Elm Creek Watershed Restoration and Protection Plan (WRAPP)

Implementation Strategy Discussion

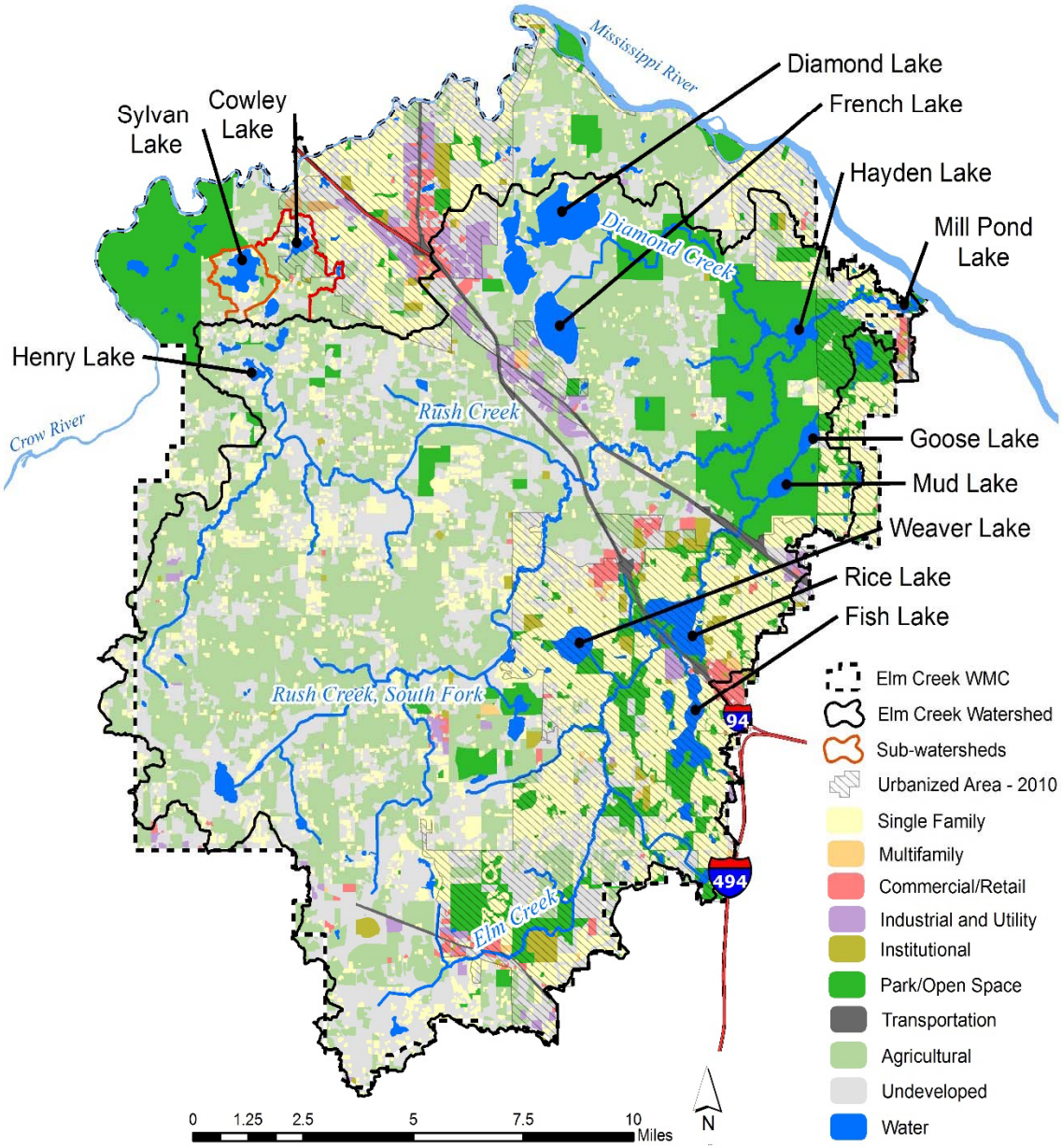
Elm Creek Watershed Management Commission
Technical Advisory Committee Meeting
December 10, 2014

