From: Jon Becker
To: Flooding, Yahara
Cc: [redacted]
Subject: Comments to YCOLTF for FEB 18 meeting
Date: Monday, February 18, 2019 9:52:27 AM

Dear YCOLTF appointees:

Thank you for your efforts to date.

At the last TF meeting, some appointees seemed to be struggling with the "grounding" of short-term recommendations to reduce the risk of flooding in Spring 2019. There really is only one foundation from which to make science-based lake level decisions: Natural hydrology (the conditions that obtained prior to building of the dam in 1849).

Fortunately, It is almost certain that the range of historical natural surface water fluctuations can be determined via soil borings or pit digs in previously undisturbed areas, or examination of historical soil boring logs from such areas. Former UW Arboretum director and renowned soil scientist Kevin McSweeney and I actually made a start on this research several years ago. The necessary work could likely be completed within a few months.

This foundation of course now needs to be considered within the context of current development, both rural (mostly Agricultural) and urban, as well as climate disruption forecasts. I.e., adaptive management is necessary.

The WG has provided the TF with three scenarios. One of those, "removing all dams," is a cartoonish version of a sensible, science-based proposal. Another, "managing safely at the 100-year level" fails to take address public safety risks to communities, as well as eco-communities (e.g., area marshes). The dredge/harvest/pump scenario has not been well-defined. Reminder: Preserving natural resources for future generations is a requirement of WI's Public Trust Doctrine. I.e., short-term recommendations from the TF must not compromise ecosystems thatr are the rightful inheritance of future generations.

Furthermore, categorizing these three scenarios as "mitigation" options, and the other potential actions as "adaptation" is confusing. These two words (mitigation and adaptation) are being used differently in climate action planning, to categorize actions that avoid climate disrupting emissions (mitigation) from those actions that lower risks from unavoidable climate disruption (adaptation). It might be helpful to just think of the WG's "adaptation" proposals as short-term action options.

Thoughtful folks with a holistic understanding of the Yahara watershed do not demand sequencing of action such that runoff must first be controlled before lake levels are naturalized; they know that lower lake levels will help control sediment and nutrient runoff. Thoughtful folks understand that short-term actions must be considered within the context of long-term goals, so that future actions are not ruled out by early actions (or made very expensive).

Thank you to those who , on FEB 11, gained clarification of the colorful/hyperbolic phrase "remove all three dams" at once. Perhaps at tonight's meeting the WG could be asked to identify who called for immediate dam removal (leading the WG to provide precious time and human resources on this non-starter scenario).

As others have already remarked, the resulting dam removal scenario is a cartoonish portrayal of thoughtful, science-based proposals. Here is the most comprehensive such proposal, presented to YLAG2 in 2012: http://www.cranesinc.org/presentations/CRANES-YLAG2-L%20Mendota%20Level%20Recs-small-v2012-03-28.pdf. Note that there is no call to remove dams, or to lower Lake Mendota 20 ft.

This proposal calls for lowering the Yahara lakes 6" initially to reduce public safety risks, then in

increments of 1-3" annually to their natural levels over time. If this approach had been implemented in 2013, Lake Mendota would in 2019 be managed in a range 18-24" lower than the WDNR 1979 Lake Orders. So, initially lowering Lake Mendota 's Summer Range 18" as soon as feasible in 2019 would be sensible.

At the TF's meeting on FEB 11, one of the WG members made the claim that Cherokee Marsh needs a stable Lake Mendota level. This is a simplistic statement. Here's a good general resource: Waubesa Wetlands: New Look at an Old Gem by Dr. Joy Zedler.

The level of Lake Mendota is unnaturally high, and has drowned 2-4 square miles of wetlands and shoreline, creating large fetches across the Yahara River to the north. Under these artificial conditions, holding Lake Mendota at an unnaturally stable level may reduce the risk of delamination of cartain floating marsh plant communities, but not as much as lowering Lake Mendota to it natural level/range.

Before the Tenney dam was built in 1849– natural fluctuations occurred across seasons, years, and centuries.There were flood years and drought years, albeit all in the context of a much lower average lake level. The eco-communities that evolved in the Yahara watershed reflect the complex dynamics of the Yahara watershed's hydrology. Those included lake level fluctuations, which undoubtedly had a range larger than the size of a modern cell phone. Adaptation to these natural fluctuations has been suggested as a likely advantage for native plants vs. hybrids or invasives.

In closing
With natural lake levels, it is entirely possible to have a more diverse and resilient watershed ecosystem, a more productive fishery, far less stormwater runoff (our goal should be natural runoff conditions, which is ~4Xs lower than the WDNR's Yahara lakes impairment targets), more recreation opportunities (including boating), and improved protection of community infrastructure.

