Barr Lake/Milton Reservoir Watershed Association
Technical Committee Meeting
Thursday, July 23rd, 2020 (9:00am – 11:00pm)
Metro Wastewater Reclamation District, Denver

Draft MINUTES

In attendance:
Steve Lundt – Metro Wastewater
Curt Bauers – FRICO   **Guests:**
John Stednick – FRICO   Amy Conklin – Coordinator
Jessica LaPierre – Aurora

Steve welcomed everyone.   Everyone introduced themselves. Steve said he is planning to have meetings 4 to 6 times per year. It will always be the 4th Thursday of the uneven numbered months (September 24th; November 26th – jk, we'll reschedule; January 28th, 2021).

Modeling/loading Update - Steve reviewed the modeling that's been started as part of the IP update and informed the group BMW now has a stormwater autosampler. Steve sampled the lakes yesterday and shared a photo of the fishing pier that is currently out of the water.

He reviewed that we are in the third round of updating the model. Initially the model was created with just two years of data from 2003 and 2004. It was updated with data from 2005 to 2010 and then again with data from 2011 to 2017. We are missing the latest round of data from Hudson, Fort Lupton and Lochbuie. Hudson moved their wastewater treatment plant out of the BMW datashed, so we don't need additional data from them. More than half of the City of Brighton's flows now go to the Lochbuie plant, so we need to get data from them.

There are actually two models; one for the Watershed called the WASP model and one for the in-lake conditions, called SWAT. In the latest update there are some discrepancies between the model predictions and the observed results. The model is slightly over predicting pollutant levels.

Some of the more recent changes in the watershed include the elimination of Metro effluent being discharged directly to the Burlington canal and increases in flows in the BB pipeline. Steve has been working closely with Kelly DiNatale and his firm to collaborate with the modelers at Integral and try to align model predictions to the measured conditions. Integral is running each of the models, the watershed and the in-lake models, separately and comparing the results to measured data. It is hoped that de-coupling the models may allow for more accurate results. Steve hopes to receive an update from the modelers soon.

BMW also hired Ken Wagner to review the models and recalculate the loading sources. The total loading has decreased for the entire watershed as has the pH. The group discussed the impacts of the 2013 flooding. While it definitely did knock out the Burlington pipes that allowed Metro to discharge effluent directly to the Burlington canal, the flooding may have also scoured out some of the sediment in Barr Lake and caused other impacts that have improved water quality. Loading has definitely been reduced since about 2012. While the pumps are not currently operating, it is likely they will be rebuilt and start operating in the future. When they

do, the loading will be reduced from 2012 levels because Metro has been aggressively reducing Phosphorus (P) in their effluent.

The model predicts in-lake P values at about 1,500 mg/L when the data shows the levels at 500 mg/L. The model is clearly over-predicting P levels. All the inputs to the model that can easily been adjusted have been. Steve will send out the modeling report to the group as soon as he receives it from Integral.

John Stednick presented some slides on the P Loads into Barr and Milton. By measuring the water quality at the lake inlets, John could calculate the actual loading into the lakes. In 2019, Milton Reservoir received 5,000 pound of P which is the target load from the TMDL. The water quality in the lake didn't respond the way the models predicted. There are many variables such as snow melt, crop growth, etc that are hard to incorporate into the model. The change in hydrology/flow led to the reduction of loads. It wasn't a concentration reduction but the flow reduction that drove the lower loads. Whatever the cause of the load reductions, the chlor a and pH didn't respond to the lower P levels as the model predicted.

John speculated that the issue may be with the in lake, SWAT, model. The watershed, WASP, model seems to reflect the P loads measured getting into the lake. The internal loading may not be as large as we anticipated. John estimates that about half of the incoming P settles into the sediments and the other half leaves the reservoirs with releases.

We are in the middle in reductions to achieve our P goal to 100 ug/l. We've gone from 600 to 300 ug/L. For Milton we reached the load target and didn't see the water quality targets. Steve is noticing that the algal growth in the fall-winter-spring is dictating and causing pH problems in the winter. He is observing that there are not as many blue green algae blooms but more photosynthesis and higher pH in the winter.

Implementation Plan Updates – One of the tasks identified in the TMDL Implementation Plan (IP) is reducing the uncertainty between the water quality components. There is uncertainty about the response of the algae to reductions in P and pH reductions from the algal response. Steve completed the limnocorral experiments where columns of water were isolated within the lake. Alum was applied to reduce P levels and then the response in the water chemistry was measured. In canal treatment was also considered but has not yet been built.

Implementation tasks are another part of the IP (after evaluating uncertainty). We've accomplished many of the tasks identified in the IP. We need to brainstorm what else we can do to work on implementing the TMDL. Stormwater load quantification will be one of the goals. The Technical Committee should consider if a significant model revision/ update should be recommended. The Optimal Corrosion Control Treatment effort revealed opportunities for improving our existing model and
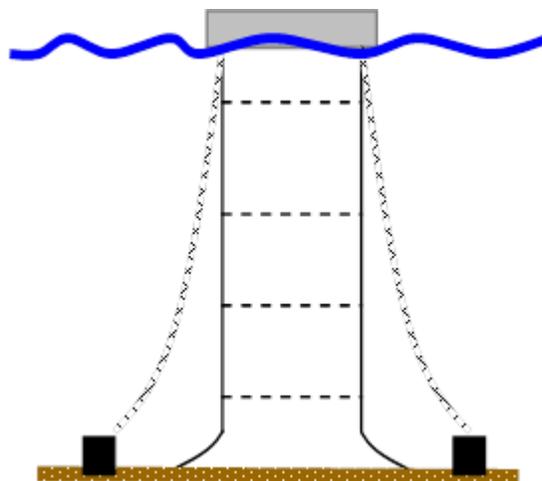
data gaps. However, it is very expensive to update models. The WASP and SWAT models can receive the inputs we're missing, it just takes time and money to revise the models with the new parameters.