Land Use Change in the Elm Creek Project Area

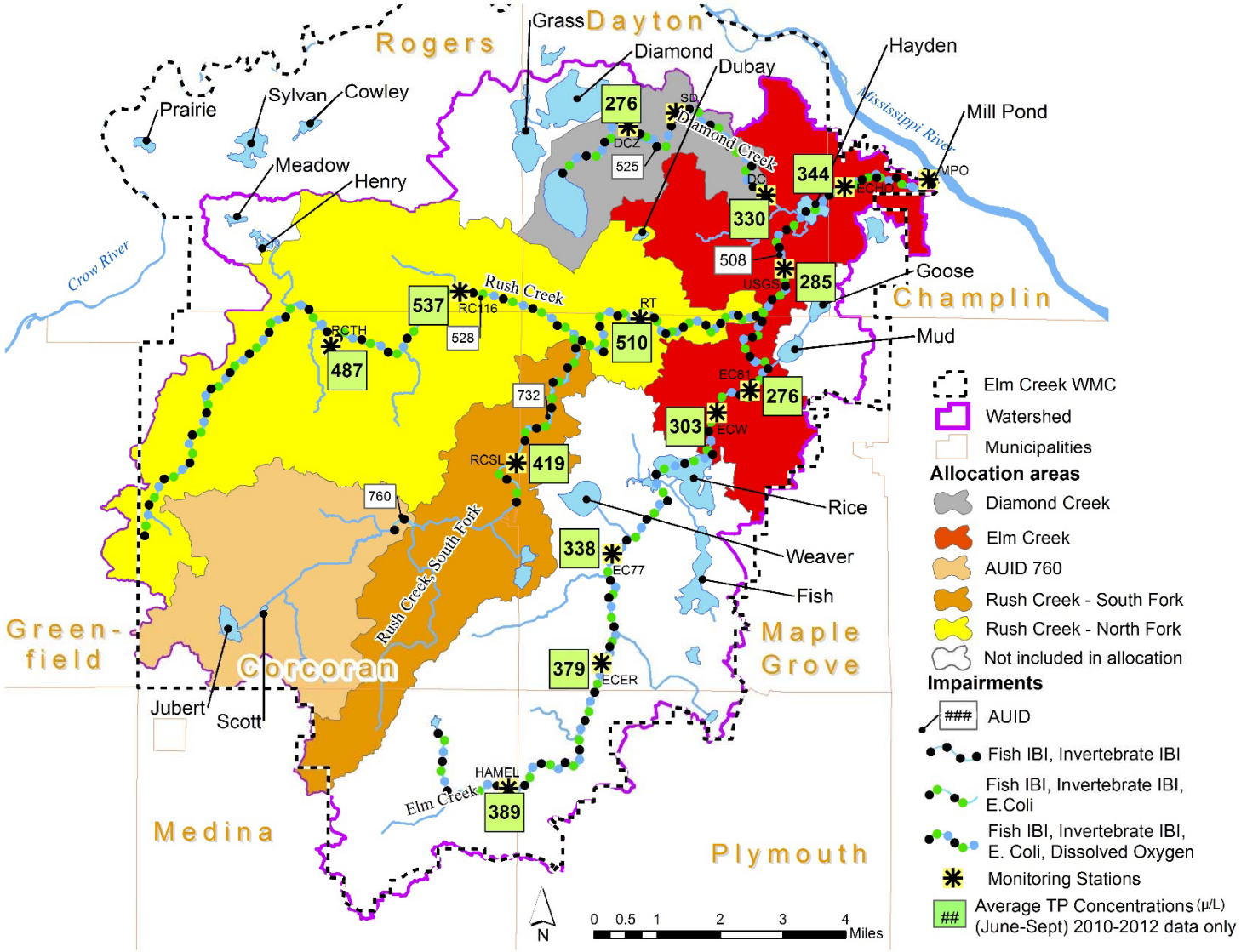
~25% of Elm Creek watershed project area in developed uses (2010 Met Council data).

Between 2010 and 2030, over 40% of the project area (~27,000 acres) expected to change land use from rural/ag to developed

Much of land use change will occur in parts of the watershed where exceedances are most severe



Stream Phosphorus Concentrations By Monitoring Site



Implementation Element 1: Land Use Transition and Application of 3rd Gen Plan Development Standards

- **Key question:** What happens to pollutant loads when watershed develops and new development is subject to updated stormwater mitigation standards?

