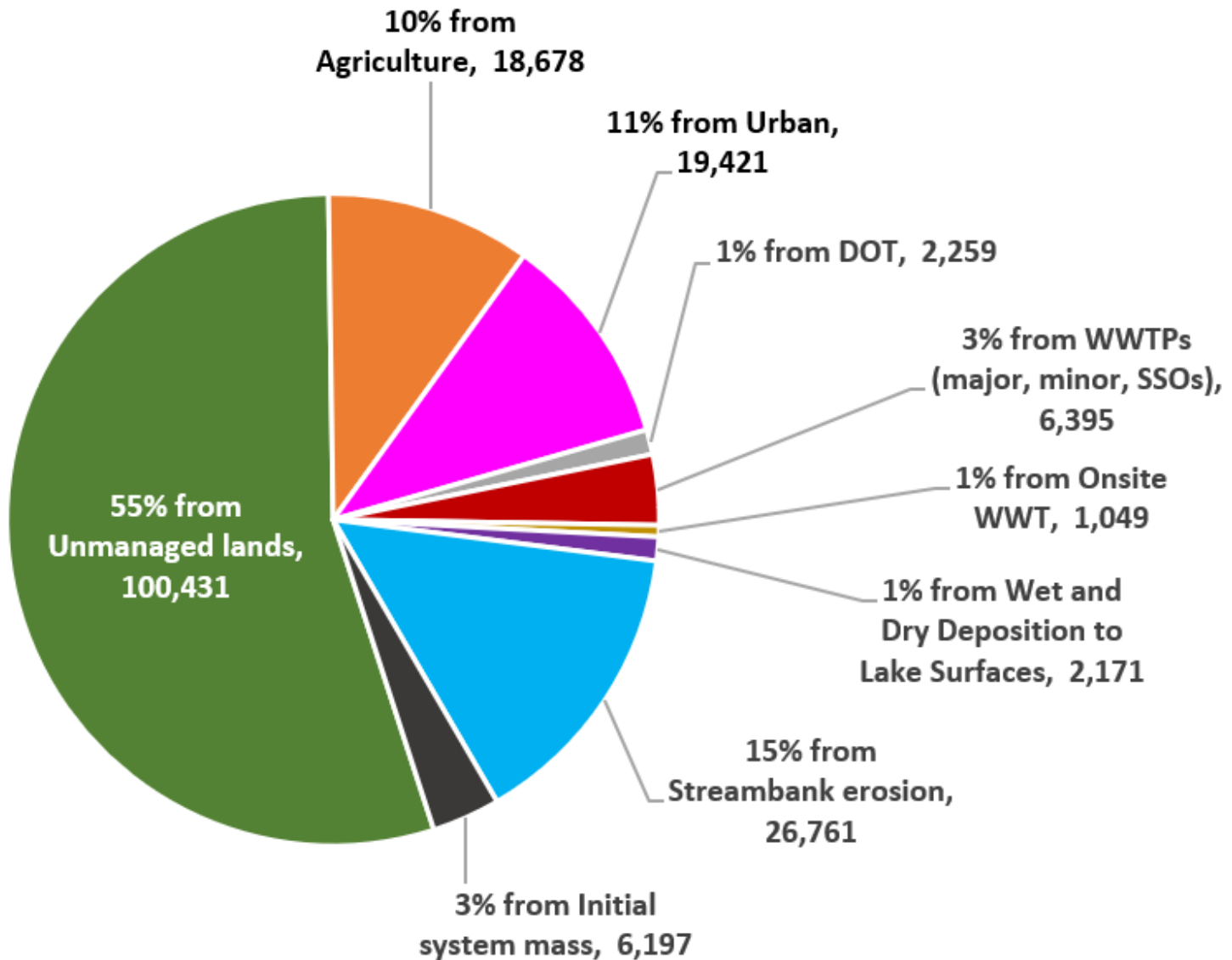
Sources of Delivered Total Nitrogen Load (1.65 million pounds per year)



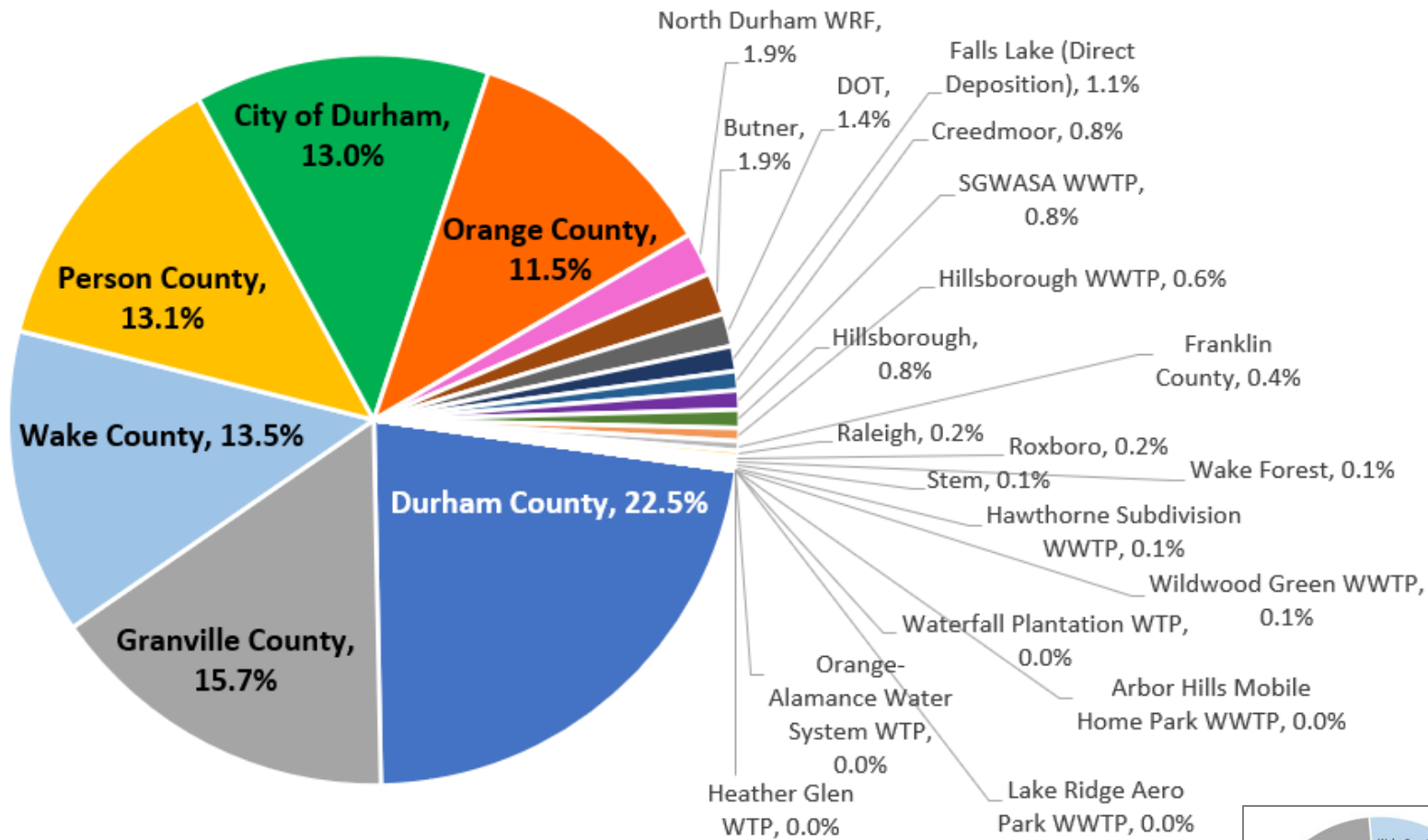
Allocations for permitted discharges are listed individually and are based on actual discharged flow rates and effluent concentrations, not permit limits.



