Wisconsin River TMDL

November 19, 2014

In Person Attendees: Kurt Schoen (NCWSC), Tom Turchi (City of Marshfield), Ann Hirekatur (WDNR), Theresa Nelson (WDNR), Aaron Ruesch (WDNR), Steve Galarneau (WDNR), Kevin Kirsch (WDNR), Angela James (MBF), John Piotrowski (PCA), Tom Pinion (City of Baraboo), Pat Oldenburg (WDNR), Brian Weigel (WDNR), Rich Boden (Plover WW Utility/ WRDG), Rachel Lee (Strand Association/WRDG), Susan Sandford (WDNR), Dave Evans (WDNR).

Remote Attendees: Dave Orcutt (Domtar), Dave Werbach (USEPA), Vilma Rivera-Carrero (USEPA), Kristy Newman (Packaging), Steve List (New Page), Sean Gehin (City of Wausau), Tom Gallagher (HDR-HQual), Cristian Mancilla (HDR-HQual), Jim Palumbo (NCASI), Eric Donaldson (Expera), Tom Emond (Expera)

Meeting notes:

1. **Introductions (All)**

2. **Welcome and overview of meeting purpose – Steve Galarneau**

3. **TMDL Schedule and Updates (Ann Hirekatur, Wisconsin River TMDL Project Manager)**

   See attachment 1 - PowerPoint slides – Comments /discussion of slides summarized below

   - **Slide 2 : Overall Project Timeline**
     Four years of monitoring was completed at the end 2013. It took several months to receive data from labs, plus additional time to review and compile data. We are moving forward as quickly as possible. We are currently in Water Quality Data Assessment and watershed and reservoir modeling step. There has been lots of progress on watershed modeling, which we anticipate will continue through the middle of 2015.

   - **Slides 8 -10 : Detailed Technical Timeline**
     - Pollutant load calculations and reservoir calculations are being done by external contractors. Specifically:
       - DNR has contracted load calculations to USGS and BATHTUB modeling to UW-Stout
       - CE QUAL W2 was contracted by EPA to RTI (prime contractor) and LimnoTech (subcontractor).
         - Dave Werbach (USEPA) - All correspondence with EPA contractor needs to go through EPA. EPA must be cc'ed on all correspondence, and

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involved in any phone calls. Only EPA can provide technical direction to their contractor.

- Brian Weigel (WDNR) - DNR will have monthly meetings with EPA so you can start communication with DNR first to see if we have answers you are looking for before contacting EPA.

- **Slides 11 – 12: Opportunities for Technical Review and Comment**

  - DNR will provide TMDL models for review and feedback from technical experts representing all stakeholders. We plan to provide model results for review and comment at scheduled points during in the TMDL model development process and subsequent calibration phases.
  - Notable is that we are providing a base level of technical documentation of model building steps and providing opportunity for stakeholder review and comment when appropriate during the model building process. Furthermore, we are offering to provide models themselves for stakeholder review at set points during model development.
  - The Wisconsin River TMDL project includes industrial and municipal point sources, stormwater, NPS dischargers, as well as local citizen groups and environmental groups as project stakeholders. Therefore DNR will continue to be transparent in our process and collaborative with ALL stakeholders throughout the TMDL process.
  - We are sensitive to the importance of the TMDL timeline as well as people's time for conducting meaningful reviews. We will provide stakeholders access to the model development and calibration process at set points as identified in the table.
  - Will share things in draft stage and give a review period. We can maintain routine contact so that stakeholders can better anticipate when model will be available and plan time for the review.
  - Only a base level of documentation will be included during these review periods, not a comprehensive report.
  - Review and comment periods will not include DNR staff conducting trial runs of the models for stakeholders or interpreting model/programming code for stakeholders. Those that intend to review must have the technical capability to conduct an independent review.
  - DNR can pass along comments to EPA pertaining to parts of the TMDL modeling being contracted by U.S. EPA. However only EPA can provide technical direction to its contractors.
  - We intend to be efficient at summarizing and responding to comments. If needed, we can schedule a webinar during the review period to address questions, and provide information about modeling approach.
  - Discussion
    - Ann – We are still figuring out how data/models will be shared /delivered - GovDelivery has a 1 MB limit and we don't post draft data on DNR website. We want to make sure

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everyone has equal opportunity to review data, so GovDelivery will likely be used to notify stakeholders that data/models are available for review.

- Tom Gallager– Will we will be able to try out and run models during calibration phase?
- Aaron – Yes, but the (SWAT) model transfer could be difficult due to size. Perhaps we could set up on FTP site. Programming code used to develop SWAT datasets is publically posted on GitHub for review. (https://github.com/dnrwaterqualitymodeling/wisconsinRiverTMDL).
- Angela – It would be good to have regular opportunities for phone meeting to get updates on timeline, even if there are no deliverables to share.
- Ann – We can plan a spring check-in, in between to winter and summer release of information.

4. Technical questions Submitted by Wastewater Facilities

See attachment 2 - Wisconsin River Industrial Dischargers Alliance (WRIDA) Questions on model Development and Stakeholder Involvement

Question 1

- TMDL schedule information was included in the power point presentation at the beginning of the meeting.
- We anticipate allocation process will begin in mid-2015 and conclude sometime in mid-2016. Our approach will be proportional allocation process that has been described previously in presentations and webinar.
- Our intention is to build an allocation database, to facilitate evaluation of various scenarios so allocations achieve both local and downstream water quality criteria. This approach of using an allocation was used for the Rock River TMDL and is being used for Milwaukee TMDL, and will be used for the Upper Fox.