Expected Land Use Change by Stream Subwatershed

Sub-watershed Name (AUID)	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*
S. Fk. Rush Creek, Upper (AUID –760)	6,700	68%
S. Fk. Rush Creek, Lower (AUID –732)	13,800	58%
Rush Creek Mainstem (AUID -528)	31,400	62%
Diamond Creek (AUID -525)[1]	3,600	30%
Lower Elm Creek (AUID -508)[2] below Rice Lake outlet	43,600	51%
Upper Elm Creek (AUID -508) above Rice Lake	13,000	30%

[1] Excludes drainage area to Diamond Lake

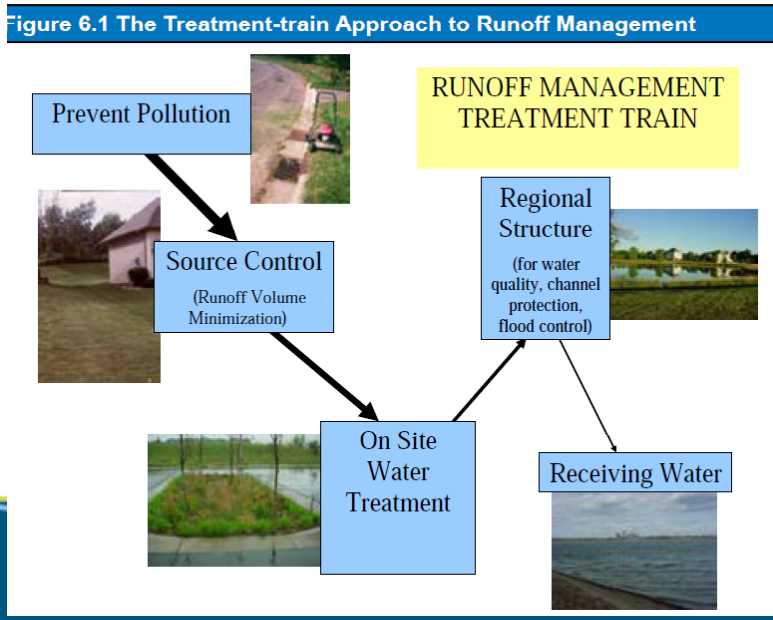
[2] Excludes drainage area to Rice, Henry, and Diamond lakes

Expected Land Use Change by Lake Subwatershed

Lake Sub-watershed Name	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*
Henry Lake	820	61%
Cowley Lake	830	60%
Sylvan Lake	320	79%
Diamond Lake	2,400	32%
Rice Lake	16,100	30%
Fish Lake	1,600	0.2%
Goose Lake	240	5%

How can land use change to more developed uses decrease pollutant loadings?

- Remove some land uses with high potential for landscape pollutant export.
- Replace with developed uses that incorporate effective stormwater controls



11/4/13 Wenck Memo Addressed Changes in TP Loading From Changes in Land Use, SW Mitigation

