JLOW Stakeholder Meeting 1

Nov 2 2023, 10 am – 2, hybrid

Discussion Topic 1 - Welcome

Emily Barrett and Patty Barry JLOW

Key Points:

- Introductions to JLOW and meeting schedule
- Name changed for Central Pines Regional Council from Triangle J council of governments

Discussion Topic 2 – Jordan One Water Collation Update

Liz Johnson

Key Points:

- Initial board members introductions
- Coalition officers introductions
- Articles of incorporation overview
    - Submitted articles to NC in July 15, 2022 allowing JLOW to be an official organization recognized by the state
- Non-profit status- 501C3 status
    - Next step in process to become a nonprofit is to **implement** JLOW bylaws
- Bylaws
    - Adopted July 13,2023
    - Flexible and consensus-based bylaw under the assumption that it will need changes over the years
    - Purpose
        - Protect the watershed waters through a collaborative and triple bottom line approach. Upheld by ensuring there are the same number of seats for upper and lower watershed, spelling out diverse and specific partners for all seats
- Website
    - Also includes *JLOW foundational document* made on Sep 2021 which summarizes the groundwork since the beginning of JLOW
- Where is JLOW Going
    - Obtaining nonprofit status
    - Grow membership
    - Implement bylaws
    - Hold workgroups to continue progress and update organization as needed based on feedback (5y management plan, education, Jordan lake rules)

Points & Themes summarized:

- JLOW is on the road to reintroducing the modified Jordan Lake rules through officiation of their organization, obtaining nonprofit status, continuing the rule implantation process through regular Workgroup meetings

Discussion Topic 3 – JLOW Rules Workgroup
Andy McDaniel, NCDOT and Chair of JLOW Rules Workgroup

Key Points:
- Oct 19th first meeting for JLOW workgroup
- Thurs Nov 9th second meeting to continue recommendations roadmap with advice from One Water
- Readoption of JL Rules in Feb 2024

Points & Themes summarized:
- JLOW workgroup prepares for the future implementation of the updated rules by making implementation roadmaps with advice from longtime participants in the JL area.

Discussion Topic 4- Jordan Rules and Status
Rich Gannon, Supervisor DWR NPS Branch

Key Points:
- Going to be looking more at feasibility of different solutions next year during the focus groups
- Review nutrient strategy history
    - Lake filled in 1983 and over enriched (which was anticipated before it was built)
    - Rule delay from 2011-2018 (end of Collab study), rules had been yet to be adopted till after 2019
    - New watershed and lake model pulled together in last year of collab study
    - Haw side and new hope side have different impairments
        - Haw side had lowest N reduction and accounts for 80% of the watershed
            - Due to low residence time on Haw (1 week) vs New Hope (1 year)
        - P reductions have been successful for both New Hope and Haw rivers
- Status of Rules Implementation
    - Agriculture rule uses Nitrogen Loss Estimation Worksheet to track changes in N loss
        - Agriculture people have been meeting since 2014 and meeting compliance since then
            - Stopped collecting data for certain crops on an annual basis in 2018
            - Going to do one more account before the rules are readopted (using agriculture census that occurs every 5 years)

    - New development stormwater and existing development stormwater have been on hold
    - State and federal entities stormwater are partially in effect (new and existing development rules)
    - Fertilizer management is in effect
        - Need to complete nutrient management training or apply fertilizer according to an approved nutrient management plan
    - Trading and nutrient offset rules are in effect
- Collaboratory report highlights
    - Reduce point source loads
    - Older infrastructure contributes more than newer infrastructure
    - Minimize or offset new development loading
    - Mitigate agricultural loading, especially wet years
    - Coordinate forest preservation
    - Maintain and repair septic systems
- Engagement-rulemaking schedule
    - Currently, releasing the lake model for external review and comment
        - Several month process before they can finalize the model (summer / fall 2024)
    - Stakeholder process
        - Next stakeholder meeting will be in February
        - Two rounds of technical focus groups for each subject in each round
        - Hopefully have first and second draft rules for feedback in fall 2024
        - Proposed rules out in late fall 2024, with final adoption in 2026
- Q and A
    - Q: is there any legal binding to finish the watershed model by 2024?
        - Rich: no, only to start rule making in 2020 which was pushed back a bit due to covid
    - Q: When buffer rules are not carried out, it falls on local governments to enforce them. Would the new Jordan lake rules provide any resources to local governments to enforce the rules? The Farm Act states that the cost penalty could not exceed the timber value of what trees were cut.
        - Rich: This requires the state to do a lot of administrative work when they do not have sufficient resources
        - Ellie: we had internal conversations about capacity issues on the local and state level. We will be looking at this more in upcoming meetings
    - Q: Pam: There is some jurisdiction that falls into both Jordan and Falls lake. What are some differences and similarities in these rules between the watersheds? (Durham straddles the line between both)
        - Rich: We are gearing up for also readopting the falls rules. We are under mandate to start that readoption at the beginning of 2024 and doing stakeholder engagement then as well. Also working in a readopting in High Rock Lake watershed. Three rule readoptions happening

simultaneously, and a lot of the policy thinking is going to be similar across the watersheds (especially Falls and Jordan)

