Path Forward Committee Meeting
March 5, 2024

Agenda

- Opening Comments, Agenda Review/Revisions
- Proposed Budget for FY 2025
- Draft Content for the Updated UNRBA Website
- Falls Lake Rules Readoption Process
- Modeling and Regulatory Support Status
- Evaluation of Falls Lake Assessment Methodology and a Site-Specific Chlorophyll-a Water Quality Standard
- Communications Support
- Other Status Items
- Closing

Opening Comments, Agenda Review/Revisions

Proposed Scope of Work and Budget for FY2025

Task 520 - Preliminary discussions of potential future UNRBA Monitoring Program

- Some UNRBA Board of Directors have expressed interest in restarting the UNRBA Monitoring Program at some level
- DWR has paused monitoring the tributaries to Falls Lake due to resource constraints; DWR continues to monitor the lake
- In order to track water quality progress and issues in the watershed, tributary data is needed
- This task includes discussions with DWR, UNRBA members, and other researchers to begin planning for a potential future UNRBA monitoring program
  - Which members want to participate in a joint program? Which members plan to conduct their own monitoring?
  - What data will be needed for routine trend analyses or when remodeling is needed (long-term part of adaptive management)?
  - What additional studies would be needed relative to past efforts? What did we miss?
  - Who, what, when, where, and how should data collection begin?
- Discussions would be summarized in status presentations

Task 530 - Data Analysis and Statistical Modeling

- The Falls Lake Statistical/Bayesian Model will be developed by the end of FY2024
- In FY2025, the model will be used to answer stakeholder questions and test scenarios
- An online interface for the model will be developed for running scenarios by UNRBA members
- Generation of tables and figures for use in project documentation for the statistical modeling and scenario evaluations
- General data analyses to address questions raised by the UNRBA members and stakeholders regarding water quality trends, correlations, etc.

Task 540 - Status Updates, Project Reporting, and Responding to DWR Questions about Reporting

- Meeting materials describing the results of project efforts in preparation for UNRBA workgroup sessions, PFC, and Board meetings as well as special meetings with subject matter experts, UNRBA member communications staff, DWR, DEQ, representatives from other regulated sectors, and environmental and land conservation organizations; a technical stakeholder workshop; synthesis workshop with the NC Collaboratory; joint forum for elected officials with DWR; and Water Resources Research Institute annual conference.
- Responding to DWR questions on the UNRBA Lake Modeling Report; finalization of this report if not completed by the end of FY2024 (depends on length of time for review process)
- Technical memorandum describing additional scenario results following finalization of the report as needed.

Task 550 – Support Continued Implementation of Current Rules

- Support development of nutrient crediting or alternative metrics for eligible projects and activities to be considered under revised rules.
- Continue administration and technical support of the Stage I Existing Development Interim Alternative Implementation Approach (IAIA).
- Coordinate joint consultation among UNRBA members to discuss and document application of current new development requirements
- Compile annual effluent discharge flows and nutrient loads from major and minor wastewater treatment plants in the Falls Lake watershed

Task 560 - Support Rules Readoption Process and Falls Lake Specific 303(d) Assessment Methodology

- Provide modeling support, scenario evaluation, and data analysis to address questions regarding revisions to the Falls Lake Nutrient Management Strategy (Rules, implementation requirements, and Falls Lake specific 303(d) assessment methodology)
- Provide support to the planning and conducting of stakeholder sessions with DWR
- Identify and organize working groups within the UNRBA to evaluate and draft specific components of the revised rules
- Support legislative engagement and potential legislative action
- Coordinate discussions and documentation of potential changes to UNRBA Bylaws
- Facilitate discussions among UNRBA members, DWR, and stakeholders about potential content for the 5-yr and 25-yr status reports discussed in the UNRBA recommendations
- Preliminary outline for drafting program document needed to support implementation of revised rules

Task 570 - Preliminary Evaluation of a Potential Site-Specific Chlorophyll-a Standard for Falls Lake

- Provide modeling support, scenario evaluation, and data analysis to address questions regarding a site-specific standard for chlorophyll-a
- Develop technical responses to issues raised by UNRBA members, DWR, DEQ, and other stakeholders about a site-specific standard for chlorophyll-a
- Facilitation discussions among UNRBA members, DWR, and stakeholders about a site-specific chlorophyll-a standard
- Develop meeting materials to support discussions and response to questions raised by UNRBA members, DWR, DEQ, and other stakeholders about a site-specific standard for chlorophyll-a (status presentation or FAQ style documents)

Task 580 - Fiscal Analysis of Proposed Rule Changes and Support DWR Fiscal Analysis

- Provide fiscal evaluation of proposed rule changes and prepare for coordination with DWR on the State's fiscal analysis.
- Participate in meetings (internal and external) and workshops, expanded outreach to compile additional data and information from affected sectors, and participation at stakeholder meetings to hear feedback on potential nutrient management actions and concerns.
- Continue gathering local data and summarizing costs and benefits for types of management activities.
- Coordinate with DWR on data and information needs to support their fiscal analysis and review of draft materials developed by DWR.

Task 590 – Communications Support

- 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
- Development press releases to communicate the work and recommendations of the UNRBA

Task 630 – Project Management, Miscellaneous Expenses, Attendance and Travel for Meetings, Workshops, and Forums

- Provide status updates to the UNRBA during PFC, BOD, or other UNRBA workgroup meetings.
- Status calls with the Executive Director and as needed, the PFC Chairs and leadership of the BOD, to support meeting preparation and discuss work status.
- Participation in meetings, workshops, forums, annual conferences, and other meetings regulators, researchers, administrators, internal and external stakeholders as directed by the Executive Director.
- Expenses associated with the project including mileage at standard rates for meeting attendance, room rentals, meeting supplies like chairs and projector screens, printing costs, luncheons for workshops and forums, etc.