- Used generic TP unit loads for rural/ag land uses and developed land uses

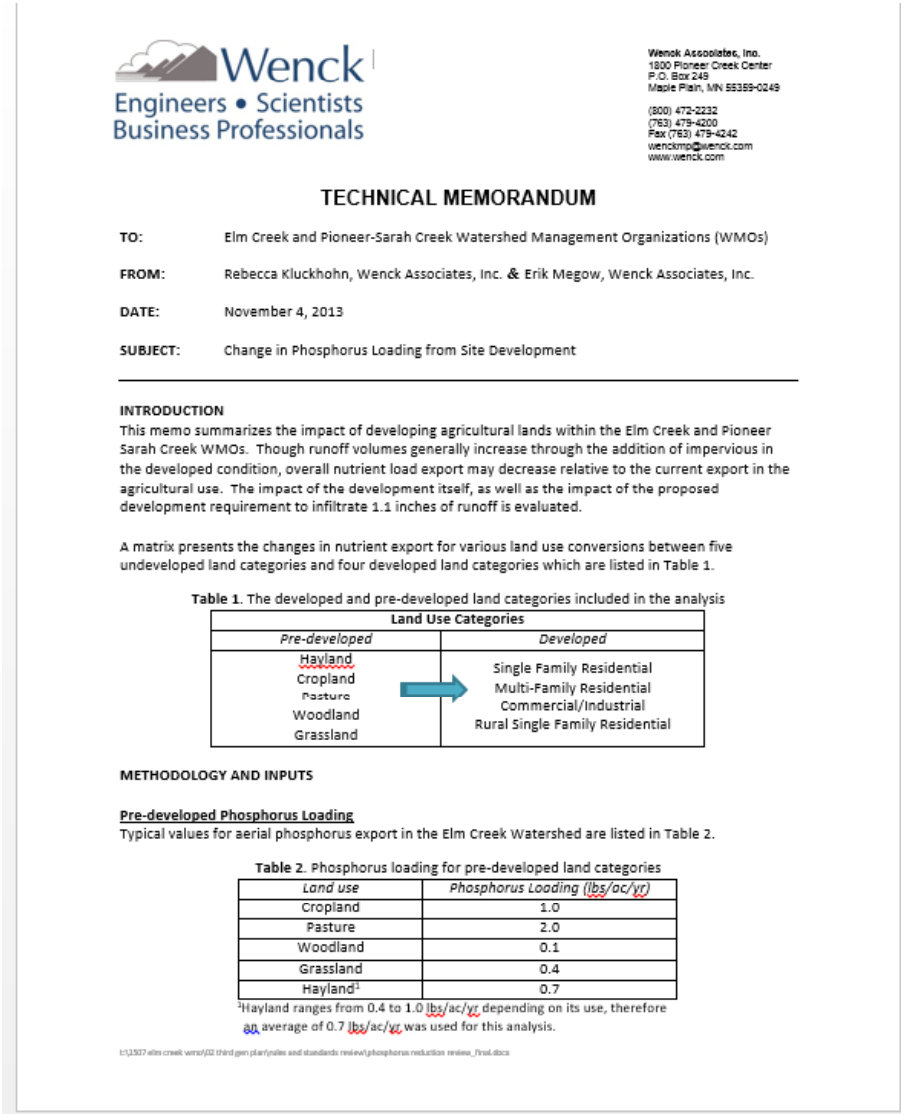
- Derived TP load reduction associated with application of MIDS standard

  75% reduction in TP if 1.1" abstraction is infiltrated, 53% if filtered

- We applied general methodology to each subwatershed *and* municipality, with two modifications

  -Lower removal % increased to 60% reduction

  -Accounted for soils in BMP performance assumptions



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TECHNICAL MEMORANDUM

TO: Elm Creek and Pioneer-Sarah Creek Watershed Management Organizations (WMOs)

FROM: Rebecca Kluckhohn, Wenck Associates, Inc. & Erik Megow, Wenck Associates, Inc.

DATE: November 4, 2013

SUBJECT: Change in Phosphorus Loading from Site Development

INTRODUCTION

This memo summarizes the impact of developing agricultural lands within the Elm Creek and Pioneer Sarah Creek WMOs. Though runoff volumes generally increase through the addition of impervious in the developed condition, overall nutrient load export may decrease relative to the current export in the agricultural use. The impact of the development itself, as well as the impact of the proposed development requirement to infiltrate 1.1 inches of runoff is evaluated.

A matrix presents the changes in nutrient export for various land use conversions between five undeveloped land categories and four developed land categories which are listed in Table 1.

Table 1. The developed and pre-developed land categories included in the analysis

Land Use Categories	
Pre-developed	*Developed*
Hayland Cropland Pasture Woodland Grassland	Single Family Residential Multi-Family Residential Commercial/Industrial Rural Single Family Residential

METHODOLOGY AND INPUTS

Pre-developed Phosphorus Loading

Typical values for aerial phosphorus export in the Elm Creek Watershed are listed in Table 2.

Table 2. Phosphorus loading for pre-developed land categories

Land use	*Phosphorus Loading (lbs/ac/yr)*
Cropland	1.0
Pasture	2.0
Woodland	0.1
Grassland	0.4
Hayland[1]	0.7

[1]Hayland ranges from 0.4 to 1.0 lbs/ac/yr depending on its use, therefore an average of 0.7 lbs/ac/yr was used for this analysis.