The BMW Board is trying to produce a final draft of the IP before the end of the year. Steve would like the Technical Committee to assist in that effort by completing some homework for the meetings. The group discussed CDPHE's ongoing effort to refine Nitrogen, P and chlor a standards. Steve is on the advisory committee developing recommendations and will keep the group informed.

2020 Technical Updates - Steve reviewed his data analysis. He is finding that reservoir management is key to water quality. When the water comes in and how much comes in seem to be drivers in water quality. In 2020, Barr Lake is much lower than in 2019. Milton is right at the 18 year average. There has been a gap in data collection as a result of the coronavirus pandemic but he doubts there have been any dramatic aberrations in water quality. In 2020, P levels have been lower than average. Chlor a is more or less average in Barr and lower in Milton. Steve hasn't observed any blue green algal blooms in Milton this year. The relationship of P and chlor a seems to be following more closely to the data regression line as the P levels in Barr keep being reduced. In Milton, the results are more scattered.

Dissolved Oxygen (DO) has been high in winter but as the water heats up, it can't hold as much DO. We have failed to attain the DO standard twice in 2019. So far, we have attained the standard in 2020. In 2019, there was a lot of inflow into Barr that then sat there, there weren't many releases. As the water stagnated, decomposition happened and DO levels fell.

The 85th percentile of pH data has been hovering around the standard of 9 since 2013. So far in 2020 we are meeting the standard. The pH profiles show that the exceedances are in fall, winter and spring. The pH increases in the colder weather.

The fish seem to be adjusting to both DO and pH. Steve has never seen a fish kill at Barr Lake (knock wood). He has also seen a charter who is very busy taking fishermen out to catch Walleyed Pike. Barr has never been as busy as this year. He often has to wait to be able to launch his boat.

Carp Removal Plans – This is Steve's 8th year removing carp. A total of 161 pounds of P have been removed with carp alone. Steve has also estimated the amount in P excretion that has been prevented from getting into water column. He hopes to include carp removal as part of lake management. The box nets are making the removal exercise easier. Steve believes that fisheries management can improve water quality. We want to try to protect zooplankton because they can keep the algae in check. Steve may want to remove Gizzard Shad because they are eating a lot of the zooplankton when they get large. The small ones are intended to be food for the walleye. Steve wants a fish screen on the Burlington headgate. Don't crush his dream.

2019 WQ Update Reviews (barr-milton.org) - Steve wants people to review the water quality updates posted on the website. He would like to add top versus bottom water quality and a summary about Total Inorganic Nitrogen (TIN).

Summary of 2019 Cyanobacteria bloom (deeper water, internal loading) - Steve showed how the number of days the lake was stratified and deep and stagnant (not much inflow) impacted DO and blue green algae.   If the water stays deep and stratified, DO goes down, P goes up, and blue green algal blooms can happen. This year, starting in late June, there is a blue green algal bloom but it isn't a bad nuisance.

TIN vs Chl-a - Dan DeLaughter requested that we evaluate TIN to see if it's related to algae in Barr. SPWRP has been reducing TIN in their effluent. TIN concentrations have been reduced from the early years of modeling. Steve overlaid chor a data on TIN but there isn't a correlation that we can see. Steve looked at winter TIN versus summer chlor and there may be some correlation. The blue dots are the more recent years.

Steve put a probe in Barr that takes readings every 30 minutes. He'll be looking at that data to evaluate diurnal DO and pH.

There are some watershed scale monitoring efforts ongoing with USGS for a longitudinal study. Their first year of study didn't reveal anything new and wasn't too helpful. They are considering realtime continuous monitoring for ortho P at no cost to BMW. Initial results show that P levels in the river increase after the POTWs discharge.

Cisco is also working on a telemetry system that they want to get into the market. They approached Metro and Denver to offer to set it up for free. Steve is brainstorming with his colleagues to what the system might include. Maybe the Technical Committee might want to get involved. Jordan Parman is the lead.

There might be a lot more monitoring in the future.

Storm Water Monitoring Station Updates - GEI captured 7 events last year. They were able to capture 3 sampling collections during the bomb cyclone; base conditions, rising, and falling. Overall, TP goes up for storms. Soluble P goes down. We may not get 7 storms this year.

Steve collects a baseflow for load estimates for TP going into Burlington ditch. It can vary a lot during the week. He also is collecting cumulative loads in the Burlington. Steve compares the concentrations going into the Burlington and flows going into Barr to get to the loads into Barr. He's calculating loads into the canal and into the lake. Since June, P concentrations are slowly increasing but the loads are not increasing. The Burlington canal is minimally diverting from the river. So where is the P coming from in Barr that is causing the increase? Internal loading?

National Western Center Relocation Update – sampler may be down for a month or two or longer. He'll keep people posted.

Next Meeting - Tech. Committee: September 24, 2020

Home work: Review 2019 Water Quality updates, Review the IP, review the monitoring program