- **Discussion**
  - John P.– What year will be used for the baseline? Lots of people are currently working on their permit process.
  - Pat –industry-representative flows are starting point. Focus on most recent flows
  - Kevin – We will check actual versus design flow to get an idea of reserve capacity. We will include a reserve capacity because in past TMDLs it was problematic not to do. Need to have reserve capacity or can get into problems in future. Reserve capacity is only for traditional point sources, not MS4s.

Question 2

- Theresa – we are pulling data out of SWAMP and verifying data with regional basin engineers to make sure we have correct facilities and right outflow locations. To fill in gaps

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4. Technical questions Submitted by Wastewater Facilities (continued)

where monitoring is not required we are using info from permit applications. For facilities that intake river water and add P we are conferring with basin engineers and updating data as necessary to make sure the existing conditions model is accurately representing actual conditions over model period. All of this data will be available for review by facilities upon completion. Data will have flags so you can review and see the source of each data. Once our data is released for review, if you have anything additional, please share it with us. It's a very large data set – ten years of monthly data for 170 outfalls.

- Discussion
  - Kurt –If a facility taking in water at 200 and discharging at 210, they would only be accountable for 10, correct?
  - Kevin - Yes.
  - Pat – Some people submit intake data as part of permit application. We aren't including non-contact cooling water that doesn't have anything added to it before being discharged

Question 3

- Pat Oldenburg - Tributaries are generally monitored at HUC 10 scale. Since we are calibrating models at that scale, transport is implicit in the SWAT model. Where we have lakes, we are accounting for deposition and to a limited extent, re-suspension.

Question 4

- Brian – Monitoring is quite robust. There was less monitoring in north because there's fewer anthropogenic pollution sources.
- Pat Oldenburg - We do have additional data in the northern region that we've been able to locate. Lots of in-lake data. There are over a half dozen stations where we have phosphorus loads calculated by USGS. There is a good data set to use for load calculations from a few years back on main stem at Rhinelander and Rainbow Falls. WVIC has a good flow network in northern region. Feeling good about the northern region data now that I've spent time digging in to find out what exists.

Question 5

Kevin/Pat - Once a TMDL has been approved by EPA, all WPDES permits issued from that point forward must be consistent with the TMDL. The TMDL is required to have a daily expression of the allocations; however, implementation does not have to be on a daily basis. The TMDL will most likely be developed with monthly allocations

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for phosphorus. Allocations will be expressed in permits as monthly mass limits to assure compliance with the nutrient criteria. Phosphorus limits in WPDES permits do not have to be expressed as daily maximum or weekly average mass limits. For allocations that produce effluent limits below 0.3 mg/L TP a six month averaging period maybe used provided such an expression of the limit is consistent with the development of the TMDL and allows attainment of water quality standards. It is unlikely that this will occur for stream segments but may occur for the reservoirs. It is unclear at this time if this will apply in this case.

For those limited places in the basin where there are waters impaired for TSS, waste load allocations would also be developed on a monthly basis. In these cases, permit limits for TSS will also be expressed as a monthly mass limit with weekly averages or daily maximums for municipal or industrial dischargers respectively. The expression of the weekly average and daily maximum will be calculated based on the TMDL monthly mass limit from the allocation and the coefficient of variation for the facility. See DNR guidance: TMDL Implementation Guidance located at http://dnr.wi.gov/topic/wastewater/Guidance.html

- Discussion
  - Kevin –Limit has to be expressed monthly because of residence time. A lot of EPA guidance comes from Chesapeake Bay, which is annual, but it will be monthly in this case. More stringent in reservoirs, so could look at seasonal instead of monthly.
  - Rachel – an averaging period would be helpful
  - Kevin – allocations have a built in averaging period, as there is a 3-month smoothing that incorporated into monthly allocations. For example, January is average of Dec, Jan, and Feb
  - Pat – In permit, divide the monthly waste load allocation by days per month and have lbs per day monthly average limit
  - Ann – To clarify, this discussion is just referring to WW permits, not stormwater.
  - Kevin – EPA allows 10% exceedance of non-toxics. This means water quality standards can be exceeded during extremely low or extremely high flows. This has big impact on allocations (see question 10).

Question 6

Aaron Ruesch - They are to some extent linked in the model, in that sediment carries with it phosphorus. Due to this inherent linkage, we will calibrate TSS prior to calibrating TP. Any remaining error in TP loads will be calibrated by adjusting SWAT model parameters that are not linked to either streamflow or sediment. For example, we will likely test if instream TP loads are sensitive to soil phosphorus concentrations, and if so, either apply more effort to regionalizing soil P concentrations, or adjusting soil P globally to fit observed data.

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4. Technical questions Submitted by Wastewater Facilities (continued)

Question 7

- Ann Hirekatur - We will not be modeling implementation scenarios during TMDL Development. We will determine the load reduction from baseline conditions needed to achieve local water quality criteria first, and then look downstream to see if it gets us to achieve downstream water quality.