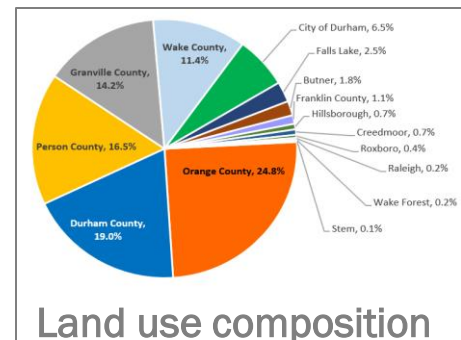
Sources of Delivered Total Phosphorus Load (184,000 pounds per year)



Sources of Delivered Total Phosphorus Load (180,000 pounds per year)



Allocations for permitted discharges are listed individually and are based on actual discharged flow rates and effluent concentrations, not permit limits.



Watershed Model Report Status

WARMF Watershed Model Report Status

- Draft report has been reviewed by the Executive Director and Chair of the MRSW
- The Executive Summary for the report has been reviewed by both and revised in response to comments (summarized on the following slides)
- Agricultural representatives have reviewed sections of the report describing agricultural inputs and outputs
- Jurisdictional loads are being incorporated into an appendix along with loading summaries by tributary
- The full modeling report will be distributed to the MRSW after the modeling team has addressed comments

WARMF and EFDC Lake Calibration Status

WARMF Lake and EFDC Modeling - Algae

- Preliminary model results were discussed with the subject matter experts
- Each model includes three algal groups which can be set up as individual algal groups or multiple groups
- There are five dominant groups in Falls Lake (greens, diatoms, blue greens, Prymnesiophytes, and Euglenoids)
- The modeling team has been working with local algal experts to gather information on these groups
- Very limited local data is available and most of the model parameters for the additional groups are unknown
- Adding two additional groups adds too many “knobs to turn”
- Both models will simulate the third algal group as “other algae;” i.e., not diatoms or blue greens
- The blooms associated with groups that occur very infrequently may not be able to be simulated

WARMF Lake and EFDC Modeling – Sediment Nutrient Fluxes

- Both models simulate releases of nutrients from lake sediments (EFDC is more complex than WARMF)
- Multiple studies by DWR, EPA, and UNRBA (Dr. Marc Alperin) have been summarized previously
- Additional studies by the NC Policy Collaboratory are being summarized (Dr. Mike Piehler)
- Each of these studies is limited in terms of spatial coverage and are much smaller in coverage than the EFDC model grid or WARMF Lake segment
- Direct comparison is not possible but these studies provide bounds on nutrient cycling in the lake for comparison to the models
- Water quality in the water column also places bounds on what can be released from the sediments

WARMF Lake and EFDC Status

- Model calibration continues and the additional information from Dr. Piehler will be added when available
- Coordination with subject matter experts will continue
- Additional meetings with the subject matter experts will be scheduled in July and August
- Plan to finalize the models in August/September to begin scenario evaluation
- WARMF Lake calibration will be presented to the MRSW at their August 2, 2022 meeting
- EFDC calibration will be presented to the MRSW at an additional meeting to be scheduled (September is a PFC meeting)