Proposed Project Budget for FY2025

Task	Brown and Caldwell Labor	Expenses	Total
520 Preliminary discussions of a potential future UNRBA Monitoring Program	$25,000	$10,000	$35,000
530 Data Analysis and Statistical Modeling Application	$60,000	$50,000	$110,000
540 Project Reporting, Responding to DWR questions on Reporting, Status Updates (PFC, BOD meetings)	$50,000	$20,000	$70,000
550 Support Continued Implementation of Current Rules (IAIA/NutCred/NewD/tracking WWTP loads)	$40,000	$0	$40,000
560 Support Rules Readoption Process and Falls Lake Specific 303(d) Assessment Methodology	$85,000	$55,000	$140,000
570 - Preliminary Evaluation of a Potential Site-Specific Chlorophyll-a Standard	$20,000	$0	$20,000
580 Fiscal Analysis of Proposed Rule Changes/Support DWR Fiscal Analysis	$40,000	$50,000	$90,000
590 Communications Support	$60,000	$0	$60,000
630 Project Management/Misc Exps/Other Meetings/Workshops/Forums	$30,000	$20,000	$50,000
Total	**$410,000**	**$205,000**	**$615,000**

Expenses include modeling subcontractors, economists, and miscellaneous expenses.

PFC Discussion and Vote for Support of Budget for Approval by the Board at the March 20, 2024 Board of Directors Meeting

UNRBA Website Status

Status of UNRBA Website Updates

- The UNRBA has contracted with River Delta Consulting to merge and update the two UNRBA websites
- PFC members have provided input on content to retain from the two existing websites
- The UNRBA team have developed draft content for the website pages
- PFC Co-Chairs and communications staff from the City of Durham have reviewed and provided comment on the draft content pages
- The website developer has provided input on how the content could be organized on the new website
- A mockup of the Home page for the website and the draft content pages were distributed to the PFC ahead of the meeting
- The following slides will show the potential organization of content for PFC discussion and input
- The contractor would like to begin coding the organization of the site soon
- Edits to text, graphics, and photos can occur as the site is built
- Please send photos/graphics of projects, natural resource areas, preservation sites, use of Falls Lake, etc.

Menu Headings

Home	About Us	Scientific Studies	Updated Strategy	Resource Library

Home Page

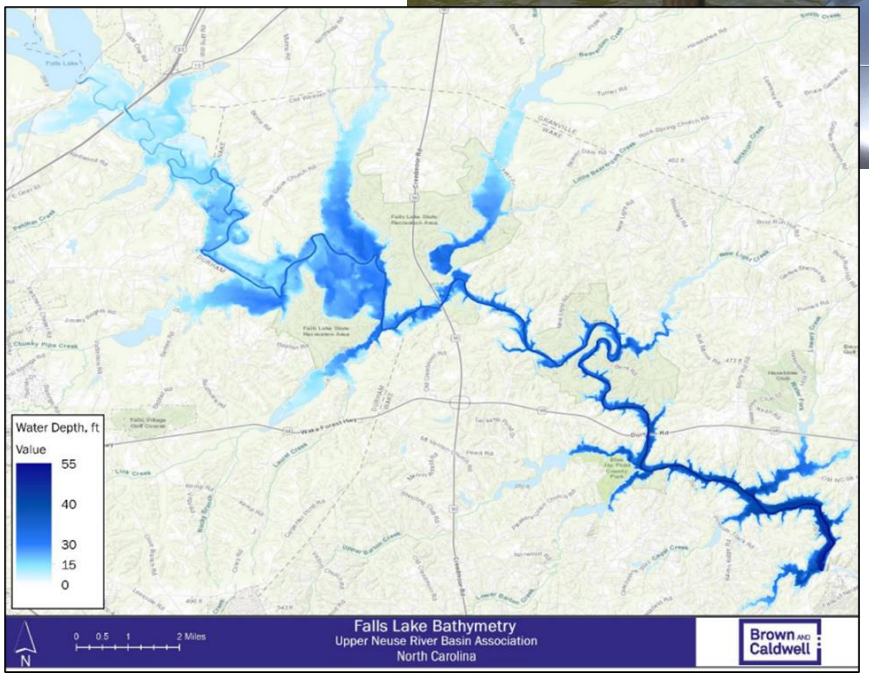
- The UNRBA
- Falls Lake
- Study and recommendations
- Current Activities
- How to Participate
  - Review our Recommendations
  - Contact Us/Provide Feedback
  - Attend our Meetings

About Us

- Background
  - Construction and Early Studies
  - Uses of the Lake
  - Addressing Nutrients
  - 2011 Rules
  - NC Chlorophyll-a Standard
- Reexamination
  - Requirements
  - UNRBA Framework
  - Need for Further Management
  - UNRBA Recommendations
  - Case Studies
- The Association
  - Mission
  - Local Governments and Utilities in the Watershed
  - Board of Directors
  - Executive Director
  - Bylaws and Guidance Documents