The future will be different, but can be much better, so long as we don't cling to the practices of the past, some of which have already put our surface and drinking water at great risk.

Sincerely, Jon

Jon Becker
[redacted]

From: Si Widstrand
To: Flooding, Yahara; Hicklin, Laura
Subject: Increase the flow from Mendota sooner, to protect the lower lakes later
Date: Friday, February 15, 2019 11:49:30 AM

To: Laura Hicklin and the Lake Levels Task Force

I retired from Madison Parks in 2008. I was the Conservation Supervisor 1974-91 and the Park Planner 1991-2008. I always followed Cherokee Marsh, flooding and lake level issues, and closely followed YLAG-2 after I retired. I currently live near West Towne in the Pheasant Branch watershed.

Throughout all of the flooding and followup, I commend the great work by John Reimer, County and City staff, the Technical Group and the Task Force. I've read the materials and listened to or attended the first two meetings. These are my observations and recommendations.

It seems clear from the models that there will still be minor flooding, and a threat of major flooding, until drainage is significantly improved by channel expansion-dredging and/or piping to increase outflow from the lower lakes. This might be a great long-term solution for all of the lakes, but there are still many unknowns that will prevent quick implementation. There is some urgency because we didn't even model the worst case scenario. The 2018 flooding could have been much worse if the 8/20 storm had been centered 15 miles further NE over the Mendota watershed, or centered 15 miles further SE over the lower lakes. https://www.wiscontext.org/what-could-happen-next-time-madison-gets-hit-extreme-rainfall

I'm pleased to see the focus on flow to maximize drainage rather than only focusing on lake levels. I frame the problem as how to maximize the whole year's flow through the system without subjecting any areas to the risk of extreme flooding. It's also clear that in high rainfall years, all the lake levels fluctuate 2' above the "maximum", so perhaps the 6" normal range isn't the best way to set our goals and measure our success.

Refine the adaptation scenario for short-term protection 2019-20??

Many people have complained that the 2018 May-July drainage of Mendota was too slow. The County staff agrees, but it had to be done to protect Kegonsa. Now we have partially fixed the Kegonsa problem with some dredging and weed-cutting. It was useful to model the extreme parameters, but now we should try to find and model a best adaptation scenario.

The 1931 lake level orders established normal summer elevations for Mendota 849.45' and Monona 845.0' (all current datum), a 4.45' difference. There was also a 1931 order that during periods of high runoff, the level of Mendota should not exceed 4' higher than Monona. The 1979 Mendota lake orders established its maximum at 850.1. It also stated, "During normal flow and low flow conditions, the level of Lake Mendota shall be held within 4.9 feet of the level of Lake Monona." The 1979 Monona orders established its maximum at 845.2, 4.9' below Mendota maximum. This effectively raised Mendota, lowered Monona and increased the difference by .45' feet.

I contend that we should consider any Mendota elevation above the midpoint of 849.85 to be a high flow situation, and that we should then use the old 4' difference to get better balance between the lakes. Using the 4' difference certainly should have been done when Mendota was over maximum in 2018, from early May until the Mendota peak on 8/22, when the differences were generally 4.4 - 4.6'. This had to be done because of the unusual flooding problem in Lake Kegonsa, but it certainly showed the risk of piling up too much water in Mendota. After 8/22, County staff maintained a 4' difference until early October.

For 2019, starting the lakes at their minimums is a good goal, but we probably won't get there or stay at those levels for very long. As many have suggested, we should be looking for immediate dredging of small problem spots, weed cutting, and a plan to lower Mendota more quickly to maximize "safe" flow throughout the season. I suggest that the following scenario should be modeled and considered for use in 2019:

Delay the rise from winter levels to the summer minimums until May 1 for flood protection. Most years will still see an early rise to the minimum needed for fish spawning. As soon after March 1 as Mendota naturally reaches the summer minimum, we could try to hold it there. When releasing excess Mendota water through the

lower lakes, the goal should be to manage the lower lakes near their maximums, which has several advantages over the minimums. Greater flow volumes will regain Mendota storage more quickly. Maximums provide deeper water to enable weed-cutting. Higher levels can also be a buffer against drought in the lower lakes without draining Mendota too low. Coincidentally, higher levels are better for boating.

We should establish higher flow any time that Mendota exceeds the midpoint of 849.85 because we then need to preserve or reclaim storage in Mendota. So that's when we should establish a 4' difference, raising/allowing Monona to 845.85. County staff would continue to anticipate rainfall impacts, manage the Tenney flow to prevent spiking lake levels, and balance the lower lakes. This would require not exactly balancing the over-max of all lake levels at all times, which can lead to water buildup in Mendota.