Summary of the CDC One Health Harmful Algal Blooms (OHHABS) Data

Characterizing Algal Bloom Events with Known Health Outcomes



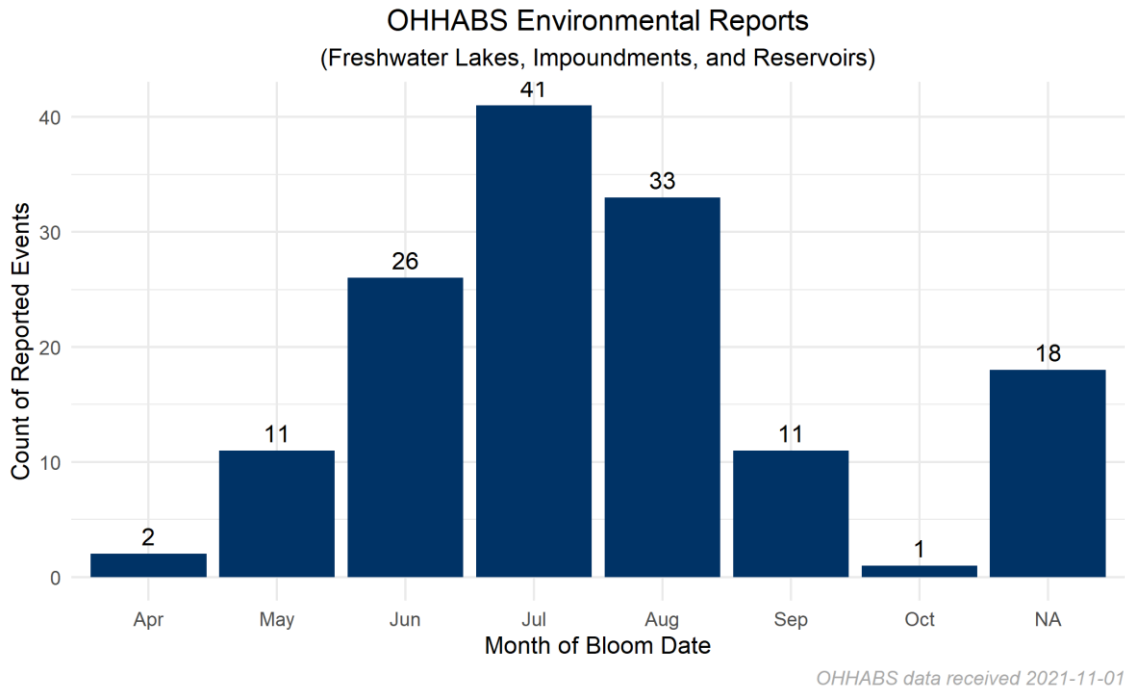
<https://www.cdc.gov/habs/ohhabs.html>

Why OHHABS data?



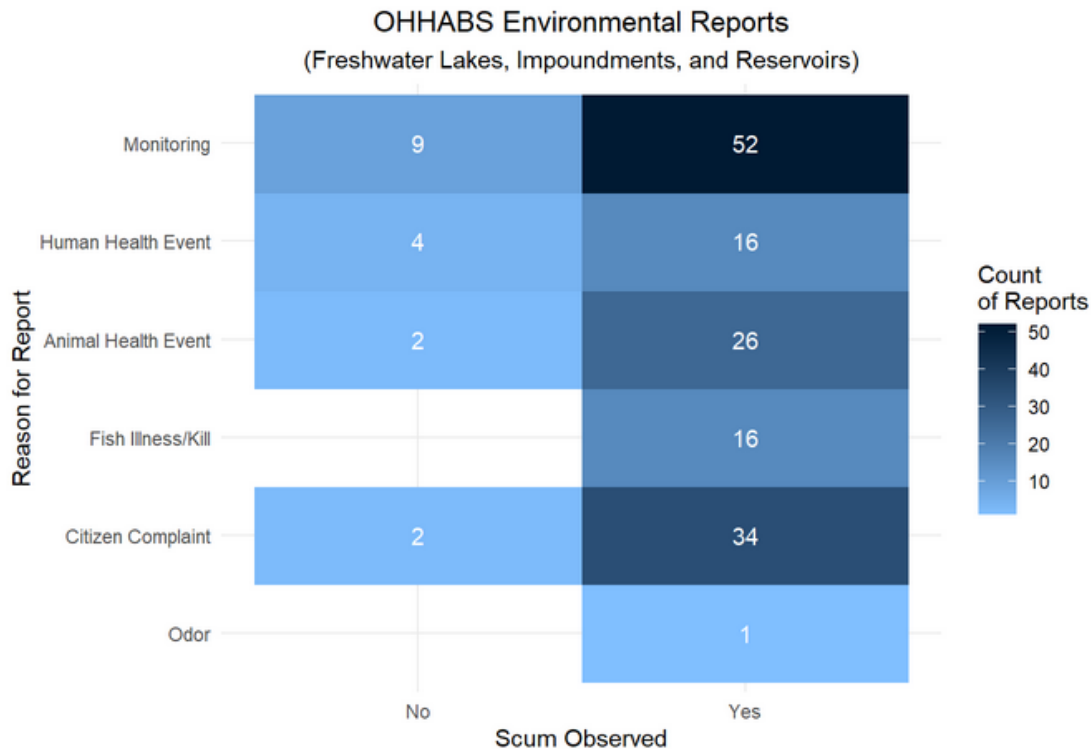
- Falls Lake
 - Few documented hazardous algal bloom (HAB) events
 - No recreational closures due to HABs
- We need data from other databases to fill gaps
- OHHABS provides data to describe:
 - Algal species present and toxin levels associated with
 - Human and animal health outcomes
 - Warnings and closures
 - Environmental conditions documented at time of HAB events
 - Human use complaints documented in relation to HAB events
- OHHABS does NOT provide data to define cause-effect relationships or set thresholds

OHHABS Events by Month



- Temporal distribution of records
 - Many NA for date of event because of choices in how they report (cause of reporting or when they reported)
 - No documented events in Dec-Mar, but cannot say events do not occur in this period