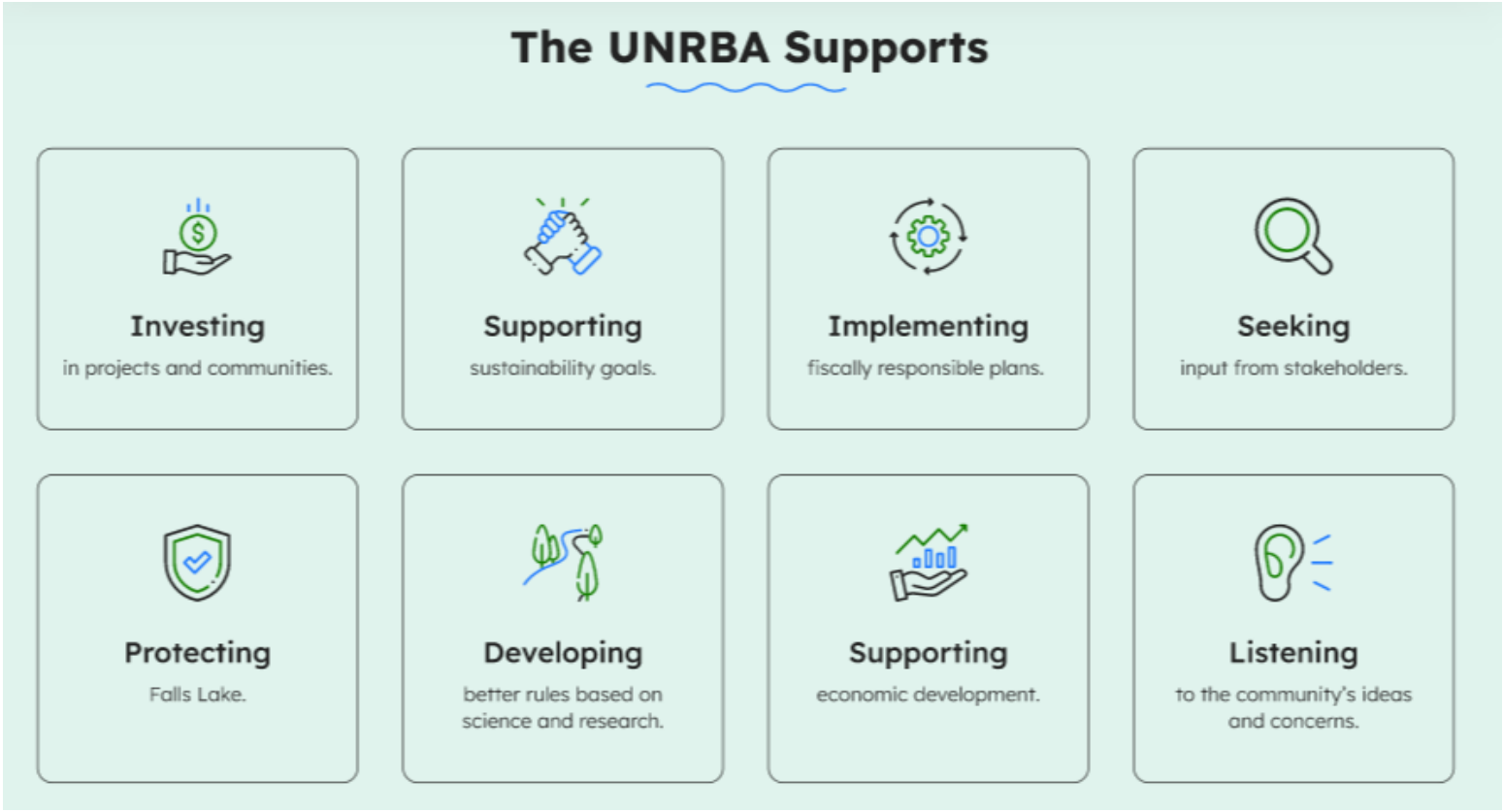
Scientific Studies

- UNRBA Preparations
  - Initial Assessments
  - Guidance Documents
- Monitoring
  - Development of the UNRBA Program
  - Development of the UNRBA Special Study Plans
  - Access to UNRBA Data
  - UNRBA Reporting
  - Other Organizations Collecting Monitoring Data
  - Key Findings
- UNRBA Modeling
  - Development of the Program
  - UNRBA Watershed Modeling
  - UNRBA Lake Modeling



Updated Strategy

- Addressing Nutrients
- Pilot Study/IAIA
- Crafting Recommendations
- Formal Submittal
- Developing Revised Rules



Resources (links to documents organized by topic)

- Recommendations for Revised Falls Lake Rules
- Pilot Study/IAIA
- Nutrient Reductions
- Monitoring Data and Reports
- Monitoring Planning Documents
- Modeling Reports
- Modeling Planning Documents
- Initial Assessments for Reexamination
- Frequently Asked Questions
- Maps
- Handouts
- Press Releases
- Bylaws/Policies/Procedures

WATER QUALITY MONITORING PROGRAM

Final Monitoring Report for the Falls Lake Nutrient Management Strategy Reexamination

Final UNRBA Monitoring Plan

Quality Assurance Project Plan for the Upper Neuse River Basin

Mockup of Home Page – we will view together during the meeting

https://xd.adobe.com/view/23d96843-b503-4263-a903-ea63131f13d4-768a/

PFC Discussion of Organization and Draft Content and Home Page Mockup

Falls Lake Rules Readoption Process (Led by DWR)

Recent Meetings with DWR

- January 19th - Met with John Huisman and Rich Gannon (DWR) to discuss status and upcoming activities
  - DWR is reviewing UNRBA and NC Collaboratory submittals
  - DWR's role in approvals of UNRBA models and recommendations
  - DWR working on a schedule for UNRBA review
  - Joint regulatory forum
  - Planning for presentations to EMC and WQC
  - Watershed organization
  - How the UNRBA can support DWR's process
- January 31st - Met with Ellie Rauh (DWR) to discuss the IAIA and potential application in the Jordan Lake watershed
- February 2nd - DWR presented the Falls Lake IAIA to the Nutrient Scientific Advisory Board as a potential approach to base upcoming/revised existing developing rules in the Jordan Lake watershed
- February 22nd - DWR hosted a Jordan Lake One Water workshop to discuss existing Jordan Rules, challenges, and alternatives

Upcoming Activities

- March 8th – UNRBA Board Officers to discuss upcoming activities
- The NC Collaboratory will provide funding to Dan McLawhorn to continue his policy-related evaluations and recommendations related to Falls Lake rules readoption, a new watershed organizations, etc.
- The Collaboratory will also be funding further research by Barbara Doll on stream bank nutrient loading and restoration efforts as well as Nathan Hall to support statistical modeling efforts
- Planning meetings with DWR to discuss schedule for rules readoption, joint forum, UNRBA support activities, etc.