Question 8

(Note: the discussion about this question took place earlier in the meeting, but is noted here to correspond with the order of the questions submitted in writing, attached)

Kevin – No, if you look at the long-term data, there has been a substantial downward trend in agricultural load over that same time period. Baseline will be set based on technology limits. Facilities that have exceeded this requirement might already be a part of the way toward meeting their TMDL limit.

- **Discussion**
  - Angela – If you look at data, PS and NPS have dropped but not consistently across the board.
  - Kevin – A lot of times, the timing that is driving PS loading is not same time as NPS loading
  - Rachel – When give point sources an allocation, they must design for the lowest monthly limit
  - Kevin – Yes, but it's still possible for them to back off at certain points of the year
  - Rachel – Not sure if they would agree. Will allocations be established by sub watershed for local water quality, or grouped to achieve downstream water quality?
  - Pat – We have to structure the TMDL to meet local water quality targets first, then tackle downstream targets.
  - Kevin – If we get down to the reservoir and not achieving WQ standards with allocations that protection local water quality, we will have to decide what else we need to do to meet these standards.
  - Rachel – If this happens and you have to make additional reductions up the watershed, we want to know how that process will go. If it hasn't been done before, we would like to be involved in planning that process.
  - Kevin – We want to plan out that process now but we don't know how the data will inform decisions yet. Haven't gotten to that point yet to see what data is showing.

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- **4. Technical questions Submitted by Wastewater Facilities (continued)**

  - Rachel – we just want to ask that it be a conversation, not just a decision that we hear about later.
  - Kevin – The Milwaukee TMDL QAPP got really detailed even though they didn't know (when they were writing the QAPP) if they had a problem yet. None of problems we eventually ran into were addressed in QAPP.
  - Angela – We don't want to be left out of decision making process before model is done being designed. Want to be aware of what's happening
  - Brian – A key feature is the allocation database. This is important for a lot of these decisions. Decisions don't have to be set in stone today. We can discuss further when the database is up and running.
  - Kevin – The allocation database created for the Milwaukee TMDL is a tool that allows for "what if" scenarios to be run and see outputs. Models feed into the database that tracks and evaluates allocation scenarios. This allows us to evaluate how changes and alternative scenarios will impact the system without redoing everything.
  - Rachel – There have been recent (WDNR) staff changes. Who is the west central region basin engineer?
  - Pat- Nathan Wells is the new basin engineer, he just started in the position this week.

Question 9

- Part A, Ann –USACE developed model grid from bathymetry shapefile. This has been provided to the EPA contractor has data who will evaluate and use if suitable. No other work was completed by USACE to a level that it could be handed off to the EPA contractor.
- Part B, Pat –We will run bathymetry data we are using by WVIC to confirm they are conformable with the data. BEP bathymetry is developed from WVIC data.
- Part C, Pat– Yes, the linkage will be more direct in CE QUAL modeling than Bathtub.
- Part D, Pat - Petenwell & Castlerock – 40; Big Eau Pleine – 30; DuBay/Lake Wisconsin – TBD. We know there are significant algal blooms in DuBay and Lake Wisconsin in 70-80 range, so 100 is not protective of its uses. Modeling will inform the decision of how to proceed. We are still evaluating whether the criteria of 40 applies to DuBay, based on residence time.

Question 10

- Brian – This question was addressed earlier in the meeting. Point sources can review our data and if they can provide additional data and rationale for using it, let us know.

Question 11

- See attachment 3, DNR response to questions about Land Cover/Land Management Technical Memo.

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4. Technical questions Submitted by Wastewater Facilities (continued)

Question 12

- EVAAL is an implementation tool and will not be used for TMDL development

Question 13

- Ann – Discussed earlier in question 3.

Question 14

- Kevin - For calibration of the TMDL models we will use actual flow rates. For setting allocations, a flow rate will be selected such that allocations allow for a 90% compliance with the phosphorus criteria on an annual basis (defined such that the median of monthly phosphorus concentrations for each separate year meets criteria). For the Rock River TMDL, this was roughly the 40th percentile of monthly flows. For the Milwaukee TMDL, this resulted in roughly the 33rd percentile of monthly flows. These percentiles were applied for each month; the 40th percentile of January flows, the 40th percentile of February flows, etc. Check back on resulting allocations to make sure you're meeting allowable monthly loads. Becomes an iterative approach – database allows for this.

Question 15

- Ann – We talked about non-contact cooling water earlier in the meeting. Theresa is working on this.
- Theresa –We are looking non-contact cooling water general permits too.

Question 16

- Ann – Discussed earlier in the meeting, during/after power point presentation

Question from Rachel Lee: How are independent agronomists involved?

- Ann - Agronomists were involved in data collection and validation of the land management data layer, as documented in technical memo available here: http://dnr.wi.gov/topic/TMDLs/documents/WisconsinRiver/Technical/WRBLndManagmntJuly2014.pdf

  We will invite agronomists to participate in NPS TMDL stakeholder meetings beginning sometime next year.

- **Discussion**
  - Rachel – They are so involved with decision making its really important to involve them.
  - Aaron – They are particularly useful if they work across large geographic areas and can distill themes.

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4. Technical questions Submitted by Wastewater Facilities (continued)

- Ann – Rock river TMDL team had a meeting specifically for agronomists – we aren't quite at that point yet, but intend to do something similar eventually
- Pat – Letting them know that it can be part of their business model is key.