Environmental Conditions Reported



OHHABS data received 2021-11-01

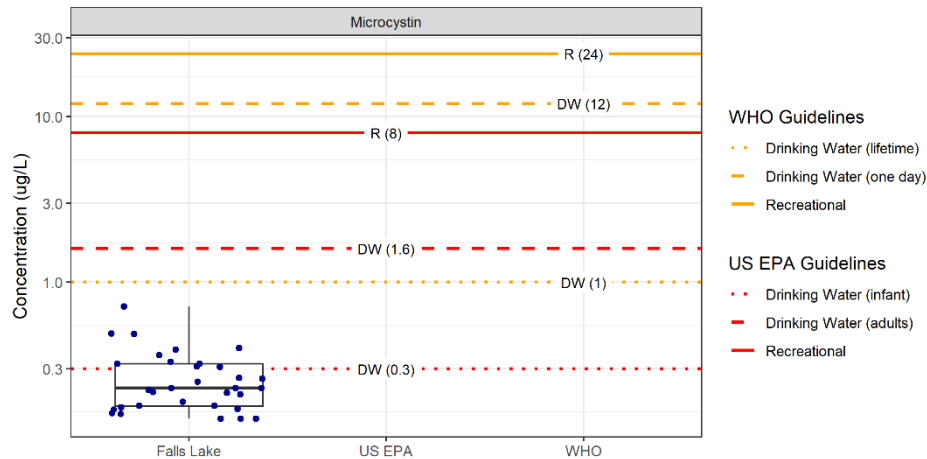
- Conditions reported:
 - Scum present/absent
 - Water color
 - Water clarity
 - Odor present/absent
 - Flowing or Stagnant

Microcystin

- Never above WHO or US EPA limits (2016-2018)
- No advisories or closures due to microcystin
- Values observed in Falls have been present during OHHABS health events
- Levels observed in OHHABS event have been observed in Falls without reported events

Falls Lake City of Raleigh Data

Falls Lake Toxins (2016 - 2018)
with World Health Organization and
US Environmental Protection Agency Guidelines

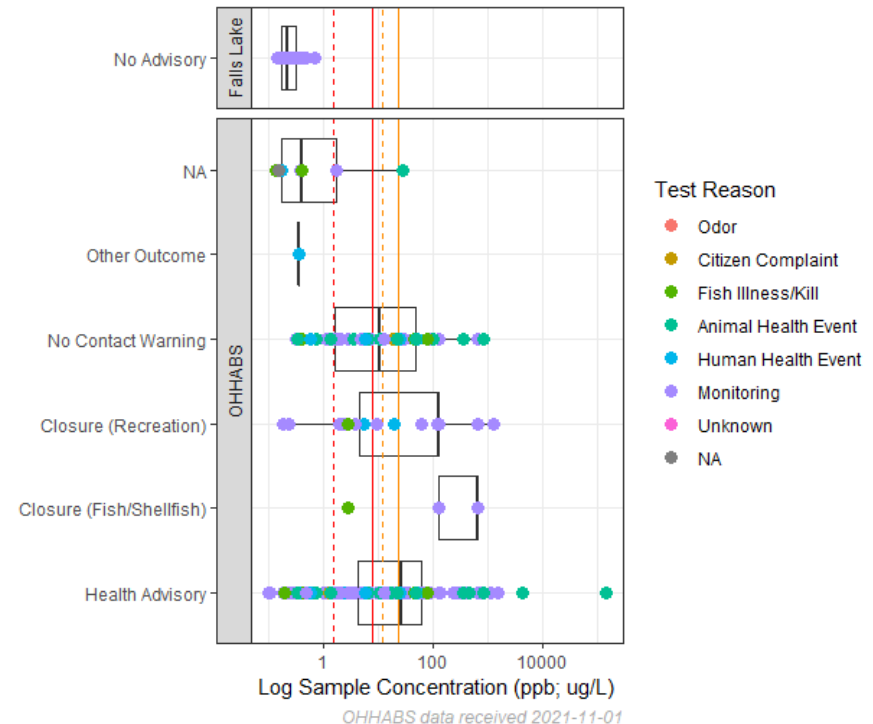


City of Raleigh toxin data

Falls Lake Data Compared to OHHABS Reports

Microcystin: Levels and Advisory Outcomes

Limits: red solid (EPA recreation); orange solid (WHO recreation); red dash (EPA drinking); orange dash (WHO drinking)



Adverse events may be caused by something other than this toxin.

Concentrations are shown in log scale.

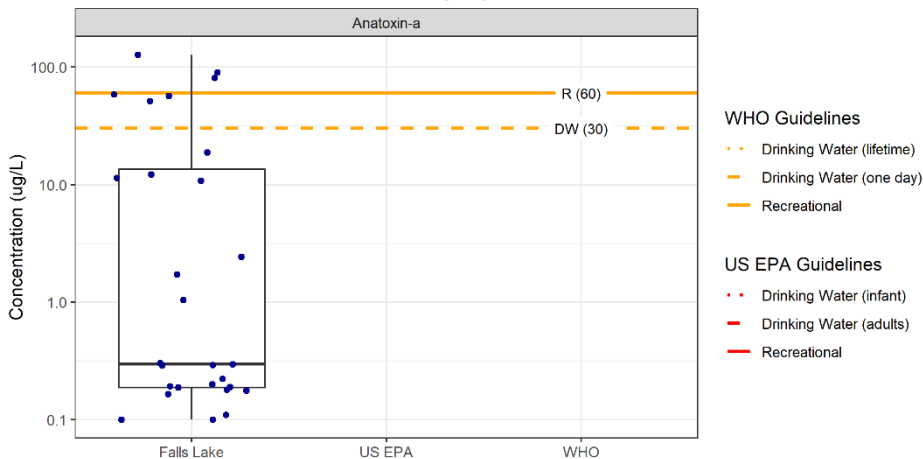
Anatoxin-a

- Occasionally above WHO limits (no US EPA limits)
- No advisories or closures due to anatoxin-a
- Values observed in Falls have been present during OHHABS health events
- Levels observed in OHHABS event have been observed in Falls without reported events

