City of Boise Comment on pre-draft Lower Boise TP Subbasin Assessment

February 9, 2015

1. **Pre-draft TMDL**

   Appreciate the excellent work IDEQ has done over the last three years working on this effort. AQUATOX modeling group; TAC and WAG processes,

   Draft TMDL a significant effort and generally well constructed.

   Have a limited number of comments to improve the draft and move the document to the point that it is ready for submission to EPA for review and approval

2. **Support the Comments from the Municipal/Industrial Group submitted on February 8, 2015**

   The City support the fifteen comments submitted by the Municipal/Industrial group on February 8, 2015

3. **Weekly Limits**

   The draft TMDL should provide the technical basis for the need for weekly limits proposed for point sources. The modeling resulted in allocations for monthly total phosphorus discharges. The default NPDES permitting timeframes for permits are monthly and weekly, however can be longer (e.g. Wisconsin 12 month rolling TP average) or shorter (daily Chlorine) as needed.

   The appropriate permitting timeframe for phosphorus is **monthly** because nutrients do not act as toxics, nutrient are slow acting, and AQUATOX analysis demonstrate the water quality goals will be met with monthly limits. Monthly is the minimum averaging period that needs to appear in NPDES permits.

   IDEQ needs to provide rationale why weekly limits are necessary or remove the weekly limit from the draft TP TMDL.

4. **TMDL Allocation Approach: Incorporation of Cost, Environmental Benefit, and Trading**

   EPA[1] [2] [3] and Idaho[4] have provided guidance concerning TMDL development requirements, including allocation methods and considerations. EPA and state

[1] EPA, 1999, Draft guidance for water quality-based decisions: the TMDL process, second edition, August 1999

[2] EPA, 2000, Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in support of revisions to the Water Quality Planning and Management Regulation, Federal Register V. 65, No. 135, July 13, 2000, p 43586-43670.

guidance identify a number of factors, including technical feasibility, cost effectiveness, affordability, relative contributions, equity, trading, and the likelihood of success, to develop the most effective allocation strategy

i. Cost Considerations

Cost can and should be an important consideration in the development of a TMDL[5]. EPA's TMDL Report to Congress on the National Costs of the TMDL program estimates implementation costs at $1 to $3.2 Billion annually. These costs are based on the assumption that states will use "... cost-effective reductions among all sources of the impairments, including trading between point and nonpoint sources.". EPA notes that "costs may be higher or lower depending on the extent to which States choose to allocate more of the reductions to sources with lower control costs versus allocating equal percentage reductions to sources regardless of costs". EPA estimates that costs could double if cost effective approaches in allocating TMDL responsibility are not used.[6]

Affordability is also a factor related to cost and has long been a consideration in TMDL development and implementation of the Clean Water Act. Affordability was initially defined by EPA in 1995 with interim guidance at 2% of Median Household Income[7].

On November 26, 2014, EPA significantly revised the Clean Water Act affordability guidance to include additional factors for consideration, including upto ten additional measures of the financial ability of communities to pay for Clean Water and Safe Drinking Water Act implementation[8].

Multiple statewide studies of nutrient removal costs have identified affordability as a significant issue, particularly for small facilities and stormwater contributors for implementation of phosphorus and/or nitrogen nutrient controls associated with TMDLs or statewide nutrient standards[9].

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[3] EPA, 2001, Notice of Availability of a Draft Report on Costs Associated With the Total Maximum Daily Load Program and Request for Comments Federal Register: August 9, 2001, V. 66, No. 154. p. 41875-41876.
[4] IDEQ, 1999, State of Idaho guidance for development of Total Maximum Daily Loads, June 8, 1999, 46 p.
[5] EPA, 2001, Notice of Availability of a Draft Report on Costs Associated With the Total Maximum Daily Load Program and Request for Comments Federal Register: August 9, 2001, V. 66, No. 154. p. 41875-41876.
[6] EPA, 2001, Administrator Mehan testimony to House Water Resources and Environment Subcommittee November 15 concerning TMDL Final Rule, November 15, 2001
[7] EPA, 1995, Interim economic guidance for water quality standards workbook, EPA-823-B-95-02
[8] EPA, 2014, Financial capability assessment framework for municipal clean water act requirements, November 24, 2014 memo from Ken Kopocis and Cynthia Giles, 8 p.
[9] MDEQ, 2007, Wastewater Treatment Performance and Cost Data to support an Affordability Analysis for Water Quality Standards, 27 p., WDOE, 2011, Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater treatment Plants, Tetra Tech for WDOE, 556 p. accessed August 15, 2014, https://fortress.wa.gov/ecy/publications/publications/1110060.pdf
Ohio EPA , 2013, http://epa.ohio.gov/Portals/35/wqs/nutrient_tag/OhioTSDNutrientRemovalCostEstimate_05_06_13.pdf
Utah, CH2MHill, 2010 , statewide nutrient removal cost impact study, 114 p.
http://www.nj.gov/dep/wms/bwqsa/UtahStatewideNutrientRemovalCostImpactStudyRptFINAL.pdf