Schedule for Rules Readoption

- The UNRBA will continue to identify opportunities to work with other stakeholders as we begin coordinating, collaborating, and supporting DWR in rules review process
- **January to May 2024**
  - UNRBA/DWR meeting to continue to discuss process for rule making and approval of UNRBA products
  - Regulatory Forum to present rule making process to UNRBA members and other stakeholders
  - Meetings with the Chairs of the Environmental Management Commission (EMC) and its Water Quality Committee
  - UNRBA annotate existing rule language to mark for potential changes and review with DWR
- **June to December 2024**
  - DWR to begin rule making and their stakeholder process
- 2026/2027
  - DWR anticipates rules readoption
  - **We hope to achieve rules readoption earlier**

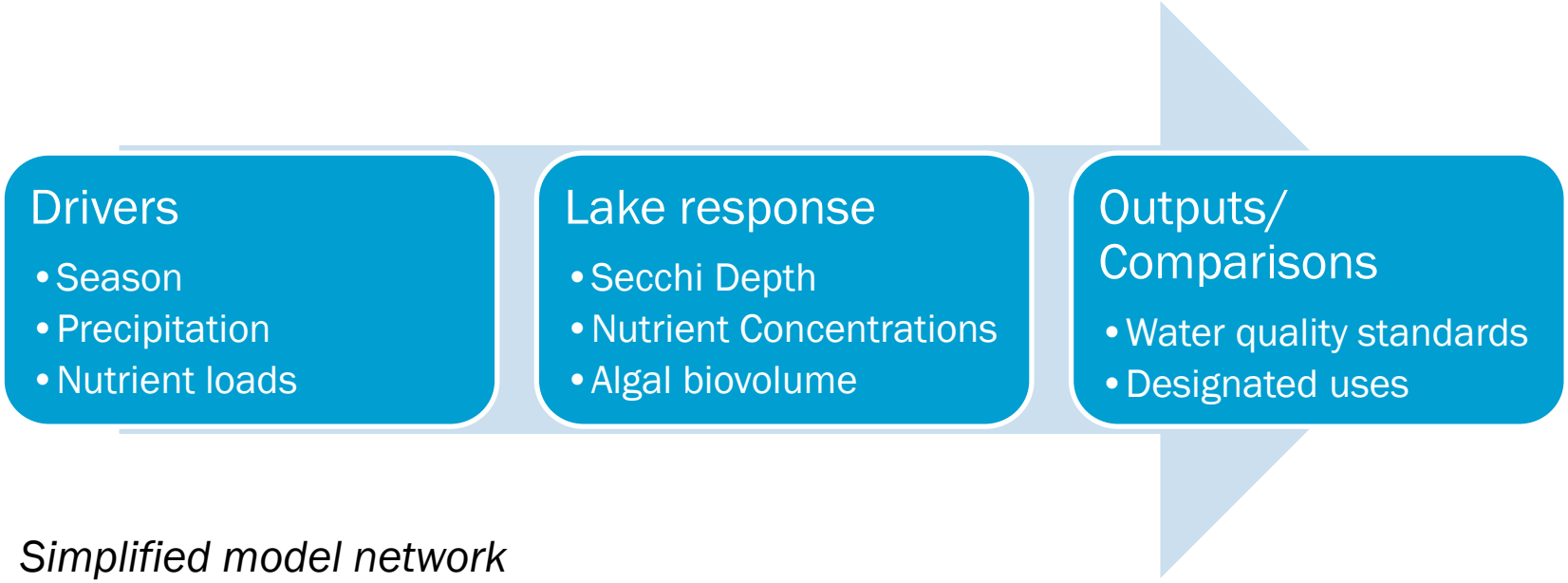
Modeling and Regulatory Support Status

Lake Model Report

- The lake model report addresses all three UNRBA lake models as well as lake model sensitivity and scenario evaluations.
- Technical details are described in model-specific appendices.
- Draft reporting components for WARMF Lake, EFDC, and the input data for the statistical model were provided to the PFC, DWR, and subject matter experts in parts in October through December 2023
- EFDC lake modeling files and model executable were provided to the agency December 19, 2023.
- Initial comments on these files were requested by January 23, 2024. The modeling team is responding to these comments.
- DWR is reviewing the draft report, WARMF Lake, and EFDC model files
- The UNRBA will submit the lake report and appendices to DWR for review and approval under Falls Lake Rule 15A NCAC 02B .0275 following this initial review process.

Overview of Statistical/Bayesian Modeling Status

- The statistical model and appendix are under development
- Model input data is summarized in the main lake report.
- Segment boundaries for the statistical model have been revised to align with available data and analysis by Marty Lebo discussed by the PFC at their November 2023 meeting; the revised draft of the main lake report will summarize the lake data using the revised segments.
- The NC Collaboratory will provide funding to Nathan Hall to continue serving as a subject matter expert on statistical model development