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Attachment 1

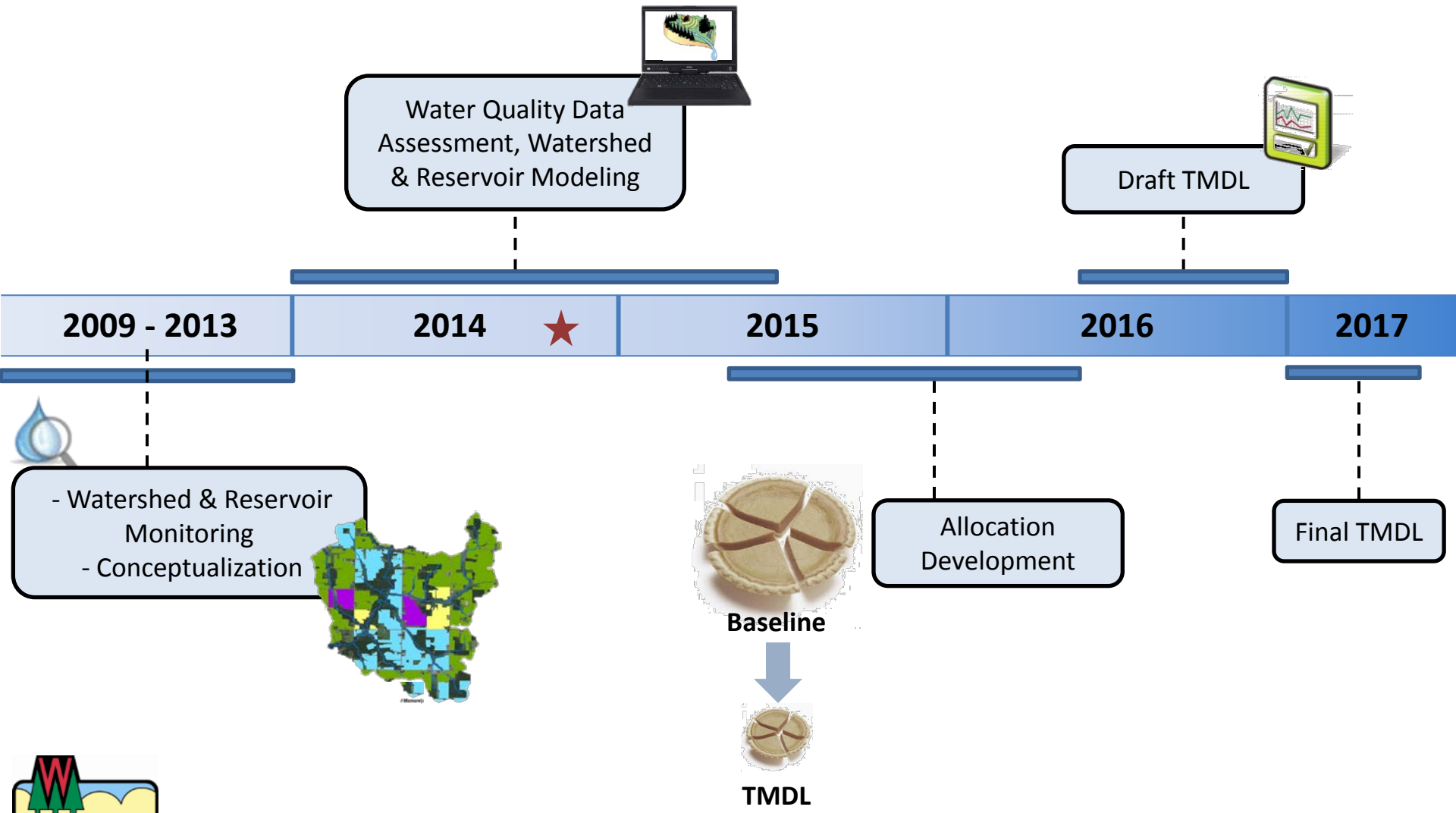
Power Point Slides

WELCOME

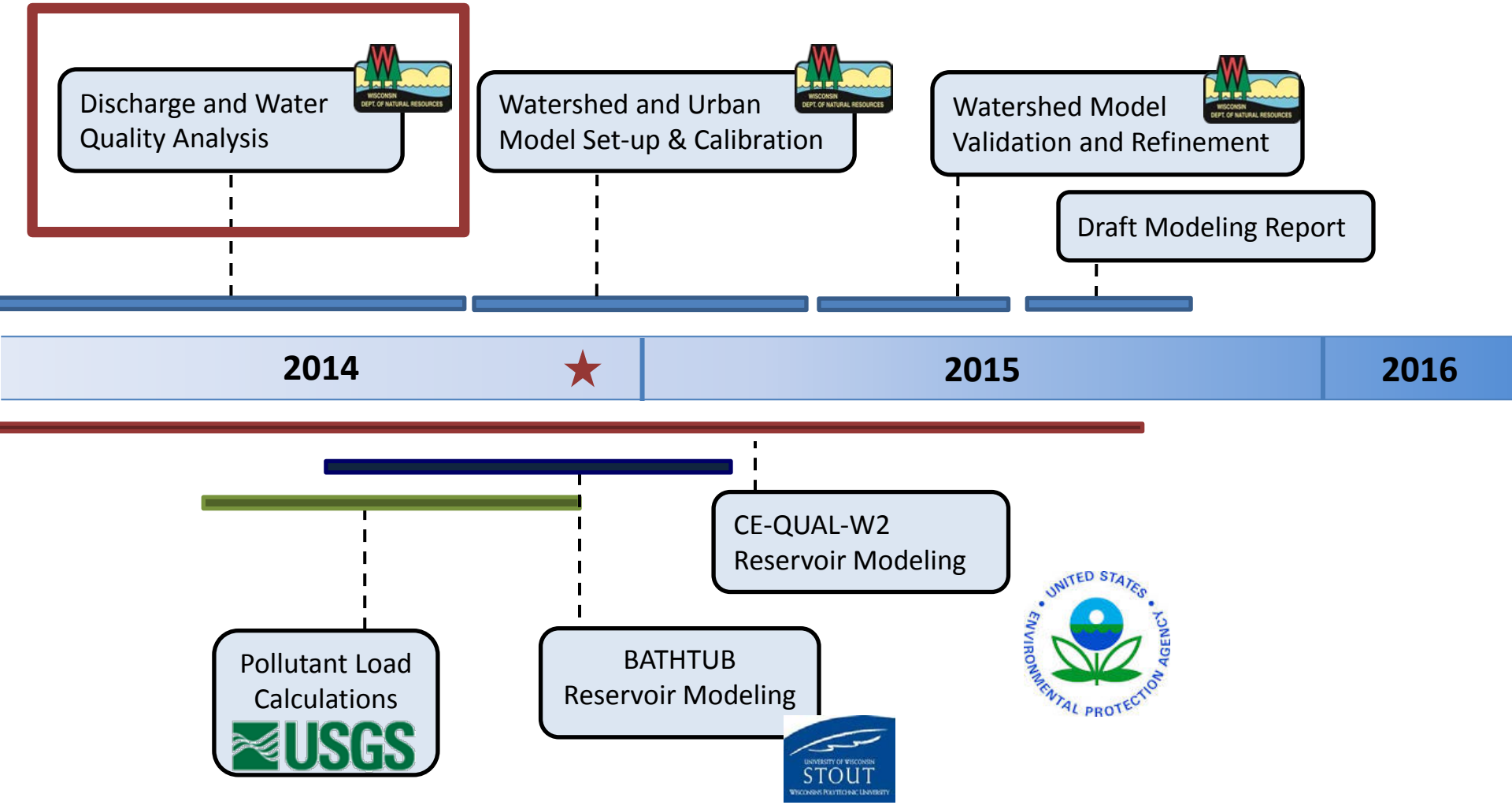
- Project Update & Timeline
- Open dialogue, transparent process, valued model review and calibration points.
- Technical Stakeholder Review & Comment
- Address questions

Overall Project Timeline

Estimated Timeline (as of April 2014)



