

# Adaptive Management Phosphorus Reductions

2015 Annual Report

**DANE COUNTY LAND AND WATER RESOURCES DEPARTMENT – LAND CONSERVATION  
DIVISION**

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# ADAPTIVE MANAGEMENT PHOSPHORUS REDUCTIONS

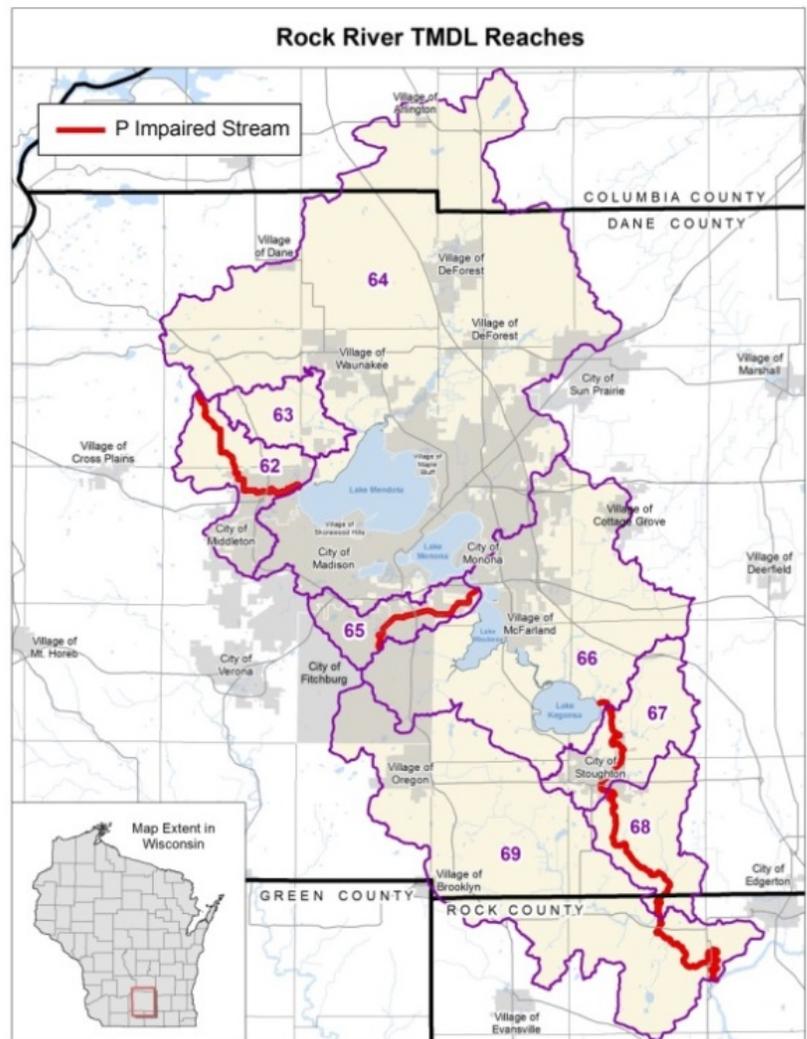
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## Background

The Dane County Land and Water Resources Department – Land Conservation Division (LCD) staff continued to assist land owners and agricultural producers with implementing conservation practices within their operations and on the landscape. Staff also assisted the Madison Metropolitan Sewage District (MMSD) with furthering the Adaptive Management pilot project efforts in both the Yahara and Badfish Creek

Watersheds (Figure 1). This past year (2015) marked the end of MMSD’s four-year pilot project evaluating the feasibility of the Adaptive Management permit compliance option. It is currently MMSD’s intention to use 2016 as a transition year with full scale implementation anticipated in 2017. Dane County will continue to provide the services outlined in the 2016 service agreement between MMSD and Dane County including, but not limited to, conservation practice implementation, practice verification, and the quantification of phosphorus reductions.