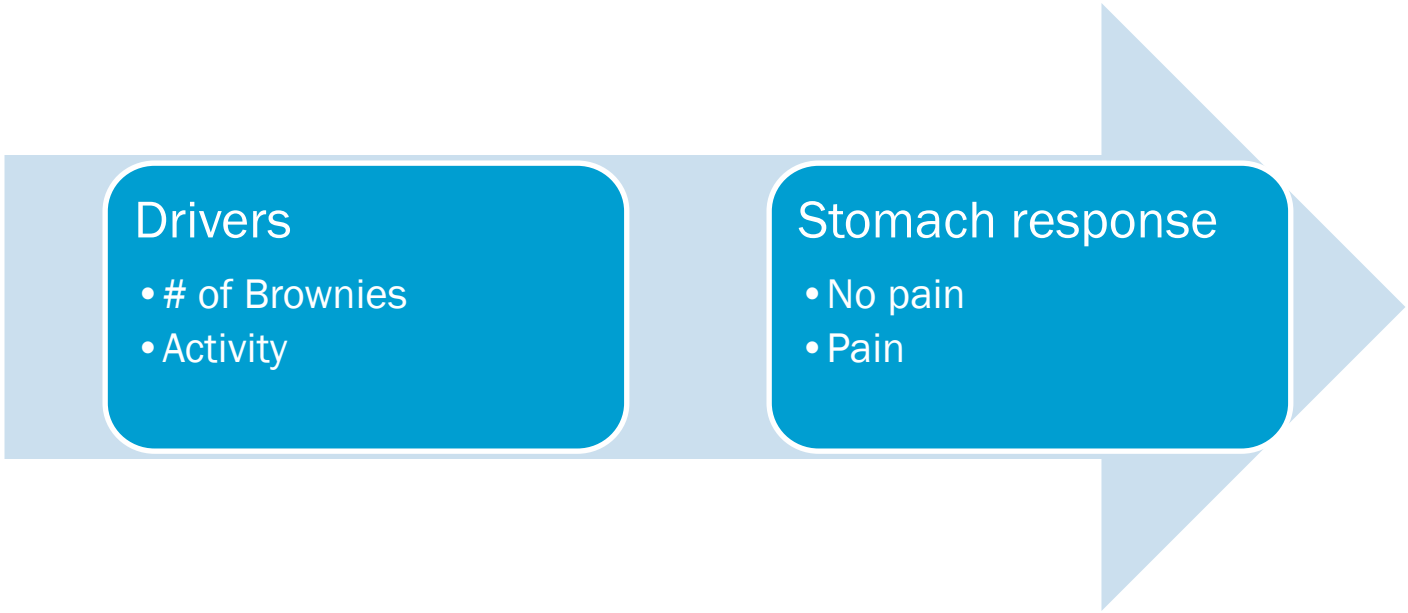
Simplified model network

Predicting Responses and Outputs

- Variables are linked across the network with “likelihood” tables called conditional probability tables
  - Drivers -> Responses -> Outputs
- We use the data and information available to create these tables
- We can fill in missing likelihoods with similar data sets or best professional judgement
- Example:

  Can I predict the likelihood I will get a stomach ache based on the number of brownies I consume and my post-dessert activity level?

Predicting Responses with Likelihood Tables

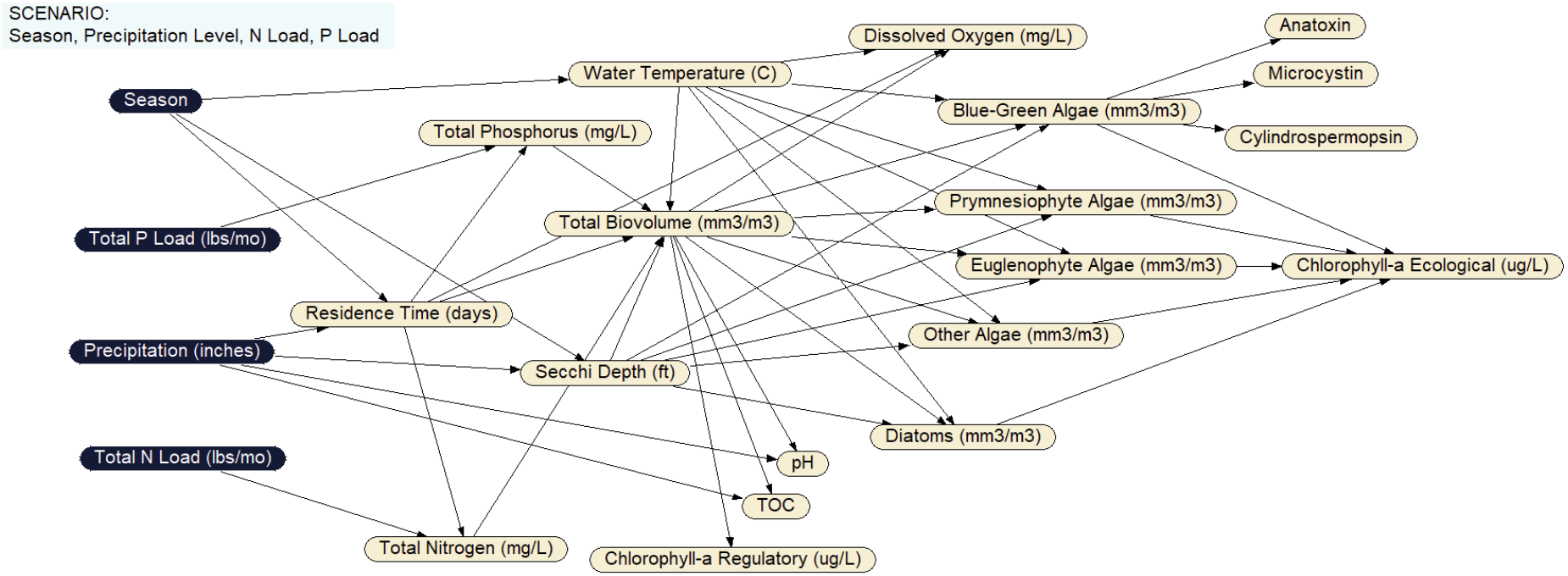


# Brownies	Activity	Likelihood of no pain	Likelihood of pain
1	Couch	95%	5%
2	Couch	70%	30%
1	Run	20%	80%
2	Run	5%	95%

Falls Lake Network

- Much more complicated (see preliminary draft on next slide)
  - Multiple drivers affecting each response
  - 3 to 5 categories of every driver and response
- Every combination of drivers and responses needs a likelihood (**can have several hundred combinations in single table**)
- Not all possible combinations have observed data in a lake segment
- Not all possible combinations have observations that occurred on the same date

Preliminary Draft Falls Lake Network –
Not all linkages and outputs are shown



LOWER LAKE

Ultimate parent node distributions are based on the data available within the lake unit.

Loads and precip are the 30-day preceeding sum. Residence time is the 30-day preceeding average.

Total loads are the sum of tributary, atmospheric, sediment, and "pass-through" from upstream lake unit.