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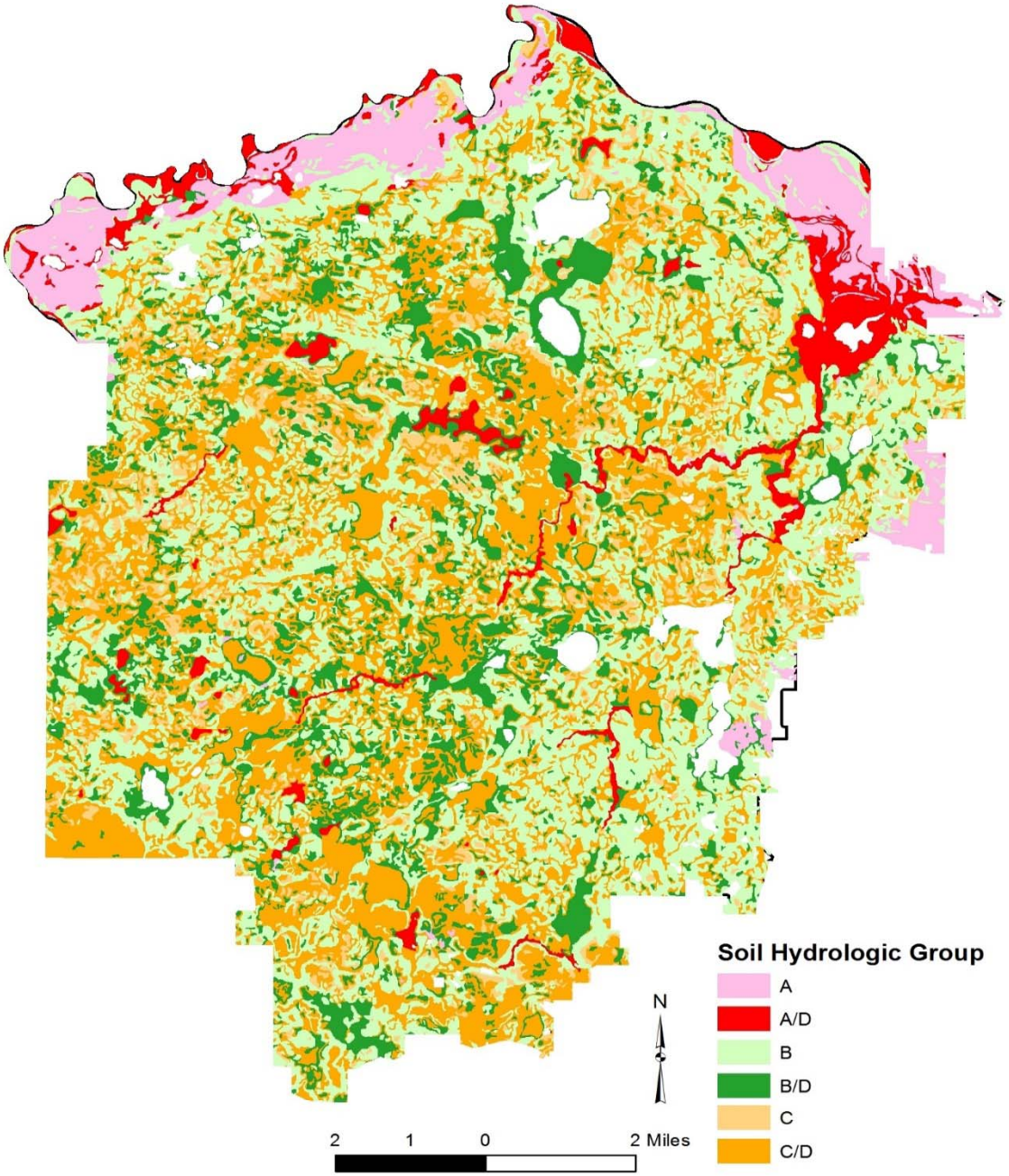
Hydrologic Soil Groups (HSGs) In Elm Creek Watershed

HSG "A" and "B" soils generally considered conducive for infiltration practices

HSG "A" and "B" soils comprise less than 25% of the areas likely to be developed between now and 2030 (but Diamond Creek sub-watershed is much higher)



Percent of Area Expected to Change Land Use That Is On HSG A or B Soils (Stream Sub-watersheds)

Sub-watershed Name (AUID)	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*	*% of Area Expected to Change Land Use with HSG A or B Soils*
S. Fk. Rush Creek, Upper (AUID –760)	6,700	68%	22%
S. Fk. Rush Creek, Lower (AUID –732)	13,800	58%	19%
Rush Creek Mainstem (AUID -528)	31,400	62%	18%
Diamond Creek (AUID -525)[1]	3,600	30%	73%
Lower Elm Creek (AUID -508)[2] below Rice Lake outlet	43,600	51%	20%
Upper Elm Creek (AUID -508) above Rice Lake	13,000	30%	14%