Falls Lake Data Compared to OHHABS Reports

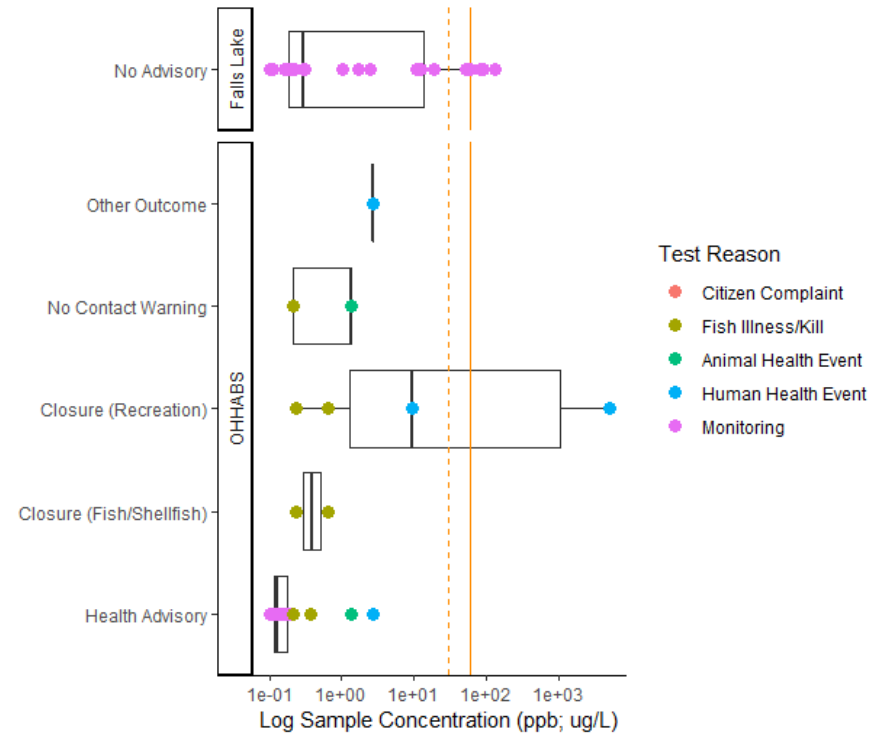
Falls Lake City of Raleigh Data

Falls Lake Toxins (2016 - 2018)
with World Health Organization and
US Environmental Protection Agency Guidelines



City of Raleigh toxin data

Anatoxin-A: Levels and Advisory Outcomes
WHO limits: orange solid (recreation) and orange dashed (drinking)



OHHABS data received 2021-11-01

Adverse events likely caused by something other than this toxin.

Concentrations are shown in log scale.

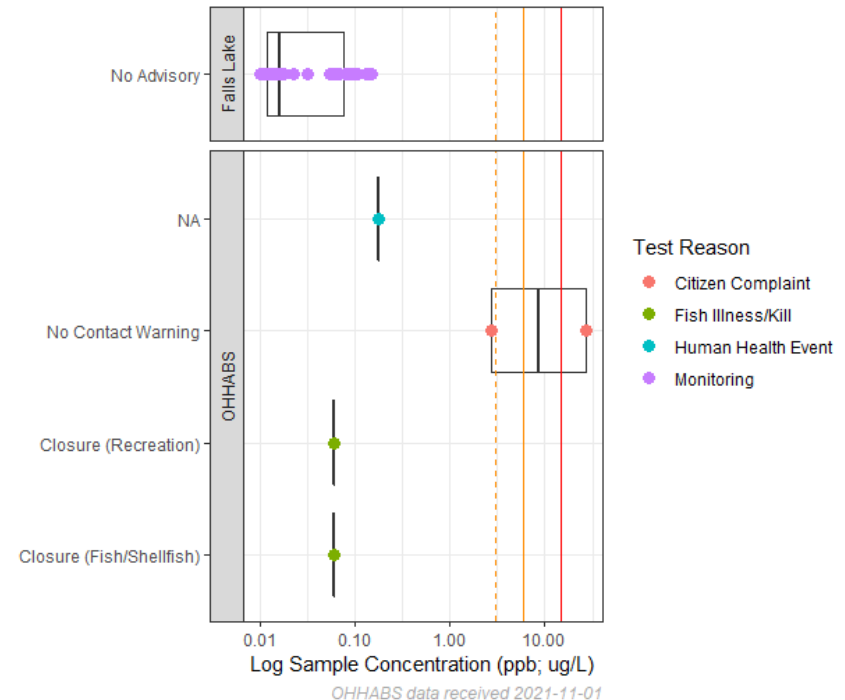
Cylindrospermopsin

- Never above WHO or US EPA limits (2016-2018)
- No advisories or closures due to cylindrospermopsin
- Values observed in Falls have been present during OHHABS health events
- Levels observed in OHHABS event have been observed in Falls without reported events

Falls Lake Data Compared to OHHABS Reports

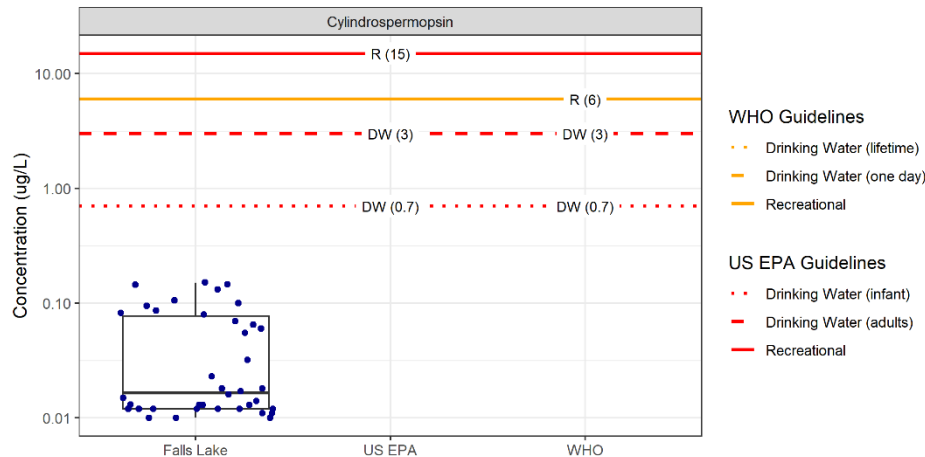
Cylindrospermopsin: Levels and Advisory Outcomes

Limits: red solid (EPA recreation); orange solid (WHO recreation); orange dashed (WHO and EPA drinking)



Falls Lake City of Raleigh Data

Falls Lake Toxins (2016 - 2018)
with World Health Organization and
US Environmental Protection Agency Guidelines



City of Raleigh toxin data

Adverse events likely caused by something other than this toxin.