- Q: What is the coordination between state and federal gov (EPA's role in impairment status). Does NCDEQ share info or meet with EPA each year to show where we are in the impairment status and was there any change in it?
  - Rich: We report to EPA annually on all of these strategies. We don't have real time interactions with them, but they have been pressing the sates to implement nutrient management strategies for a long time. They have wanted to see states moving forward for a long time, and they have changed some strategies in recent years. If we are making progress and moving forward, EPA is generally happy with the work they are doing. Keeping them informed in a general way, but would like to have EPA staff involved in rules readoption process
  - Nora: Lake is still classified as impaired. Data is collected ever two years and that is reported to EPA

Points & Themes summarized:

- The rules readoption process is underway, and we will be discussing different solutions during focus groups next year
- Many rules have been successful, and many have paused / decreased data collection because they have sufficient data to prove the rules have been working
- Lake model will be out in 2024, and hopefully fully adopting the new rules by 2026

Discussion 4 – New 2023 Jordan Reservoir Model

Dr. Jim Bowen, UNC Charlotte

Key Points:

- Using a 3d mechanistic model of the lake to mathematically calculate and model impacts of future inputs and outputs in Jordan Lake (thinking about this like a bank account)
  - Fluctuations of nutrients, heat, etc. will change the final chlorophyll concentration in the lake
  - Lake has 407 cells and 25 layers (0.4 m each). In each area, algal functional groups and nutrients are tested for several different states resulting in billions of calculations for a single model run
  - Model calculates about 1,000 timestamps per day to keep checks on several different factors in the lake
  - One model run will take billions of calculations
- Jordan lake is not like other lakes
  - volume fluctuations, different volumes and areas of separate arms, nutrient loading differences of these arms
- Comparing trends of biological processes at the lake from 1980-2022

    - Best time period for chlorophyll cover is between 2014-2016, so that is used as timestamp to compare set factors over all years (1980-2022) to
        - Upward trend in rainfall, but streamflow has decreased (1980-2022)
            - Looks like its about average when you compare 2014-2016 to overall time for both of these factors
        - Cumulative nitrogen loading has stayed about the same (slight downward trend)
        - Cumulative phosphorous down significantly
- 2023 Model calibration
    - The model meets performance criteria for water surface
    - Temperature performance criteria met for stratification and temperature
    - Chlorophyl levels meet model criteria
    - Not much of Haw River water makes it to Upper New Hope (about 1%)
    - About 40% of the lake is above the 90th percentile for chlorophyll-a (at 72 micrograms/ L compared to the standard at 40 micrograms per liter)
        - Law requires that <10% of all stations be under the 40 microgram per liter standard
    - Reducing N and P will more than halves median predicted chlorophyll (up to 70% reduction in the model)
        - Reducing N and P both by 70% will still leave 4% of stations over the standard
        - Reducing P isn't as effective as reducing N
            - This lake in general is more sensitive to load reduction in N than P
            - But this is different in the two arms in the lake
                - Haw arm is pretty sensitive to P reductions but not N (and generally lower chlorophyll-a concentrations than Upper New Hope)
                    - 20% N, 50% P reduction would follow the standard
                - Upper New Hope is sensitive to N reduction not sensitive to P reductions
                    - 70% N, 0% P reduction would follow the standard
- Q: Are percent reductions based on 2016 data, and is the work that's been done in Jordan count towards reductions?
    - Dr. Bowen: I'm guessing your question is what is the baseline? I incorporated the already obtained reductions into my baseline, however I don't know what the actual baseline is.
- Q: The slideshow shows temp and chlorophyll A, did you look at performance of nutrients?
    - Dr. Bowen: Model meets total P but does not do as well for N (overpredicts). In general, the model does not meet the mean error criteria for nutrients due to benthic estimations and volatile nature of the lake, but confident that model is functioning correctly for total N (not great for ammonia and nitrate)
- Q: How does the benthic internal loading effect results?

    - Dr. Bowen: Both the watershed and the recycling of nutrients contribute to the eutrophication issues. I think that's true in this lake. Will dampen the response but there is a longer response time. Will take reductions over a period of time to see improvements but they will come
- Q: In terms of general water quality, the public confuses the water quality of Haw with water quality in Jordan lake. Do you have a comment about the percent contribution of Haw water into the middle section of the river (this is where drinking water is taken from)
    - Dr. Bowen: This is between causeways area. The model is able to calculate these percentages by doing simulations. Any answer in the lake can use this model. Not sure which location is closest to water intake, but you can find the location and use the model to predict the nutrients
    - Estimated on slide – to be place 087B3-087D, 12%-20% with age of 16% of Haw river contribution to Jordan
    - The volume of water can be going in two different directions. It is a challenging model
- This model is open in a few months for internal review if anyone here would like to read it when it's released. Just contact Dr. Bowen

Points & Themes summarized:
- The model created by Dr. Bowen looks at chlorophyll concentrations at different areas of the lake (broken up into 407 individual sections)
- The model uses data from 2014 to 2016, but the estimations did fall within performance criteria of the lake
- The lake itself is much more sensitive to N reductions over P reductions
- The Haw arm of the river is more sensitive to P reductions than the rest of the lake
- The lake will need significant N and P reductions based on this model to meet the 40 ug/L standard based on this model