FIGURE 1. MAP OF YAHARA AND BADFISH CREEK WATERSHEDS



## Practice Implementation

Conservation practices implemented in 2015 can be broken down into two main categories defined as management “soft” practices and engineering “hard” practices. Soft practices are primarily dependent on landowner or manager decisions to function properly while hard practices rely on appropriate design and construction for effective phosphorus reductions. Nutrient management, harvestable buffers, and cover crops were the soft practices that contributed to the phosphorus reductions in 2015. Hard practices implemented include; grassed waterways, roof runoff structures, diversions, grade stabilization structures, water and sediment control basins, and heavy use area protections.

### Soft Practices

Forty nutrient management plans (NMP’s) were verified within the Yahara and Badfish Creek watersheds in 2015. These 40 plans consisted of 1,475 fields accounting for 20,574 acres of cropland. Although the county receives a much larger number of nutrient management plans and check lists each year not all of them can be reviewed due to limited resources and information. The 20,574 acres reported here were reviewed and mapped by county staff in order to provide a reasonable level of assurance to both MMSD and the Yahara Watershed Improvement Network (WIN’s) that associated phosphorus reductions resulting from these nutrient management plans are credible and can be counted towards Yahara WIN’s overall adaptive management goals. The total acres of NMP’s verified for each TMDL reach is presented in Table 1.

This past year also marked the second year in which the county implemented a harvestable buffer cost-share program. This year’s program was highly successful with over 50 acres being implemented in both TMDL reaches 66 (28.9 acres) and 67 (23.2 acres) (Table 1). This is more than three times the amount then was implemented in 2014 (approximately 15 acres). In addition, all of 2015 harvestable buffer agreements required that the buffer be maintained for ten years. All corresponding phosphorus reductions were calculated using SNAP Plus.



**TABLE 1. TYPES OF SOFT CONSERVATION PRACTICES AND CORRESPONDING AMOUNTS BY TMDL REACH WITHIN THE YAHARA RIVER AND BADFISH CREEK WATERSHEDS.**

TMDL Reach	Practice Type	Practice Units	Amount
62	Nutrient Management Plan	acres	2,076.7
	Cover Crop	acres	25.0
63	Nutrient Management Plan	acres	3,756.5
	Cover Crop	acres	92.3
64	Nutrient Management Plan	acres	14,574.1
	Cover Crop	acres	176.2
65	-----	-----	-----
66	Nutrient Management Plan	acres	103.6
	Harvestable Buffer	acres	28.9
67	Nutrient Management Plan	acres	36.8
	Harvestable Buffer	acres	23.2
68	Nutrient Management Plan	acres	26.1
69	-----	-----	-----

----- Indicates that the TMDL reach did not have quantified Dane County assisted phosphorus reducing conservation practices implemented.

### Soft Practice Phosphorus Reductions

Six of the eight identified TMDL reaches had verified phosphorus reductions from soft conservation practices in 2015. Of the six, reach 64 had the largest soft practice phosphorus reduction of 1,634 pounds. A complete list of all phosphorus reductions by TMDL Reach is provided in Table2. All totaled, soft practices reduced 3,516 pounds of phosphorus from the Yahara and Badfish Creek Watersheds. Calculated phosphorus reductions for all soft conservation practices were done using SNAP Plus.

**TABLE 2 TOTAL PHOSPHORUS REDUCTION FROM SOFT CONSERVATION PRACTICES IMPLEMENTED BY TMDL REACH IN 2015.**

TMDL Impaired Reach	Pounds of Phosphorus Reduced
62	232.7
63	468.0
64	1,633.6
65	-----
66	905.5
67	273.4
68	2.6
69	-----
<b>Total for all Reaches</b>	<b>3,515.8</b>

----- Indicates that the TMDL reach did not have quantified Dane County assisted phosphorus reducing conservation practices implemented.