Concentrations are shown in log scale.

Current Understanding and Application

- Toxin levels in Falls Lake are generally lower than regulatory thresholds or recommended guidance
- NC Policy Collaboratory researchers presented similar results at the Symposium in terms of low concentrations, and reported that chlorophyll-a is not correlated to algal toxin concentrations
- The OHHABS data will be incorporated into the statistical/Bayesian model to
 - Put the Falls Lake toxin data into context when compared to conditions that occurred when harmful events happened in other parts of the country
 - Understand current levels of risk and identify potential mitigation measures IF better predictors of toxin levels can be identified

**Preliminary Discussions of
Concepts Believed to be
Important in Developing the
2023 Nutrient Strategy
Revisions (Falls Lake Rules)**

Preliminary Discussions of Concepts Believed to be Important in Developing the 2023 Nutrient Strategy Revisions

- The Co-Chairs of the PFC identified the need to begin discussions on concepts for the UNRBA's recommendations for revision to the Falls Lake Nutrient Management Strategy
- This initiative was noted in communication to the PFC
- Past and current feedback from internal and external stakeholders is being gathered (meetings, workshops, forums, symposia)
- The watershed model has identified some critical aspects that will relate directly to developing an effective revised strategy.
- Lake model calibration continues and will be incorporated into the process
- The Co-Chairs of the PFC will meet today following the PFC meeting to discuss next steps

MRSW Workgroup Reports

Status of Scenario Screening Workgroup

- Developed a selection process for prioritizing scenarios to evaluate with the models
- Developed a preliminary list of scenarios to evaluate (high and medium priority)
- Worked with representatives from agriculture to determine if further nutrient reductions were feasible to simulate with the models
- Presented recommendations to the MRSW in March 2022
- Presenting recommendations to the PFC today for approval

Recommended Approach for Agricultural Areas

- Current actions already implemented and simulated include
 - Stream buffers and keeping animals out of streams
 - Conservation tillage (simulated as a land use)
 - Reduced crop and pasture acres (44% lower than baseline)
 - Reduced nutrient application rates from baseline
 - 53% less total nitrogen applied
 - 41% less total phosphorus applied
- Modeling team met with representatives from NC Department of Agriculture and the Farm Bureau in February, April, and May to discuss if additional reductions are feasible
- Representatives from the Farm Bureau and NC Department of Agriculture met with staff from local conservation districts to hear directly if additional practices could be implemented
- No additional measures were identified that would further reduce loading from this agriculture, and acreages will continue to decrease due to economic pressures
- Current actions will be documented in UNRBA reporting

Summary of Scenario Screening Workgroup Recommendations – High Priority Scenarios

- All Forest scenario (already approved by MRSW and PFC)
 - Provides information on constraints for lake water quality
- Determine the load reduction curves needed to comply with the chlorophyll-a standard as currently written
- Simulate reductions from controllable sources where feasible

PFC to vote on recommending the high priority scenarios to the Board for evaluation with the models.

Summary of Scenario Screening Workgroup Recommendations – Medium Priority Scenarios

- Medium priority scenarios may be evaluated later
- Algal flo-way/turf scrubber*
 - Pump water from tributaries or lakes, reduce nutrients, discharge back to water
 - Depending on where these are simulated, may require simulation in the watershed model
- Modification to Falls Lake operations
 - Operation of the lake as a flood control basin impacts residence time and the growth of algae
 - A change in operational guide curve may not be feasible and would require extensive negotiation with the USACE

Summary of Scenario Screening Workgroup Recommendations – Options for Nutrient Management

- The workgroup recommends that the revised nutrient management strategy consider the following options for management, but they do not recommend evaluating these with the UNRBA watershed or lake models
 - Forest management such as controlled burns and stream restoration
 - Inspections, repairs, and education programs to address proper maintenance of onsite wastewater treatment systems

Plan for Statistical Model Development and Regulatory Options for the Site-Specific Chlorophyll-a Water Quality Standard Proposal

Statistical Model Development and Regulatory Options for the Chlorophyll-a Water Quality Standard

- The UNRBA is developing a statistical/Bayesian model to link the water quality in Falls Lake to its designated uses
- The Technical Advisors Workgroup for the legal group, MRSW, and PFC have identified local subject matter experts to provide data and information regarding satisfaction with the designated uses of Falls Lake
- The modeling team has been conducting virtual meetings with these experts to understand the types of data and information that are tracked with respect to designated uses to inform development of the statistical/Bayesian modeling
- Development of a site-specific chlorophyll-a standard represents an important consideration for a revised Falls Lake management strategy and is linked to this modeling effort
- Subject matter expert, Dr. Marty Lebo, was approved by the Board in June and has begun his work in support of this effort.
- The UNRBA is also coordinating with the Environmental Finance Center on their Year 3 effort funded by the NC Collaboratory.

Status of the 2022 NC DWR 303(d) List and Integrated Report

2022 303(d) list and Integrated Report

- The DWR Draft Integrated Water Quality Assessment Report and the Draft 303(d) List for 2022 were posted: [DWR website](#)
- The UNRBA submitted comments on the draft documents on February 18, 2022
- DWR submitted final documents for EPA approval April 1, 2022
- EPA approved the 303(d) List on April 28, 2022, as submitted
- Overall, The Big Picture
 - from the UNRBA perspective, no surprise.
 - Falls Lake not attaining the chlorophyll-a standard
- As related to UNRBA interests, EPA's approved 303(d) List seems to contain some inconsistencies with the UNRBA's comments and DWR's response to those comments.