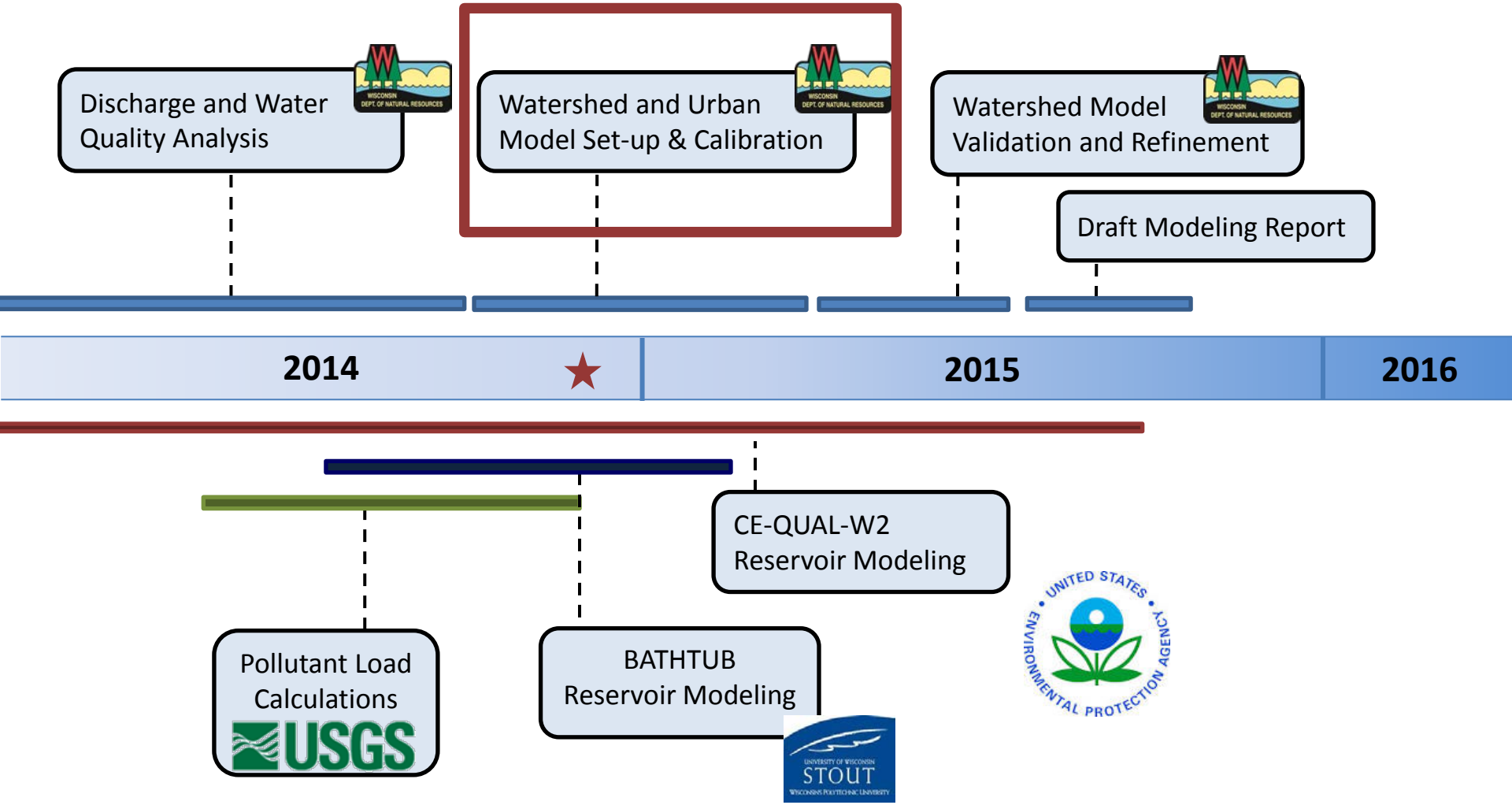
Detailed Technical Project Timeline



Discharge and Water Quality Analysis

- Discharge Analysis
  - Obtained and reviewed surface water effluent load information from basin engineers and compiled into Access database
  - Working with wastewater staff to compile info on facilities that intake river water, so loads can be adjusted accordingly.
  - Working with wastewater staff to determine loadings from NCCW general permits
- Water Quality Analysis
  - Review and compilation of monitoring data as needed for delivery to contractors (UW-Stout, EPA, USGS)
  - Compilation of other monitoring data ongoing

Detailed Technical Project Timeline



Watershed Model (SWAT) Setup & Calibration

SWAT Model Setup

- Set-up SWAT model runs to test and incorporate new data layers
- Testing run times with different data types