The principle here is that as water levels rise we must take stronger measures, e.g. going from 4.9' to 4.0' difference from Mendota to Monona. This principle is expressed in the 1931 orders and in the DNR 2009 Kegonsa temporary order. I suggest that this management system be modeled with the 2018 rainfall. Most of the previous modeling appears to include the assumption that Kegonsa drainage was blocked in May-June 2018. That made sense for comparison, but for modeling future scenarios, the dredging and weed-cutting accomplished June-August, 2018 should be assumed.

Under this scenario, in years of moderate rainfall (2011, 2014, 2015) I expect that much of the summer would see low to midpoint levels on Mendota and normal range levels on the lower lakes. High rainfall years will likely result in higher levels on the lower lakes in exchange for lower levels in Mendota to protect from catastrophic flooding. The tradeoff here is that lower lakes suffer in the short run to restore Mendota storage, but the Mendota storage can then provide more protection later from catastrophic flooding. We're always going to have this problem of moderate flooding to be able to pass water in wet years, so we should also look seriously at purchasing or floodproofing vulnerable areas.

Unfortunately, I cannot attend on 2/18, but I plan to speak at the 3/5 meeting and be available to answer questions. If any of my facts are wrong, I will appreciate being corrected. I can also be contacted with questions in the interim, if that is appropriate, at [redacted]

Simon Widstrand
[redacted]

From: Daniel Schultz
To: Flooding, Yahara
Subject: Yahara Flooding - Public Comment
Date: Thursday, February 14, 2019 8:04:02 AM

Your comments below must include a name and address in order to be reviewed by the task force. Comments may be posted online and available as open records.
Name: Dan Schultz
[redacted]
Comments:

REVIEW OF THE TECHNICAL WORK GROUP REPORT ON LAKE LEVELS

By Dan Schultz

This is a summary of the Technical Work Group report that gets to the key points without having to slog through a 53 page report. The good news is that Technical Work Group identified three approaches that could reduce the risk of flooding by significantly enhancing the ability to move water out of the Yahara chain of lakes. The three approaches with the most promise are :

1) Dredging three sections of Yahara River from Lake Monona to Stoughton Dam

2) Rerouting and pumping water from Lake Waubesa to Badfish Creek through a 1.5-mile 60 inch diameter pipeline.

3) A combination approach of dredging the Yahara River from Lake Monona to Lake Waubesa and rerouting and pumping water through a pipeline from Lake Waubesa to Badfish Creek.

I will discuss these three scenarios in a little more detail and several other scenarios where the results were not as significant. All of the potential approaches were evaluated using the INFOS lake model using 2018 data. The primary metric that was used to evaluate each approach was the impact on the peak 2018 water levels for each scenario compared to the actual results for each of the four lakes. The work group also developed a chart for each lake that showed the number of days each lake spent above the target lake level range as reflected in six inch segments (i.e 0-6, 6-12,12-18 etc). This allowed the work group to see the effect of each scenario on the amount of days spent at each lake level segment.

For simplification, they also developed a single number that reflected the sum of the daily water levels above summer max (as measured in feet). For instance, 30 days at 1 foot over summer maximum would have a score of 30, 30 days at 3 feet over summer max would have a score of 90. This fairly represents not only the time spent over the target range but also reflects the extent each lake was above the target range. We don't have space for a bunch of charts so I will use the single number metric in my discussion. I refer to this metric as "foot-days", reflecting the number of days over summer maximum and the number of feet over summer maximum each day. According to this "foot-days" metric, in 2018 Lake Mendota had 185 ft-days over summer max, Lake Monona had 281 ft-days, Lake Waubesa 233 ft-days and Lake

Kegonsa had 150 ft-days over summer maximum.

So let's review the results of the scenarios that were developed and modeled by the Technical Work Group

1) **Yahara River Dredging**-This scenario assumed the Yahara River was dredged 50 feet wide to depths of 2-3 ft. from Lake Monona to Lake Waubesa, Lake Waubesa to Lake Kegonsa and Lake Kegonsa to the Stoughton dam. The good news is the peak lake levels were materially reduced on Lakes Mendota, Monona , Waubesa and Kegonsa (reductions of 6,12 ,11 and 7 inches, respectively). The foot-days above summer max were reduced on Mendota, Monona Waubesa and Kegonsa by 70, 138, 127, and 93 days, respectively. A very significant reduction in both measures. So this alternative offers a lot of promise. It may have secondary effect of allowing expanded weed harvesting with greater depths in an expanded area and perhaps some phosphorus reduction akin to the "suck the muck" project. It would require annual monitoring and maintenance because of the natural fill in from silting and the non-natural rocks dumped by the railroad to fortify the bridges.