Discussion 5 – 2019 Jordan Watershed Model
Dan Obenour, Civil and Construction Environmental Engineer

Key Points
- Nutrient history (we have 30 years of site-specific data)
- Modeling approach- mechanistic allowing us to estimate future nutrient concentrations (dependent variables) based on independent environmental variables
    - Instream (incremental) load calculation
        - This calculation has many dependent variables (nutrient concentration) which are effected by independent variables (multipliers of of precipitation coeff, land, nutrient export rate etc)
        - Prior knowledge of nutrient loading was drastically lower than this new model shows
- Results

    - Nutrient coming off land
        - Haw
            - Agriculture varied by year and was a large contributor to N
                - Similar for P
                - Especially in years with high rainfall
        - NH
            - Urban pre-1980 was the largest contributor for N
                - Similar for P
        - Higher NP pollution for older farming lands
    - Nutrient getting to the lake
        - Ave 13% nut is retained on the land, aka the rest gets into the lake
    - Takeaways
        - Majority of land in watershed is undeveloped which is the largest retainer aka smallest nutrient contributor
    - Enhancements
        - Precip
            - Summer is lowest nut export rates accept for pre-1980 development lands
        - Retention
            - Higher retention in summer (lower flows)
            - Implications- manage streams in the summer to decrease summer pollution problems
        - Buffers (looking at total phosphorus)
            - More buffers and SCM (stormwater control measures)
            - Implication: stmW mng decreases export but not to pre-development levels
- Compared to other studies
    - USGS SPARROW model- similar model and similar results to JLOW model (N and P both)
        - Land development is a large contributor to nut export
    - NCPC Stream monitoring and nutrient loading- similar model and similar results to JLOW model
        - NO3 and SRP loading and export rates were highest in developed lands
- Q and A
    - Q: Climate change has picked up, so how do you think that will factor into your recommendations?
        - *Dan*: Considers year to year variability and precipitation. There is no clear trend for precipitation (maybe more extreme events). Hard to say if there will be a big impact on loading rates, but heavier years will have higher loading rates. Temp is not considered but something to consider int eh future
    - Q: More precipitation = greater effect. Doe the data show a difference between a short and long periods of precipitation with the same volume of water?

        - *Dan*: Looked at extreme vs total, and did not seem to make a large difference in this model, but it would make sense that there would be a difference
    - Q: Why does pre-1980 development have a larger effect on loading rates?
        - *Dan*: Older urban areas may be more dense, older sewage infrastructure, a lot of development before 1980 did not have SW controls or comprehensive SW. 1980 split explained the variability
        - Followup: I was confused because MS4 programs did not start till early 2000s. New development seems more dense, less dense vegetation
        - Andy: older development is usually more dense. And we would like to incorporate your observations but our models can only be so complex
    - Q: Did you look at the sites used for calibration to ensure they were representative of the watershed as a whole?
        - They did have downstream stations to capture the whole watershed, but if there is anything that may be underrepresented then they would think it would be heavily forested areas. Thinks it's pretty good coverages (most watersheds don't have this many). When they removed one and recalibrated, the model was still robust
    - Q: Older urban areas with septic (some in Durham), does this key into the pre-1980 buffers?
        - Some amount of overlap between buffers
    - Q: Are you updating data in to the model (current), and can you separate out sub watersheds to get targeted data?
    - Data being used is monthly data (lab data). Want to add a couple years at some point.

<u>Points & Themes summarized:</u>

- This study's model combined 30 years of site-specific data to estimate nutrient concentrations based on certain environmental conditions in several areas of Jordan Lake Watershed.
- It was found that rainfall, season, and land buffers/ SCM had the largest impacts on nutrient concentration in both the NH arm and Haw arm.
- The results of this model was similar to other nutrient concentration estimation models therefore, the results are sound.

Discussion 6 – Nutrient Loadings and Trends in the Jordan Lake Watershed
Andy Painter, DWR Modeling and Assessment Researcher

Key Points

- Goal: evaluate change in nutrient loading from baseline period (1997-2001) to 2016-2020
- Flow normalized TP loading change and mean
    - Most are likely to decrease, Only one likely increase in nutrient load in the upper watershed

- Flow normalized TN loading change and mean
    - Lower: haw had an increase in TP
    - Mean: 4-0.69 TN with heist in the upper lake
- Trend in TN over several lower stations in Jordan Lake
    - Green: TKN
    - Red- NO3 NO2
    - Blue- TN
- 2021-2022 data overview
    - B12 station showed decrease for NOx, usually indicative of a WWTP change
        - TZ Ozbourn plant (60mi upstream) decrease loading by 2/3
        - Every station downstream from the Ozbourn plant had some little decrease in nutrient loading but not as drastic as Ozbourn
- Storymap
    - Ellie will send a link to locate this information

Points & Themes summarized:

- Most nutrients are expected to decrease in the Lake
- The story map shows this information in a more visual way