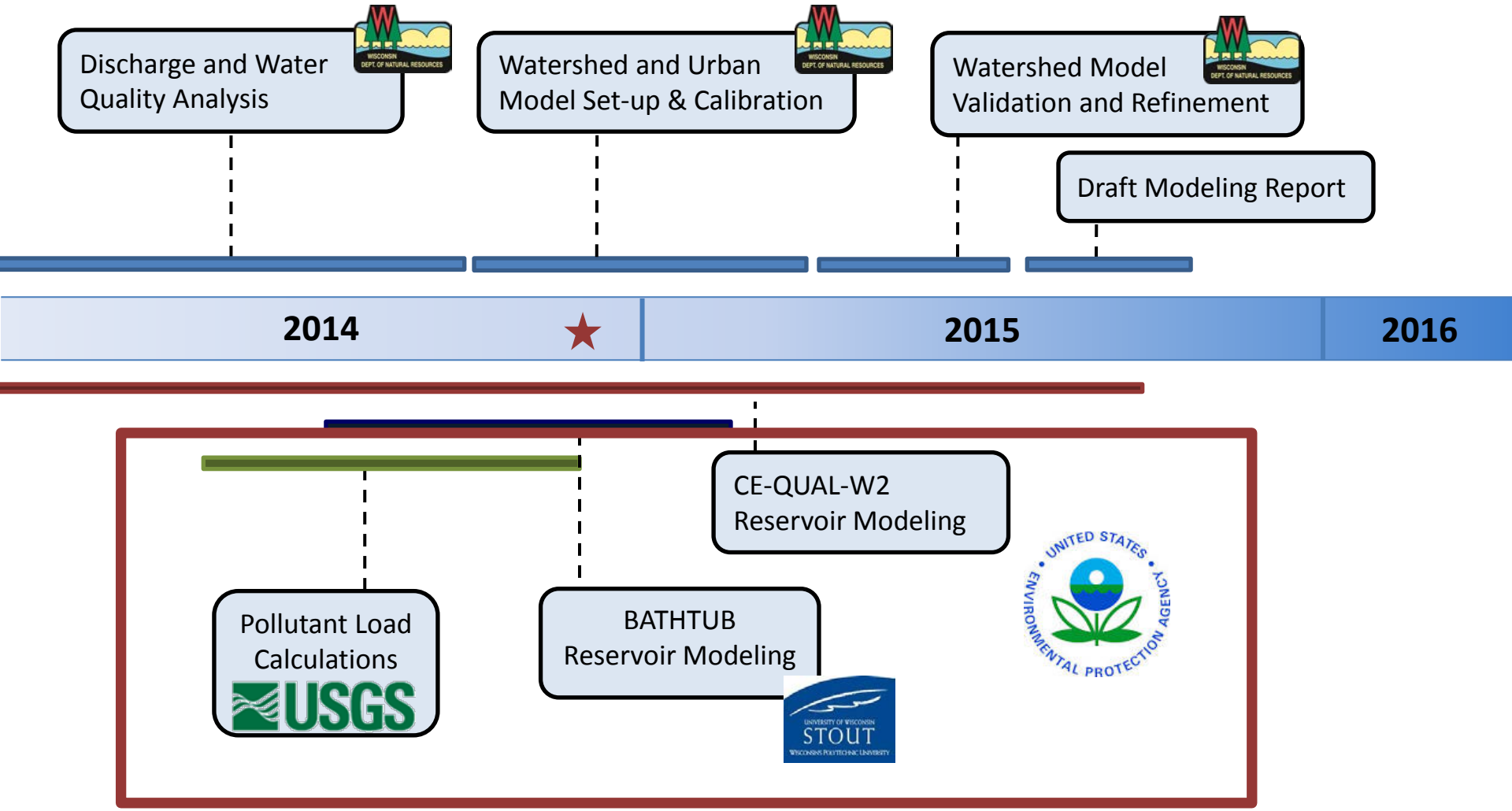
• SWAT Model Dataset Development

- **Subwatershed Definitions** - HUC 10 to HUC 12 scale sub-basins, with breaks added where required to address impaired water segments, point sources, and other features.
- **Reservoir Characteristics** - Geometric properties required for SWAT configuration
- **Internally Drained Areas/ Wetlands**
- **Land Use/Land Management** (tech memo online)
- **Soils** (SSURGO-based)
- **Baseflow Separation**
- **Annual Water Budget**
- **Climate**

Urban Load Modeling

- MS4 urban area map finalized and distributed to permitted MS4s
- Delineated reach sheds within urban model area of permitted MS4s, will be distributed with SWAT model
- Urban model soil texture layer developed

Detailed Technical Project Timeline



Load Calculations

- Flow and water quality monitoring data for 38 sites delivered to USGS, including flow data from WVIC and Alliant Energy
- “Load calculating” is underway by USGS

Reservoir Modeling

Bathtub Modeling

- Bathymetry, reservoir and river/stream monitoring data delivered to UW-Stout
- Model Setup is underway by UW-Stout
- Water quality calibration work can begin upon completion of load calculations

CE-QUAL-W2 Modeling

- EPA contractor selected Sept 2014
  - RTI (prime)
  - LimnoTech (Sub)
- Kickoff Meeting October 21, 2014
- QAPP development underway; Draft due Dec 5, 2015
- Modeling to begin upon completion and EPA approval of QAPP
- EPA must be cc'ed on all communications with contractors

Opportunities for Technical Review & Comment

Model	Model Development	Estimated Date	Model Calibration	Estimated Date
SWAT	Model Setup	Jan/Feb 2015	Model Calibration	Summer 2015
SLAMM	• Urban Model Area Mapping • Reach Shed Mapping	Jan/Feb 2015 (UMA mapping distributed 9/14)	SLAMM Model	Summer 2015
BATHTUB	Model Setup	TBD	Model Calibration	Summer 2015
CE-QUAL-W2*	Hydrodynamic Calibrated Model	April 2015	Water Quality Calibrated Model	Summer 2015

Wisconsin River TMDL Stakeholder Input

Valued collaboration by all stakeholders & DNR

- Products shared at draft stage
- Review periods: 14-21 days
- Base level documentation
- Summary response to comments
- DNR will not run models or explain how the models work. It is understood that reviewers have the expertise needed to conduct independent review