Nutrient removal costs are more affordable for large facilities (e.g. 10-20 million gallon per day capacities and processes) that can be modified to achieve biological nutrient removal.

Impacts on small rural wastewater facilities are two to five times more expensive as identified in multiple recent statewide nutrient treatment cost analyses. Utah evaluated upgrade cost for all municipal wastewater treatment facilities statewide, including small facilities (< 2 mgd) and design lagoon (0.55 mgd), to attain four potential levels of phosphorus and/or nitrogen control (1 mg/l and 100 ug/l of TP; 1 mg/TP and 10 mg/l TN; 100 ug/l TP and 10 mg/l TP). Affordability was evaluated under the 1995 2% of MHI. The Utah Study findings were that for mechanical plants, nutrient removal was affordable for all nutrient removal scenarios but that small system affordability using the MHI threshold was fully used or exceeded for three of the four nutrient removal scenarios (i.e. 108% for 1 mg/l TP and 10 mg/l TN; 93% for 100 ug/l TP; and 149% for 100 ug/l TP and 10 mg/l TN)[10].

Affordability for Municipal Separate Storm Sewer System (MS4) is also a major concern as treatability options for nitrogen or phosphorus are minimal and extremely expensive if applied on individual MS4 basis.

Three very small municipal wastewater treatment facilities (Greenleaf, Notus, Wilder) discharge <0.25 mgd per facility. Greenleaf recently constructed wastewater treatment facilities and currently has monthly rates of $80, or 2.6% of median household income. Greenleaf would be able to meet the summer allocation but not the winter allocation. The additional winter treatment cost to Greenleaf would increase the % of Median Household Income for wastewater, which is significantly over the 1995 EPA guidance and even higher compared to the November 2014 revisions of EPAs affordability guidance.

The TMDL should include affordability analysis associated with the allocations, and where exceedance of the affordability thresholds are anticipated, develop alternative allocations, as it has done for stormwater.

ii. Trading:

Stormwater and agricultural control costs have been studies as part of the Chesapeake Bay Program evaluation of trading potential. Median phosphorus removal costs for urban stormwater range from $5,000 to

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Illinois, 2011, Evaluation of practical technology-based effluent standards for phosphorus and nitrogen in Illinois; 53 p. http://c.ymcdn.com/sites/www.isawwa.org/resource/dynamic/forums/20111226_095749_18134.pdf

Minnesota Department of Transportation, 2005, Cost and effectiveness of stormwater management practices, Minnesota Department of Transportation, Research Report 2005-23, 103 p. http://www.lrrb.org/media/reports/200523.pdf

Chesapeake Bay Commission, 2012; Nutrient Credit Trading for the Chesapeake Bay: an economic study; 60 p. http://www.chesbay.us/Publications/nutrient-trading-2012.pdf

[10] Utah, CH2MHill, 2010 , statewide nutrient removal cost impact study, 114 p. http://www.nj.gov/dep/wms/bwqsa/UtahStatewideNutrientRemovalCostImpactStudyRptFINAL.pdf

$55,000 per lb TP/year while median agricultural phosphorus removal costs range from $200-$825 per lb phosphorus per year[11], which provides a substantial opportunity and incentive for trading to more quickly and cost effectively attain water quality standards.

EPA and IDEQ support trading and these has been significant effort in the Lower Boise watershed to develop trading rules[12] and statewide to set a broader framework. Trading is a tool that allows a lower cost reduction by one source to be used for compliance purposes by another source that has higher costs provided additional environmental benefit occurs, no local hot spots are created, and the trades are transparent and tracked.