2) **Flow Rerouting and Pumping**-This scenario envisions pumping water from Lake Waubesa to Badfish Creek through a 1.5-mile 60 inch diameter pipeline. This would require land purchase and/or easements, permits and analysis of downstream flooding impacts. That said, this scenario also shows significant positive impact on peak lake levels on Lakes Mendota, Monona, Waubesa and Kegonsa (with reductions of 12,10 21 and 10 inches respectively). There are significant reduction in days above summer maximum for Mendota, Monona, Waubesa and Kegonsa with reductions of 127,110, 203 and 110 days, respectively. This pumping option is a brilliant way to super-charge the flow out of Lake Waubesa without the concern of aquatic vegetation, silting and obstructions and it can be turned off and on as needed.

3) **Combination of Dredging and flow rerouting**- The Technical Work Group also evaluated the combined impact of dredging the Yahara River from Lake Monona to Lake Waubesa (so not the full river in this scenario) and rerouting and pumping water from Lake Waubesa through a 1.5 mile long pipeline to Badfish Creek. The peak water levels had significant reductions on all four lakes but had especially large reductions on Lakes Monona and Waubesa. Reductions in peak water levels on Mendota, Monona, Waubesa and Kegonsa were 12, 20,25, and 13 inches, respectively. The ft-days above summer max are reduced on Lake Mendota from 185 to 52 ft-days, on Lake Monona from 281 to 64 ft-days, Lake Waubesa from 233 to 8 ft-days and Lake Kegonsa from 150 to 14 ft-days. The study shows that the combination of Dredging and Flow Rerouting virtually eliminates the high water issue for Lakes Waubesa and Kegonsa and reduces the "foot-days" by nearly 75% on Lake Mendota and Lake Monona. These are remarkable results that offer great promise, particularly when you consider that Dane County experienced the second highest annual rainfall in recorded history (just 2.5 inches shy of the 1881 record). It demonstrates the real possibility of a significant increase in our ability to manage the lakes levels.The foot-days on Lake Waubesa are virtually eliminated in this scenario(8) and most days over the target rane are at less than 12 inches over summer max.

   Although there is also significant reduction in the foot-days in Lake Monona, there are still 64 foot-days on Lake Monona with a material number of days in the 12,18 and 24 inches above summer max segments. So although under this combination scenario we now have the ability to rapidly remove water from Lake Waubesa, there is still some roadblock to rapidly moving water from Lake Monona. So, in my humble opinion, we need to study

whether it would make sense to put another pipeline between Turville Bay through the railroad corridor to Lake Waubesa or alternatively analyze whether the railroad bridge at Lake Waubesa is (after dredging) serving as a material obstruction to the flow from Lake Monona. We have always had the ability to move water out of Lake Kegonsa (with obstructions from the river removed) and to quickly move water from Lake Mendota. The limiting factor has been moving water from Lakes Monona and Lake Waubesa. So the Waubesa pipeline gives us the ability to rapidly move water from Lake Waubesa. Just imagine how our ability to control these lakes would improve if we could also quickly move water from Lake Monona!

4) **Bridge Modifications**- The work group studied whether widening 14 bridges to their free span and removing supporting structures would provide an meaningful benefit. Unfortunately, the reduction in peak levels for Lakes Mendota, Monona, Waubesa and Kegonsa was a modest 1.5, 2, 2 and .25 inches, respectively. We shouldn't completely drop the idea of bridge modifications for several reasons. We may find that when the other initiatives to increase flow are put in place we may find the flow obstructions of the bridges become more material. This could be happening at the railroad trestle at the north end of Lake Waubesa under the combination scenario discussed previously.

5) **Other Adaptive Scenarios**- The work group analyzed other "adaptive" scenarios that either had limited benefit or actually had a negative impact on the overall lake levels.

a) Lowering Mendota one foot and manage to that level

b) Safely managing Lake Mendota to the 100-year water level

c) Remove all dams from the Yahara Lakes- this would have to be evaluated over a longer term.

In Summary, I am pleased with the analysis by the Technical Work Group and believe the scenarios of dredging the Yahara River, rerouting and pumping from Lake Waubesa to Badfish Creek and the combination of dredging and pumping would each significantly enhance our ability to control the lake levels and minimize flooding. This report provides a solid foundation for the Lake Level Task Forces work. There may be other combinations or options that may need to be considered or further researched. (hint: a Monona pipeline or expand Waubesa railroad trestle). It goes without saying there are a lot of details that needs to be fleshed out, particularly the cost and funding issues,,environmental and downstream impacts, but there is clearly reason for optimism that the County may finally have the tools to keep our lake levels within the target range.