- DNR may provide webinar opportunity to ask questions about the models during the comment period
- Review and comments cannot be accepted by DNR for parts of the TMDL being contracted by U.S. EPA.

Attachment 2

Wisconsin River Industrial Dischargers Alliance (WRIDA) Questions on model Development and Stakeholder Involvement

Wisconsin River Industrial Dischargers Alliance (WRIDA)

Questions on model development & stakeholder involvement

November 14, 2014

1. Please provide an update on the TMDL schedule including a detailed discussion of the load allocation process and schedule.

2. How will design flows and P discharges be verified/validated with point sources?

   (a) How will P taking into a facility through surface water intakes be treated by the TMDL? Do all facilities monitor river water influent P? Will WDNR accept this influent monitoring data gathered by facilities?

3. What assumptions will be made about fate and transport of P from tributaries? Will DNR include any empirical studies/findings to inform this aspect of the model?

4. We understand that there is limited monitoring data available for the northern portion of the study area.

   (a) What data will be used, and how is that data QA/QCed?

   (b) What is the function of lake monitoring data in this data set (if any)?

5. How will the TMDL allocations be integrated into WPDES permits? (monthly, seasonal, etc.), and how will this influence model development?

6. Will TSS and P be linked in the model, or evaluated independently?

7. How will you select TMDL implementation scenarios that will be modeled?

8. Will the reductions already attained since 1992 by point sources be considered when determining future reductions required of point and nonpoint sources?

9. What is the status of modeling the reservoirs?

   (a) We understood that Army Corps of Engineers were working on the hydrodynamic model for the Petenwell and/or Castle Rock – was any of that work completed? Will any of the findings from the CE-QualW2 model be applied to any other reservoirs besides Petenwell?

   (b) What information do you have about the surface area and capacity of the reservoirs on the WI River? How is the footprint and volume for each reservoir determined? (eg., what river elevation is used?) How do we insure each calculates the same way for consistency , let alone accuracy?