[1] Excludes drainage area to Diamond Lake

[2] Excludes drainage area to Rice, Henry, and Diamond lakes

Percent of Area Expected to Change Land Use That Is On HSG A or B Soils (Lake Sub-watersheds)

Lake Sub-watershed Name	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*	*% of Area Expected to Change Land Use with HSG A or B Soils*
Henry Lake	820	61%	27%
Cowley Lake	830	60%	20%
Sylvan Lake	320	79%	20%
Diamond Lake	2,400	32%	13%
Rice Lake	16,100	30%	14%
Fish Lake	1,600	0.2%	0%
Goose Lake	240	5%	27%

Percent of Required Watershed TP Load Reduction By Land Use Change, SW BMP's (Stream Sub-watersheds)

Sub-watershed Name (AUID)	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*	*% Required TP Load Reduction Estimated Through Land Use Change, Stormwater Mitigation*
S. Fk. Rush Creek, Upper (AUID –760)	6,700	68%	69%
S. Fk. Rush Creek, Lower (AUID –732)	13,800	58%	52%
Rush Creek Mainstem (AUID -528)	31,400	62%	50%
Diamond Creek (AUID -525)[1]	3,600	30%	79%
Lower Elm Creek (AUID -508)[2] below Rice Lake outlet	43,600	51%	~100%
Upper Elm Creek (AUID -508) above Rice Lake	13,000	37%	26%

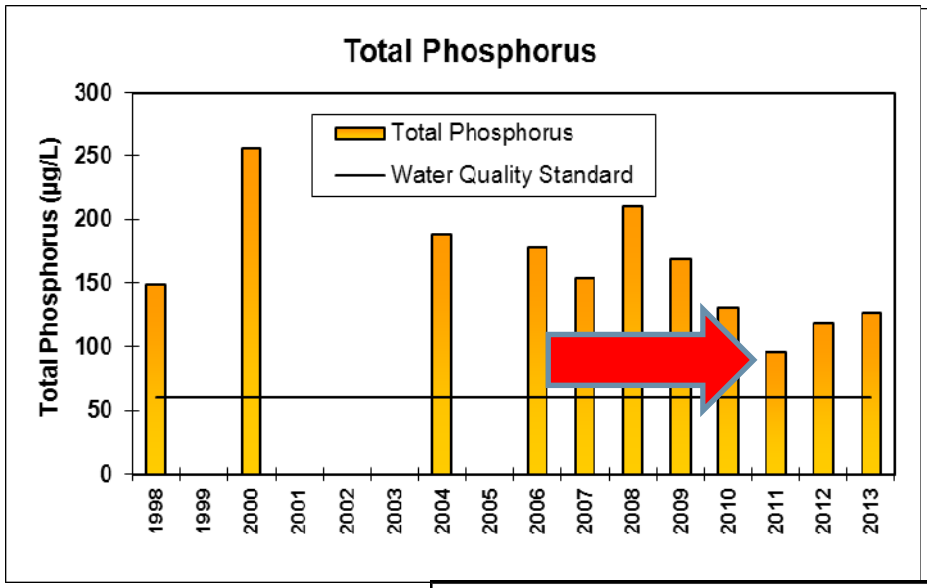
[1] Excludes drainage area to Diamond Lake

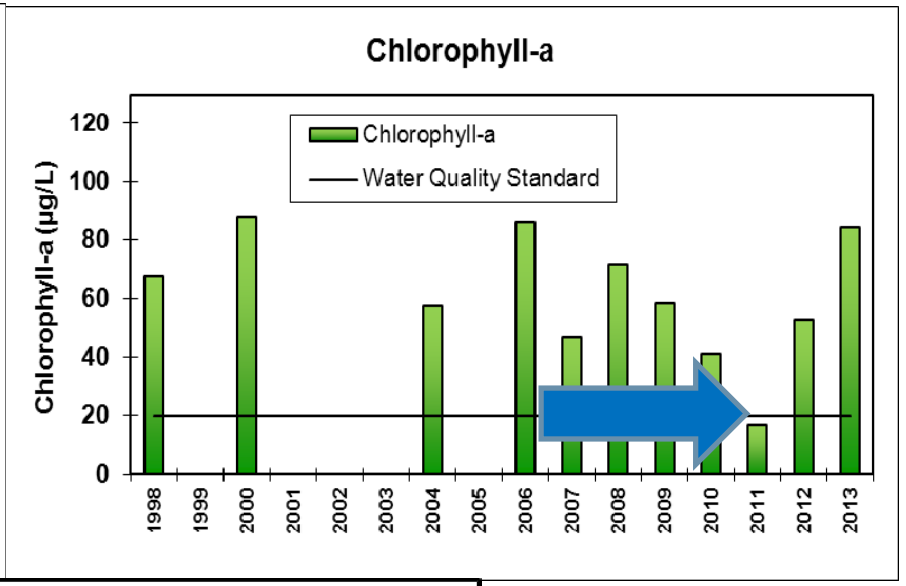
[2] Excludes drainage area to Rice, Henry, and Diamond lakes