Select UNRBA Comments and DWR Responses on the DWR Draft 2022 303(d) List

- Work group to modernize the current NC Water Quality Standard for chlorophyll-a. **DWR did not embrace.**
- Consistent Assessment Units should be established based on limnologic/morphologic and hydrologic characteristics. **DWR did not embrace.**
- Falls Lake Ledge Creek Arm should be re-evaluated. The EMC-approved evaluation methodology suggest this AU Meets the Criteria. **DWR agreed.**
- Barton Creek Arm to Falls Dam may be split into two AU's. **DWR Response: DWR agreed.**
- Three waterbodies located within the Falls Lake drainage area should not be 303(d) listed. **DWR partially agreed.**

UNRBA Comments and DWR Responses on the DWR Draft 2022 303(d) List

- Three waterbodies located within the Falls Lake drainage area should not be 303(d) listed because part of the Neuse Rules
Beaverdam Creek Reservoir
Little River (Little River Reservoir)
East Fork Eno River (Lake Orange)
- DWR Response-
“DWR can meet with stakeholders to begin the process of evaluating if Little River Reservoir chlorophyll a assessments can be recategorized to 4b or 5r based on existing rules and activities currently being implemented. Note a recategorization to 4b requires EPA approval and will have to show that implementation of the Falls Lake rules is occurring upstream of the reservoirs. However, because Beaverdam Creek drains directly into Falls Lake, it will be listed as Category 4b.”

New Additions to the 2022 303(d) List as Included and Approved by EPA April 28, 2022

- 27-12-(0.7)b
Beaverdam Creek Reservoir below normal pool elevation -
Chlorophyll a.
- 27-2-21-(3.5)
Little River Reservoir - Chlorophyll a
- 27-2-3b
East Fork Eno River (Lake Orange) - Chlorophyll a

Communications Outreach and Preparation

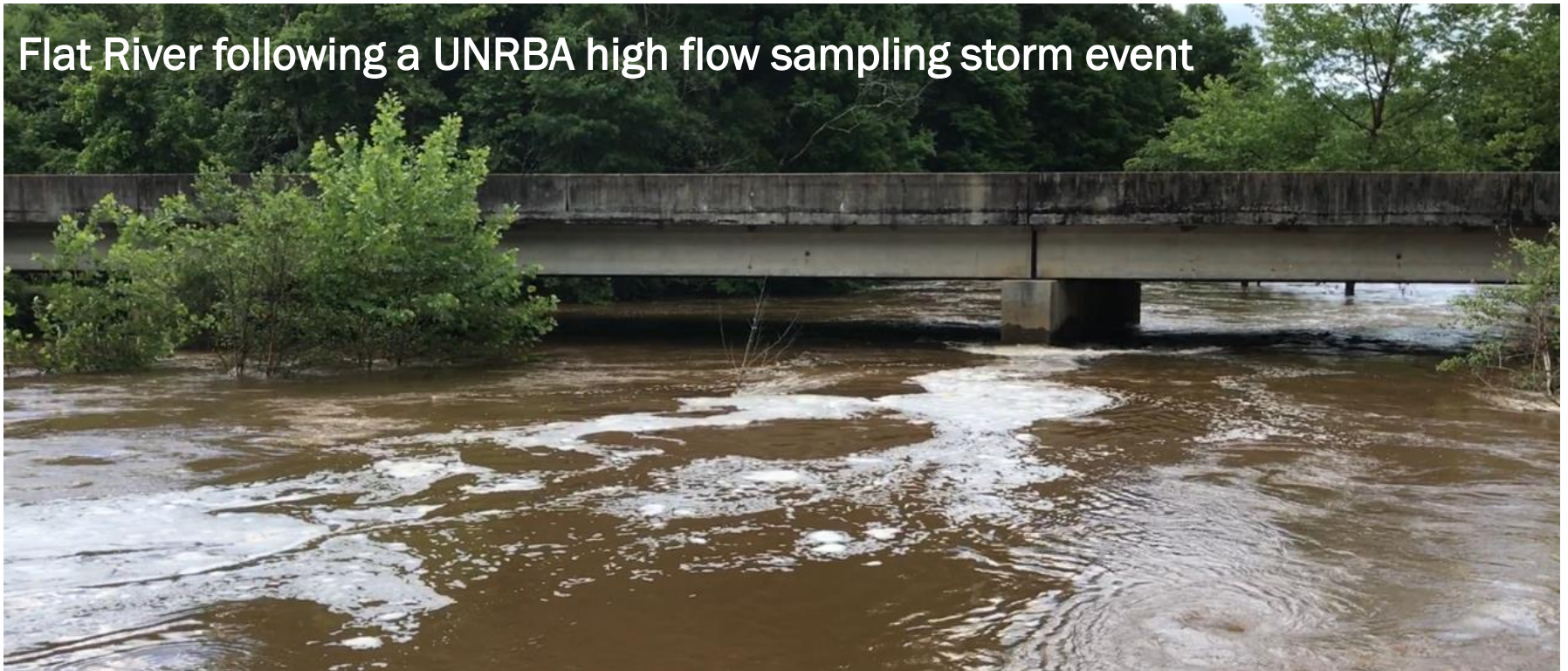
Summary of the Joint Symposium with the NC Policy Collaboratory

- The second joint symposium with the NC Policy Collaboratory was held on April 7, 2022.
- Several UNRBA member representatives were able to attend.
- This in- person meeting was very successful with substantive discussions about the challenges facing Falls Lake
- [Example slides from the Symposium follow](#)
- The UNRBA would like to thank the NC Policy Collaboratory and the UNC Institute for the Environment for coordinating and hosting this important event

Impacts of Hydrology on Nutrient Loading

- At the March MRSW meeting, we discussed how nutrient loading can be hundreds of times higher than baseflow conditions on days with high precipitation amounts
- We showed that data at the Symposium along with this picture showing the Flat River flow through the treetops and rising toward the bridge deck