   (c) Will dissolved oxygen and phosphorus linkages in reservoirs be incorporated into the model?

(d) What phosphorus criteria will be used for the reservoirs/impoundments? 0.03 or 0.04?

(e) Has the WDNR considered whether it might be appropriate to develop site-specific criteria (SSC) for any parts of the Wisconsin River?

10. What specific data can point sources provide that would be helpful to the modeling effort? Will WDNR accept any data provided by point sources? Are there steps we should follow to ensure that our data is acceptable?

11. How have the data from the land cover analysis been verified?

12. How will EVAAL be used in determining nonpoint source contributions? How will this be tested?

13. How will the model evaluate "downstream impacts" of a point source?

14. What river flow rate will be used in the model (e.g., 7Q10, 7Q2, etc.)?

15. How will the model deal with potential P discharges from non-contact cooling water (NCCW)?

16. Will WDNR allow stakeholders to participate in the model calibration through sharing their efforts with our consultants?

Attachment 3

DNR response to questions from Municipal Discharger Group on
Land Cover/Land Management Technical Memo

Wisconsin River Total Maximum Daily Load
Response to Public Comments on the Land Cover and Agricultural Management Definition within the Upper Wisconsin River Basin Technical Memorandum
September 12, 2014

1. **In section 2.2 of the memo you reference using the 2008 USDA Common Land Unit (CLU) to designate land in the conservation reserve program (CRP). Anecdotally, we have heard that CRP land has changed significantly in recent years because of high corn prices. Could you have each county's Land and Water Conservation District (LWCD) comment on the change in CRP land during the years you are modeling?**

   WDNR Response: The distribution and acreage associated with CRP land can change annually. The WDNR considered the 2008 CLU definition as representative because our model period is 2002-2013—2008 is nearly central to that period. However, it should be noted to users who are running scenarios, either forecasting or backcasting, that grassland cover coincident with CRP definitions may need to be considered invalid due to the changes you noted.

2. **Section 3.3.5 discusses manure validation and Figure 7 shows the comparison of the DATCP cattle inventory manure amounts and the amount of manure applied using the WDNR approach. The text states that "the estimates only needed to align closely with the cattle inventory values." A closer look at the data included in Appendix E reveals that the difference in the amount of manure from the DATCP inventory and the WDNR approach exceeds 500 million pounds on an annual basis. That is approximately 25 percent of the manure generated in the six counties detailed in the appendix. This manure, which is excluded from the WDNR model, contains approximately 330,000 pounds of phosphorus. The text implies that this amount of phosphorus is a write-off when considering manure, but it is enormous to the municipalities along the river. To put this amount of phosphorus into perspective, the industrial and municipal wastewater treatment plant point source load was approximately 256,000 pounds in 2011. To ensure that future allocations are fair and proportional for all discharge sources, we ask that WDNR include the 500 million pounds of manure that is not included in the model at this time. The enclosed Table 1shows these calculations.**

   WDNR Response: The approach used by WDNR to estimate manure totals uses similar methods as previously applied in other watershed modeling efforts throughout Wisconsin including the Lower Fox River TMDL. Within the six counties that the WDNR compared the NASS estimate to the WDNR's manure estimate, the deficit (500 million pounds on an annual basis) was a result of our estimates being intended to honor as closely as possible the generalizations the WDNR compiled from county staff, county-level inventories of head cattle, and estimates of typical manure output per animal from DATCP. Using best available information for the entire basin, WDNR applied several assumptions to estimate manure application rates, each had potential error. For example, the DATCP annual cattle counts by county were multiplied by an average annual manure output per animal based on the DATCP Manure Quantity Estimation form (*V. 09/01/03*). This form provides an average estimate of manure production per cow in both solid and liquid forms for a range of

animal sizes. For example, a 150lbs. calf produces a much smaller amount of manure than a 1400lbs. lactating cow. The WDNR was required to estimate the distribution of cattle sizes on a typical farm, which was done based on advice from county staff, WDNR staff, and crop consultants. As the example shows, the assumptions used for the cattle inventories per county provide one source of error in estimating the amount of manure coming from cattle. As such, we cannot use the DATCP cattle counts as an *exact* validation number – these cattle estimates were provided by NASS and the methodology for estimating them can be seen online (http://www.nass.usda.gov/Data_and_Statistics/County_Data_Files/Livestock_County_Estimates/index.asp). As such, the NASS data that is serving as the basis of determining a deficit is also an estimate.

Accounting for the amount of manure applied is a critical component of the TMDL source allocation. To that end, it is important to note that this deficit will not manifest in the TMDL model. The TMDL model aims to account for all sources of phosphorus, point and non-point. Fortunately, we have extensive in-stream monitoring data as well as monitoring data from point-source dischargers. As a result, we can, to a large extent, account for the difference between in-stream loads and upstream point-source discharges--that difference being composed of naturally occurring and non-point sources. Ultimately, we will calibrate the TMDL model so all sources fit in-stream monitoring data. There are several phosphorus based factors with respect to manure that can be adjusted during the calibration process including phosphorus content of the manure, incorporation depth, and the manure application rate within specific regions of the model domain. Because point-source loads are well-known, we can independently calibrate non-point load to match in-stream observations.