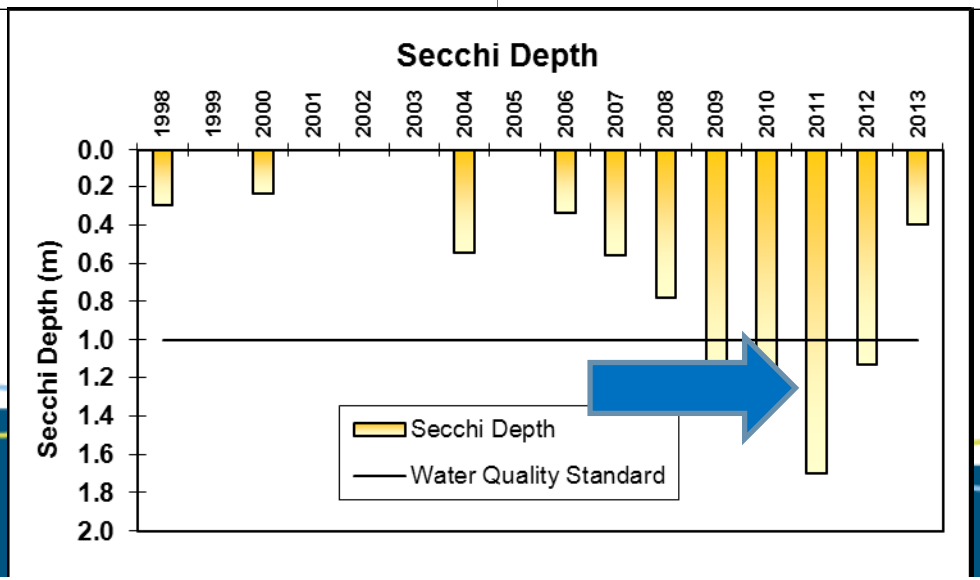
Percent of Required Watershed TP Load Reduction By Land Use Change, SW BMP's (Lake Sub-watersheds)

Lake Sub-watershed Name	*Drainage Area (ac.)*	*% Drainage Area Expected to Change Land Use By 2030*	*% Required Watershed TP Load Reduction Estimated Through Land Use Change, Storm Water Mitigation*
Henry Lake	820	61%	High
Cowley Lake	830	60%	High
Sylvan Lake	320	79%	Very High
Diamond Lake	2,400	32%	Moderate
Rice Lake	16,100	30%	Low
Fish Lake	1,600	0.2%	Very Low
Goose Lake	240	5%	Very Low

Phosphorus Reductions and Shallow Lakes (Diamond Lake)







"Take-home messages" re: impact of land use change/SW mitigation in meeting Pollutant Load Reductions

- Application of proposed new development standards everywhere in project watershed should have very significant effect in reducing overall pollutant loads.
- Load reduction opportunities greatest in upper reaches (where exceedances are most severe) because that's where most of the land use change is expected.
- Recommend promoting stormwater "treatment train" approach to boost removals for developments in areas where native soils are not conducive to infiltration.

Implementation Element 2 – Adopt non-production livestock operation siting/management ordinance