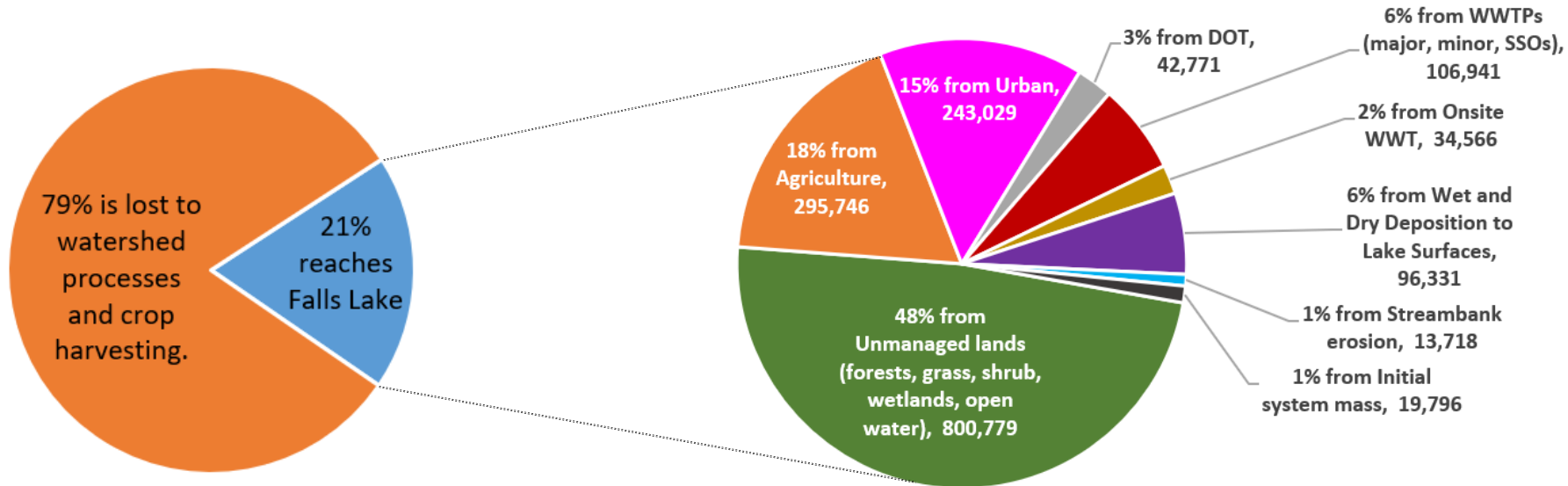
Flat River following a UNRBA high flow sampling storm event



Annual Average Applied and Delivered Total Nitrogen Loads

Gross inputs:
8.8 million pounds per year

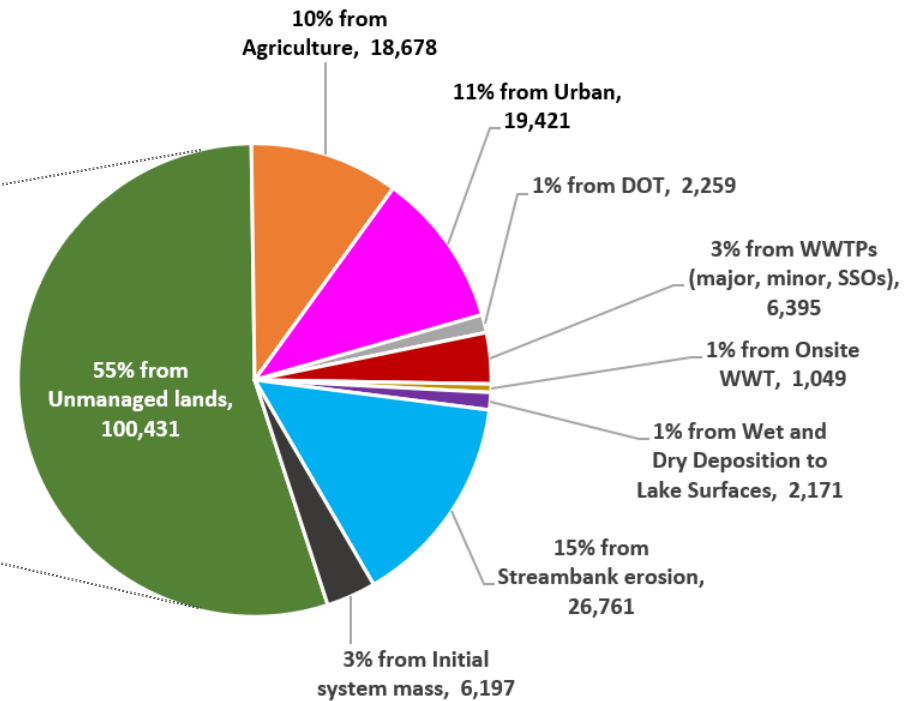
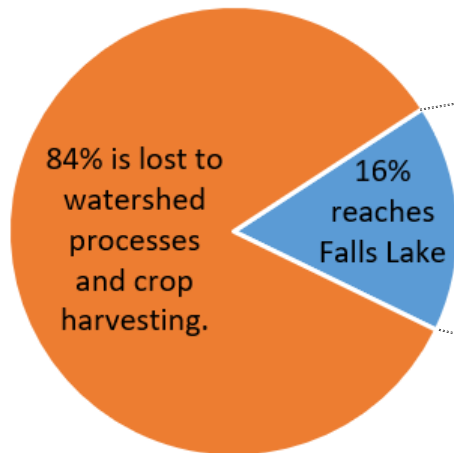
Delivered load:
1.65 million pounds per year



Annual Average Applied and Delivered Total Phosphorus Loads

Gross inputs:
1.1 million pounds per year

Delivered load:
180,000 pounds per year



Future Meeting Protocols

Future Meeting Protocols

- This is the first, in-person/virtual option, meeting the PFC has had since March of 2020.
- With COVID-related meeting and person-to-person contact protocols changing, the PFC needs to be flexible in considering future meeting protocols.
- This decision will need to be looked at by the PFC ahead of their next meeting which is September 6, 2022.
- Today, the PFC should discuss if the in-person/virtual option approach should continue.
- There will be no meeting of the PFC or MRSW on July 5, 2022.
- The next meeting of the MRSW has been postponed until August 2, 2022.

Closing Comments

Additional Discussion