Review Past Decisions and Progress

- Previous decisions by subject matter experts, the Technical Advisors Workgroup, and PFC:
  - How to assign bins to observations (e.g., low, medium, high)
  - How to group data spatially (upper, middle, lower lake)
- Progress on input data (observations) –
  - Data for 55 variables has been compiled, merged, made uniform, and quality assured
    - Lake wide variables (e.g., precipitation and water level)
    - Loads and concentrations (e.g., total nitrogen loads, TN concentrations)
- Exploring relationships among variables
- Building model network (the linkages among drivers, responses, and outputs)

Recent SME Meetings (February 7th and 28th)

- How to match water quality samples collected at different stations and time in Falls Lake
  - Date when possible
  - ½ month
  - Month
- How to fill gaps when not all potential possibilities have data to inform the "likelihood" tables
  - First try expanding to ½ month or month
  - Next look at the next upstream segment and evaluate date, ½ month, month; then the next upstream segment
  - Use available likelihoods to extrapolate to other combinations (if I know the response when an input is low and high, can we reasonably assume the moderate category is an average?)
  - Fill in with subject matter input
- Reviewing preliminary correlations among variables
- Modifications to the draft model network

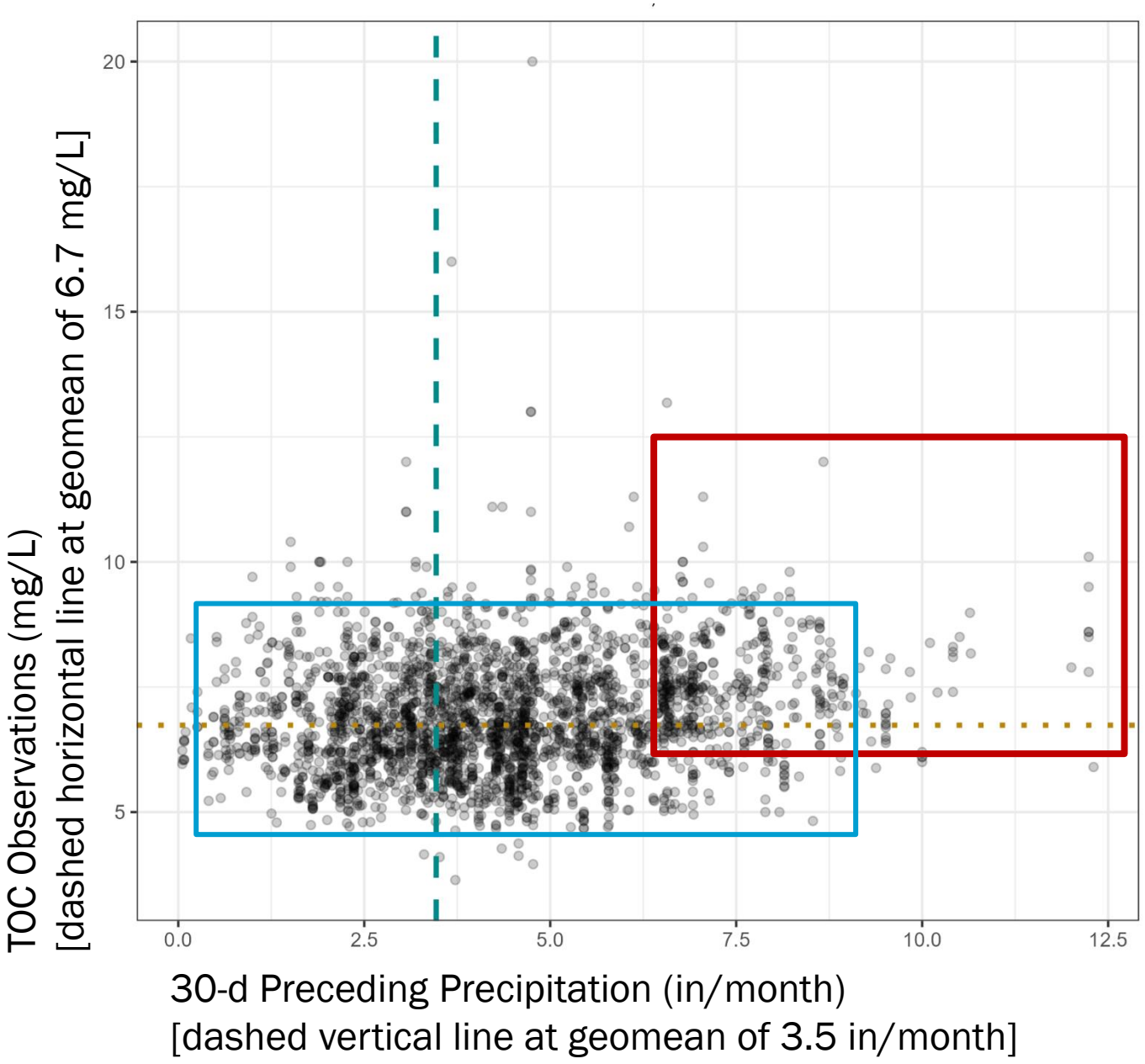
Example Recent Discussion Item: Predicting TOC

- We have estimates of nutrient load to the lake back to the 1980s that helps predict nutrient concentrations in the lake
- We have total organic carbon concentration data in the lake, but we do not have long-term loading estimates because the tributary record for TOC is only available recently
- We know most of the TOC in the lake is due to the watershed and a very small part is due to algae in the lake
  - 2019 UNRBA monitoring report
  - Calculations based on amount of algae in Falls Lake and typical carbon content of algae
- Initial network had a link between biovolume and TOC concentration, but there was no representation of the watershed component
- The team used the Bayesian network tool to evaluate the predictive relationship of precipitation categories for TOC concentration categories as a surrogate for the watershed load of TOC
- This relationship was confirmed and will be incorporated into the model

Preceding 30-d Precipitation Versus TOC Data in Lower Lake

Nearly all possibilities of TOC concentration occur across the range of preceding 30-d precipitation.

Above a certain threshold of precipitation, TOC concentrations are more likely to be above the median.