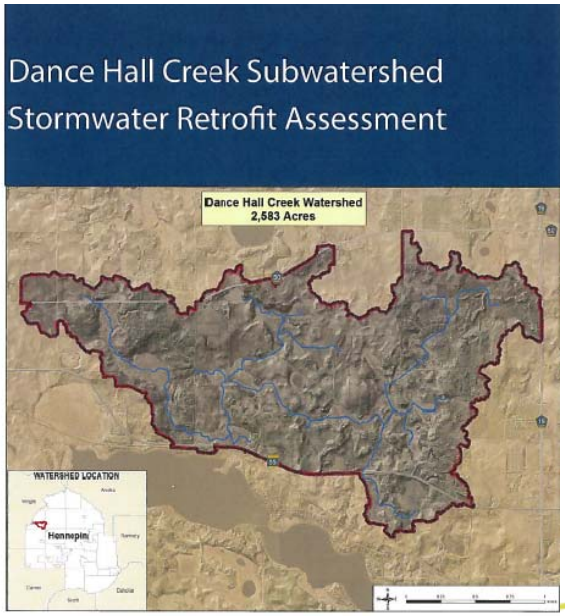
- ~ 20% of watershed expected to transition to rural residential between 2010 and 2030; hobby farm use could be significant.
- Intent is to have standards in place before-the-fact that will require good siting and management practices.
- Medina's current ordinance good model.
- Requirement currently included in 3rd Generation plan.

Implementation Element 3: Initiate outreach program for existing livestock and cropping operations

- Ag BMP's generally have higher cost/benefit than urban BMP's, especially for "retro-fits" of existing operations.
- Key is securing voluntary cooperation, sufficient financial incentives to get land owners to improve practices in priority areas.
- Need to flesh out details of what this would look like.

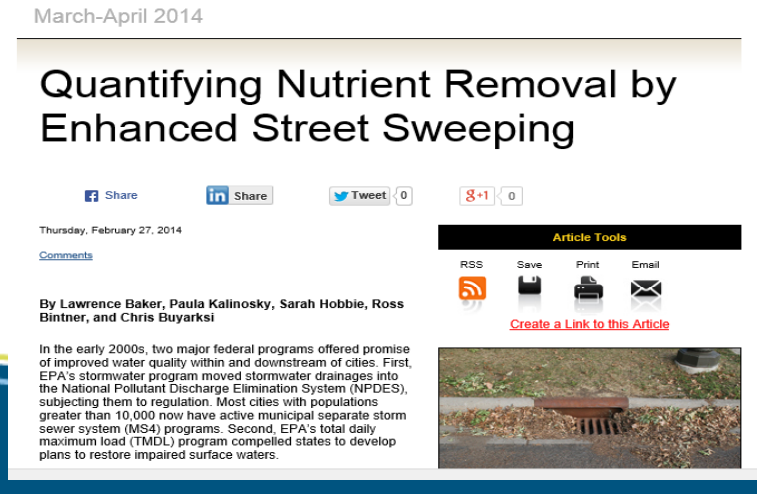
Implementation Element 4: Promote subwatershed assessments (SWAs) where needed

- Will need more detailed on the ground information to move on retro-fit opportunities, especially in rural parts of watershed.
- SWAs identify projects and provide estimates of project–specific benefits and costs.
- Lays excellent ground work for grant applications.



Implementation Element 5: Incorporate BMP's in road projects and pursue urban retro-fit projects/programs as opportunities arise

- Medina's Tower Hill Drive project, Elm Creek bank stabilization projects by Champlin and Plymouth (proposed) are good examples.
- Intensive street sweeping program evaluated for Fish Lake watershed load reduction tool (after UM work).



March-April 2014

Quantifying Nutrient Removal by Enhanced Street Sweeping

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Thursday, February 27, 2014

Comments

By Lawrence Baker, Paula Kalinosky, Sarah Hobbie, Ross Bintner, and Chris Buyarksi

In the early 2000s, two major federal programs offered promise of improved water quality within and downstream of cities. First, EPA's stormwater program moved stormwater drainages into the National Pollutant Discharge Elimination System (NPDES), subjecting them to regulation. Most cities with populations greater than 10,000 now have active municipal separate storm sewer system (MS4) programs. Second, EPA's total daily maximum load (TMDL) program compelled states to develop plans to restore impaired surface waters.

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Element 6 – Advance identification of areas with high infiltration potential, especially near streams

- Poor baseflow, high downstream flow volumes are issues in system. Pollutant loads also driven by runoff volume.
- Taking maximum advantage of any infiltration capacity is important
- May be helpful to ID best areas early so Commission and/or cities can work with landowner to take advantage of them when opportunities arise
- MCWD is just starting a similar effort

Implementation Element 7 – Pursue instream habitat restoration projects to enhance biota, provide other benefits

- Improvements likely to be recommended include:
  - Biologically engineered streambank/channel stabilization
  - Large woody debris placement
  - Increasing floodplain connectivity

Questions / Discussion