EPA and IDEQ recently approved a municipal wastewater permit that authorizes an offset (Dixie Slough) that results in over two times more reduction total phosphorus reduction at the mouth of the river by using the offset compared doing all the treatment at the wastewater facility[13]. The draft Lower Boise TMDL also requires that future municipal growth occur only by executing trades.

Current EPA TMDL guidance
http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/Draft-TMDL_32212.pdfTrading]
says that:

> *"If post-TMDL trading is anticipated, States should consider including specific trading authorization provisions in the TMDL (WQT Policy, p. 5). <u>At a minimum, the state should consider including language explaining that an assumption of the individual WLA is that it may be implemented in an NPDES permit through the acquisition of appropriate water quality trading credits.</u> EPA recommends that a State identify the process and criteria it will use to revise TMDLs in either its Continuing Planning Process (CPP), a Memorandum of Agreement (MOA) with EPA, or, in some circumstances, a Water Quality Trading Agreement with EPA."*

Trading also could be used to meet some or all of a point source reduction obligation (e.g. small municipalities or MS4s) instead of requiring substantially more expensive treatment for each source.

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[11] Chesapeake Bay Commission, 2012; Nutrient Credit Trading for the Chesapeake Bay: an economic study; 60 p. http://www.chesbay.us/Publications/nutrient-trading-2012.pdf

[12] IDEQ, 2000, Lower Boise River effluent trading demonstration project: summary of participant recommendations for a trading framework, September 2000, 160 p. https://www.deq.idaho.gov/media/489512-boise_river_lower_effluent_report.pdf

[13] West Boise Modified NPDES permit, June 2013, http://www.epa.gov/region10/pdf/permits/npdes/id/west_boise_mod_052813.pdf

The draft TMDL should include a general authorization for trading to meet permit obligations for all sources.

iii. Additional Environmental Benefits

Additional environmental effects of nutrient removal for point sources include additional energy use, additional emissions of carbon dioxide (CO2), nitrogen oxide (NOx), and particulate; additional chemical use (e.g. alum) and additional biosolids volumes have been identified by the State of Utah [14], the Water Environment Research Foundation[15] and EPA [16] depending on the allocation methods chosen (e.g. green v grey v black infrastructure).

The WERF study examined the costs (environmental and social) and benefits (decreased algae production) and found that as treatment levels increase, other emissions occur and the effectiveness of the controls decrease. For example, WERF found that the net CO2 emissions of nutrient removal to 1 mg/l TP is 0.5 times and for 100 ug/l TP is 190 times greater than conventional secondary treatment and the Utah report confirms the high level of emissions associated with increased treatment levels[17].

The WERF Report also quantified the additional algae production potential with each technology step and found that increased levels of reduction beyond biological nutrient removal (1 mg/l) produced very small reductions in algae production potential.

EPA[18] conducted an allocation modeling exercise for the recently adopted Chesapeake Bay TMDL. The modeling exercise included ten scenarios with 22 separate allocation options to meet the Bay TMDL goals with cost and ecosystem benefit information for each allocation options. The purpose of the project was to develop an analytic framework to assist policymakers in evaluating these TMDL-related tradeoffs associated with various allocation approaches.

The report describes how the analytic framework can be used to explore key allocation questions:

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[14] Utah, CH2MHill, 2010 , statewide nutrient removal cost impact study, 114 p. http://www.nj.gov/dep/wms/bwqsa/UtahStatewideNutrientRemovalCostImpactStudyRptFINAL.pdf

[15] WERF, 2011, Striking the balance between nutrient removal in wastewater treatment and sustainability, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=5&cad=rja&uact=8&ved=0CDcQFjAE&url=http%3A%2F%2Fwww.werf.org%2Fc%2FKnowledgeAreas%2FNutrientRemoval%2FLatestNews%2FNutrients_Research_S.aspx&ei=qdymVP2JIIylyASow4KoAw&usg=AFQjCNEYE8m0_qnsd8lfQ6japzJjdATdBA&sig2=J8GPXA2ETCmKOWgd3Z91eQ

[16] EPA, 2011, An optimization approach to evaluate the role of ecosystem services in Chesapeake Bay restoration strategies, October 2011, EPA/600/R-11/001, 151 pages http://www2.epa.gov/sites/production/files/2014-03/documents/chesapeake-bay-pilot-report.pdf