Example Discussion Item: Predicting Chlorophyll-a from Nutrient Loads

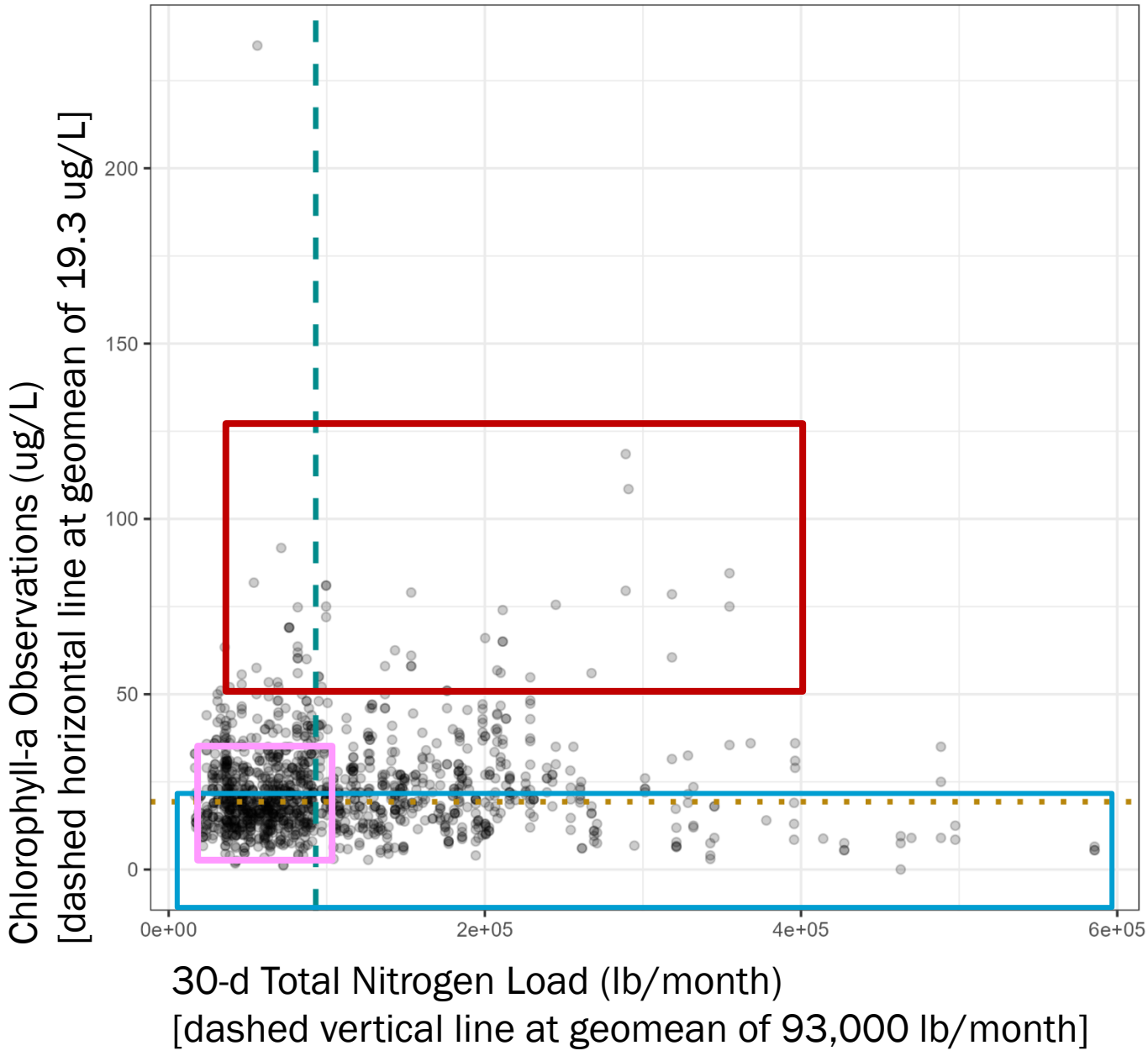
- The UNRBA lake models and past evaluations of data collected in the lower lake (downstream of Highway 50) show that chlorophyll-a has been relatively stable in this segment, even back to the 1980s
- A preliminary Bayesian network was used to test the impact of nutrient loading on chlorophyll-a in this part of the lake
- Setting nutrient loads to the highest category did not greatly affect predicted chlorophyll-a concentrations in the lower lake, confirming previous evaluations
- Reasons for the lack of response for lower lake chlorophyll-a:
  - Most of the nutrients enter the system in upper lake
  - Available nutrient forms are largely consumed in the upper and middle lakes
  - Higher nutrient loads usually enter the system following large rain events, reducing the residence time once the USACE releases that water (often in 1 or 2 weeks following a large storm)
  - Lower nutrient loads are associated with less rain fall and long residence times, leading to more algal growth

Preceding 30-d Total Nitrogen (TN) Load Data Versus Chlorophyll-a Data in Lower Lake

We can have some of the highest chlorophyll-a concentrations across a range of preceding TN load.

We can have some of the lowest chlorophyll-a concentrations across a range of TN load.

Most pairs are low chlorophyll-a low TN load

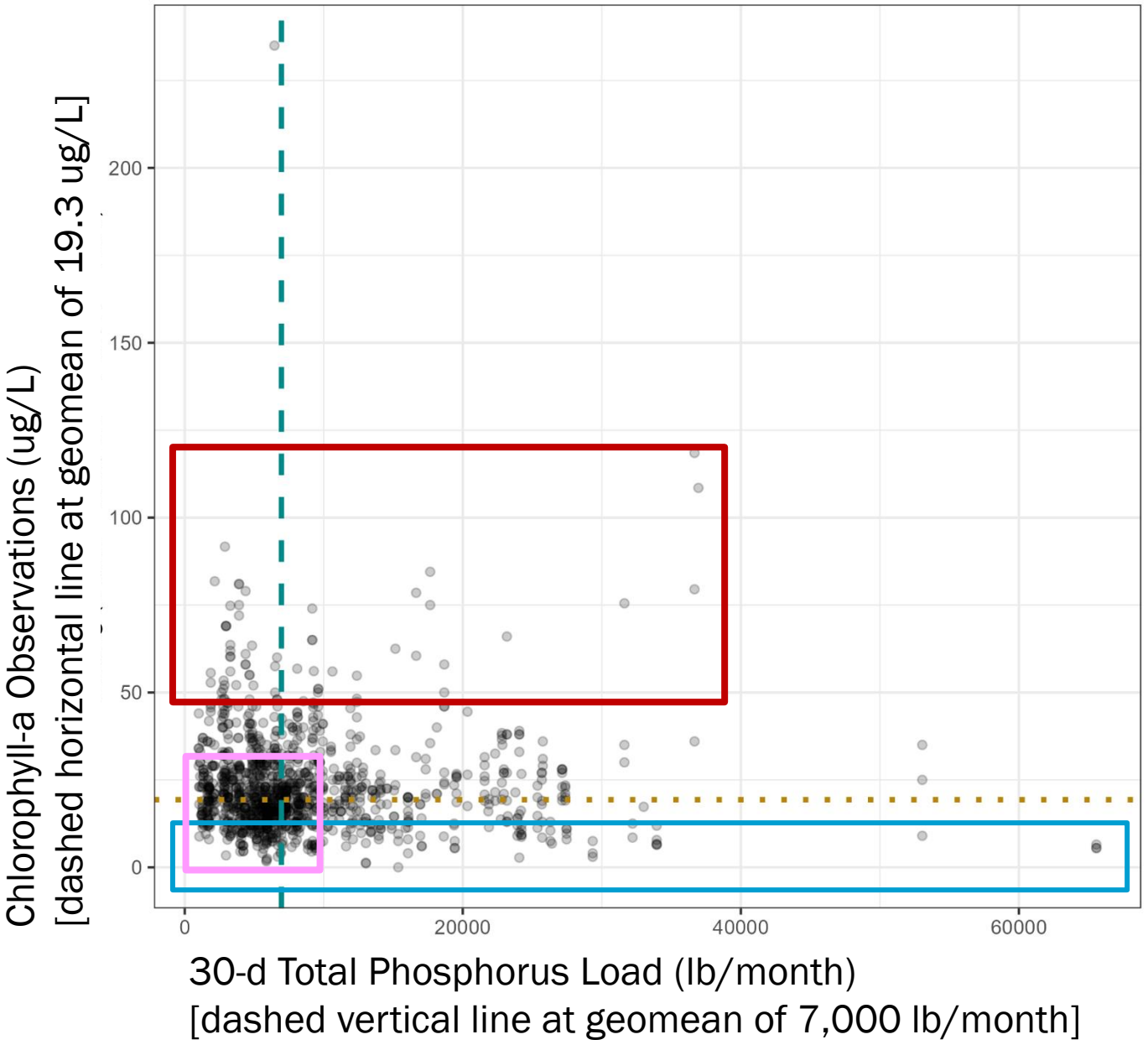


Preceding 30-d Total Phosphorus (TP) Load Data Versus Chlorophyll-a Data in Lower Lake

We can have some of the highest chlorophyll-a concentrations across a range of preceding TP load.

We can have some of the lowest chlorophyll-a concentrations across a range of TP load.

Most pairs are low chlorophyll-a low TP load



Ongoing Evaluation of Falls Lake Specific Assessment Methodology and Site-Specific Chlorophyll-a Criteria

Evaluation of Falls Lake Specific Assessment Methodology and Site-Specific Chlorophyll-a Criteria

- Marty Lebo is continuing his work under his current contract to evaluate a Falls Lake Specific Assessment Methodology and Site-Specific Chlorophyll-a Criteria
- Dr. Lebo presented his initial evaluations at the February PFC meeting
- His report shows that blue green algae are present in Falls Lake
- Some forms of blue green algae are edible to higher trophic-level organisms, others are not
- The NC Collaboratory will provide funding to Nathan Hall to provide input on the ecological functioning of Falls Lake (algal species and edibility of higher trophic level organisms)
- The statistical model is being developed to support these efforts

Communications Support

Communications Support

- The UNRBA continues to coordinate with DWR
  - Rules readoption process
  - Potential modifications to the water quality assessment methods
  - Development of a site-specific chlorophyll-a criteria for Falls Lake
- The work with DWR will intensify greatly following submittal of the UNRBA's and NC Collaboratory's recommendations in December 2023.
- Additional meetings to gather input from NC Collaboratory staff, researchers, and representatives of NGOs are being planned.
- Jurisdictions should identify additional meetings where support from the UNRBA team is needed

Additional Information and Activities

- Planning for a joint stakeholder workshop with DWR and UNRBA on the rules readoption process
- Planning for a synthesis workshop with UNRBA and NC Collaboratory regarding the intersection of research studies and insights for the rules readoption process
- Planning for a Falls Lake session at the Water Resources Research Institute Annual Conference March 20 and 21, 2024
- American Rivers is still planning a “Neuse River of the Year” event for the upper part of the basin.

Coordination with Stakeholders

- The UNRBA will continue to identify opportunities to work with other stakeholders as we move through rules readoption.
- The “open” nature of all UNRBA meetings remains a key component of a transparent communications approach.
- We encourage member representatives and interested individuals to speak up about ideas and opportunities to communicate our work and the importance of our recommendations on a revised strategy and a site-specific standard.

Other Status Items

Other Status Items

- DWR Neuse Watershed Model Information Session / Delivery Factors for WWTP, etc.
- DWR Proposed Changes to New Development Rules for the High Rock Lake Watershed
- Inquiries and Issues Regarding Nutrient Credits
- Jordan Lake rules readopotion process
- Interviews by researchers at the Science and Technologies for Phosphorus Sustainability (STEPS) Lead Researcher, Jay Rickabaugh. Appalachian State University, to provide some comments

Future Meetings Currently Scheduled:

Next BOD Meeting: March 20, 2024, 9:30 AM to Noon

Next PFC Meeting: April 2, 2024, 9:30 AM to Noon

Closing Comments
Additional Discussion