[17] Utah Division of Water Quality, 2010, Statewide nutrient removal cost impact study http://www.nj.gov/dep/wms/bwqsa/UtahStatewideNutrientRemovalCostImpactStudyRptFINAL.pdf

[18] EPA, 2011, An Optimization Approach to Evaluate the Role of Ecosystem Services in Chesapeake Bay Restoration Strategies, October 2011 EPA/600/R-11/001, 151 pages http://www2.epa.gov/sites/production/files/2014-03/documents/chesapeake-bay-pilot-report.pdf

(1) what mix of pollution-control projects provides the least costly way to achieve water quality goals in an impaired watershed and

(2) how does the consideration of bonus ecosystem services affect the desired mix of projects?

The results show that there was a wide range (10 times) in allocation option costs and associated ecosystem benefits. The range of annual costs was using a least cost approach was $200 million to $2.1 Billion/year with an associated ecosystem benefit of $10 million to $400 million/yr, for a least net cost for TMDL implementation cost of $115 million to $1.7 billion/year.

A Least Net Cost approach, included additional investment in green solutions resulted in the most benefits (100-600 million per year) and lowest annual cost of $-260 million to $1.7 billion/year. The "Least Net Cost" alternative, after accounting for the additional benefits was $-260 million or a net negative cost when the economic value of those benefits are factored into the analysis.

The study conclusions included:

1. As the total cost of control increases and the value of bonus ecosystem services decrease significantly when:
   - transaction and land rental costs are increased for nonpoint-source BMPs,
   - the pollution removal effectiveness of BMPs is reduced,
   - the availability of agricultural BMP projects is restricted, and
   - the requirements for WWTPs are made more stringent.
2. The highest aggregate control costs (over $2 billion per year) were estimated for the scenario that combined lower nonpoint pollution removal targets and more stringent WWTP technology requirements.

The Lower Boise Watershed in many ways is similar to the Chesapeake Bay watershed, with significant concentrations of both agriculture and urban/suburban population centers and dynamic growth in both agriculture and urban/suburban sectors. The Lower Boise has a higher proportion of agricultural lands and a population density 1.8 times greater than the Chesapeake watershed. (LBW: 1,290 sq miles, 615,387 Canyon/Ada population, 477 people/mi2; 31% of area in agricultural production; Chesapeake Bay Watershed: 64,000 sq miles, 17 million population 25% of area in ag production).

The TMDL should include consideration of additional environmental benefits to optimize the investment in water quality improvement and also meet other important environmental goals (e.g. habitat, CO_2 reductions, Carbon sequestaration…).

iv. Idaho Examples of Cost, Environmental Benefit in determination of TMDL Allocations

Examples of Idaho use and EPA approval of TMDLs containing allocation considerations in setting municipal nutrient allocations includes:

- Middle Snake River/ Succor Basin TMDL[19]
  http://www.deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/snake-river-middle-succor-creek-subbasin.aspx]

  The TMDL proposed an equal concentration allocation for non-point sources (70 ug/l) and current treatment levels upto design capacity for point sources (200% greater than current discharge for Marsing; 167% allocation for Homedale). Point sources were discharging directly or indirectly to water quality limited segments of the Snake River [see Table 50 in Snake River/Succor Creek TMDL]. EPA approved the TMDl on January 5, 2004.

- Snake River Hells Canyon TMDL[20]

  The allocations proposed by the states of Oregon and Idaho and approved by EPA were based on economic analysis and selection of the least cost approach to comply with the total phosphorus target. The five municipal and one industrial source allocations were based on cost effective biological nutrient control (80% reduction from current discharges) and implementation of agricultural BMPs for the majority of the reduction, because in part, point sources were a very minor portion of the cumulative load.

The TMDL should include a discussion of cost effectiveness of various allocation methods to achieve the water quality target, including:

- Various technology based thresholds for WWTFs
- Evaluation of affordability, particularly for small municipalities and stormwater dischargers
- Authorization for the use of trading for all point sources to achieve WLAs
  - Limited use by large WWTFs based on hot spot….
  - Unlimited use for small (<2mgd WWTFs)
  - Use by stormwater dischargers

Additional Environmental Benefits

The TMDL should include a discussion of additional environmental and sustainability benefits for each allocation approach. This could be qualitative or quantitative based on the exiting literature so that finalization of the TMDL can proceed in a timely manner.

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[19] 2003 Middle Snake Succor Creek TMDL, http://yosemite.epa.gov/opa/admpress.nsf/8b770facf5edf6f185257359003fb69e/618c1f314c6b621c85257dcd00685aae!OpenDocument

[20] 2004 Snake River Hells Canyon TMDL, https://www.deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/snake-river-hells-canyon-subbasin.aspx

5. Stormwater

The stormwater loads appear to be overestimated for both summer and winter season. Data used for the stormwater load estimates are:

- inconsistent with NOAA Boise Airport precipitation data
  - summer estimated at 40% of 11.7" rainfall, actual is 27%, or a 33% overestimate of summer season rainfall and allocation reduction necessary to meet the TMDL target
  - winter estimated at 60% of 11.7" rainfall, actual is 73% or 22% underestimate of winter season rainfall
- data obtained from drainages with no or minimal stormwater controls, including exclusion of the Walnut data from the analysis because the subbasin includes stormwater controls[21] and use of a 1960's vintage subdivision in Caldwell to estimate dry weather flows and loads[22]. The Caldwell subdivision used data from drainage areas with no or minimal stormwater controls overestimates the current load given development conditions for the City of Caldwell.
- Stormwater data in the draft TMDL are primarily pre-2012 data, which do not reflect the voluntary removal of phosphorus from residential fertilizer by Scotts and other residential fertilizer formulators[23]. For Canyon and Ada Counties, USGS reported a total of 5.276 million kg phosphorus of fertilizer and manures in 2001[24] of which non-farm phosphorus inputs (e.g. residential fertilizer) as 436, 299 kg. The removal of phosphorus from non-organic residential fertilizers, represents a significant reduction that are not included in the dataset used for estimation of current conditions.
  - Minnesota banned phosphorus in residential fertilizer in 2002 and found that:
    - Phosphorus-free lawn fertilizer is widely available statewide and comprised 82% of lawn fertilizer used (by weight) in 2006, reducing the amount of phosphorus applied as lawn fertilizers decreased 48% from 2003-2006[25].
  - Phosphorus free fertilizer is widely available in the Treasure Valley, and in many big box stores (e.g. Costco, Lowe's, Home Depot…) the only available fertilizer

The draft TMDL needs to be modified to:

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[21] January 2015 Draft Lower Boise Subbasin Assessment, Appendix E

[22] January 2015 Draft Lower Boise Subbasin Assessment, Appendix E

[23] Protect and preserve water quality in Michigan: Use phosphorus free fertilizer, Michigan Dept of Agriculture and Rural Development. http://www.turf.msu.edu/assets/ArticlePDFs/use-phosphorus-free-fertilizer.pdf

[24] USGS, 2006, County-level estimates of nutrient inputs to the land surface of the conterminous United States, 1982-2001, Scientific Investigations Report 2006-5012, Barbara C. Ruddy, David L. Lorenz, and David K. Mueller, http://pubs.usgs.gov/sir/2006/5012/

[25] Minnesota Department of Agriculture, 2007, Effectiveness of the Minnesota phosphorus lawn fertilizer law, March 15, 2007.

- include the correct seasonal rainfall split and associated allocations/% reductions to meet the seasonal targets
- recognize that the data are overestimates of the stormwater loads due to the data used (few if any BMPs) and green chemistry/pollution prevention measures that have been implemented by the residential fertilizer industry, resulting in overestimates of the reduction necessary to meet water quality targets that need to be addressed in the five year reviews and implementation plans.

6. Reasonable Assurance

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

The draft TMDL includes phosphorus water quality data from the Northside Canal Company (NSCC) that is helpful in demonstration of reasonable assurance. NSCC diverts 1.3 million acre feet of water from the Snake River and operated like the Lower Boise River irrigation systems with 100% furrow irrigation and an intricate water reuse system for 75 years before beginning conversion of the irrigation system to sprinklers and implementing a system of sediments and wetland ponds to improve water quality. Total phosphorus discharges from NSCC to surface waters over the last 12 years averaged 54 ug/l TP and averaged 49 ug/l TP over the last 8 years. The performance with the NSCC demonstrates that the 70 ug/l LA for agricultural and groundwater non-point sources is attainable and achievable, and should be used to support the reasonable assurance for the Lower Boise River TMDL.