## Hard Practices

Six different types of structural conservation practices were installed within the Yahara in 2015. Each practice was designed and installed according to the appropriate NRCS standard and specification. Once installed, each practice was spatially mapped to ensure any associated phosphorus reductions would be credited to the appropriate TMDL Reach. Individual unit amounts for each hard practice implemented by TMDL reach are available in Table 3.

**TABLE 3 TYPES OF HARD CONSERVATION PRACTICES AND CORRESPONDING AMOUNTS BY TMDL REACH WITHIN THE YAHARA RIVER AND BADFISH CREEK WATERSHEDS.**

TMDL Reach	Practice Type	Practice Units	Amount
62	Grassed Waterway	acres	1
63	-----	-----	-----
64	Diversion	feet	1350
	Grade Stabilization Structure	number	1
	Grassed Waterway	acres	3.55
	Heavy Use Area Protection	acres	0.1
	Roof Runoff Structure	number	1
	Water and Sediment Control Basin	number	1
65	-----	-----	-----
66	Diversion	feet	300
	Grassed Waterway	acres	4.95
67	-----	-----	-----
68	-----	-----	-----
69	Grassed Waterway	acres	0.4
	Water and Sediment Control Basin	number	1

----- Indicates that the TMDL reach did not have quantified Dane County assisted phosphorus reducing conservation practices implemented.

## Hard Practice Phosphorus Reductions

Total phosphorus reductions from all hard conservation practices implemented in 2015 was 886 pounds. Reach 66 had the largest phosphorus reduction with 424 pounds when compared to all eight reaches. Phosphorus reductions by TMDL Reach resulting from hard conservation practice implementation is available in Table 4. Models and tools agreed upon by MMSD, Dane County and the Wisconsin Department of Natural Resources (WDNR) were used to determine the corresponding phosphorus reductions from each practice. The BARNY barnyard model was used to determine phosphorus reductions from the roof runoff structure practice. Water and sediment control structures and grade stabilization structures



were evaluated using the P8 urban catchment model. To determine phosphorus reductions from the installation of grassed waterways and diversions physical measurements of existing gully erosion were taken and used to calculate resulting sediment and phosphorus losses. These losses were then transferred to credits once the erosion was stabilized with the installation of the practice.

**TABLE 4 TOTAL PHOSPHORUS REDUCTIONS FROM HARD CONSERVATION PRACTICES IMPLEMENTED BY TMDL REACH IN 2015.**

<b>TMDL Impaired Reach</b>	<b>Pounds of Phosphorus Reduced</b>
<b>62</b>	17.7
<b>63</b>	-----
<b>64</b>	403.3
<b>65</b>	-----
<b>66</b>	424.0
<b>67</b>	-----
<b>68</b>	-----
<b>69</b>	41.1
<b>Total for all Reaches</b>	886.1

----- Indicates that the TMDL reach did not have quantified Dane County assisted phosphorus reducing conservation practices implemented.

## 2015 Phosphorus Reductions

Combining the phosphorus reductions from both soft and hard conservation practices implemented in 2015 resulted in a total of 4,402 pounds of phosphorus being reduced. These phosphorus reductions were calculated using the best available methodologies and tools available and agreed upon by Dane County, MMSD, and WDNR. By using these methods and tools Dane County is able to provide reasonably assured verifiable phosphorus reductions to both MMSD and Yahara WIN’s partners that can in turn be credited to the overall adaptive management goals.

When adding the phosphorus reductions from practices implemented in 2015 to those phosphorus reductions from practices previously implemented, that continue to function based on standards and specifications, results in a total phosphorus reduction of 6,947 pounds (Table 5). Total phosphorus reductions is the sum of new and carryover phosphorus reductions. New pounds are calculated phosphorus reductions resulting from conservation practices implemented during the reporting year. Carryover pounds are those calculated pounds of phosphorus resulting from previously verified and implemented conservation practices. A breakdown of all new and carryover phosphorus reductions by TMDL reach are presented in Figure 2.



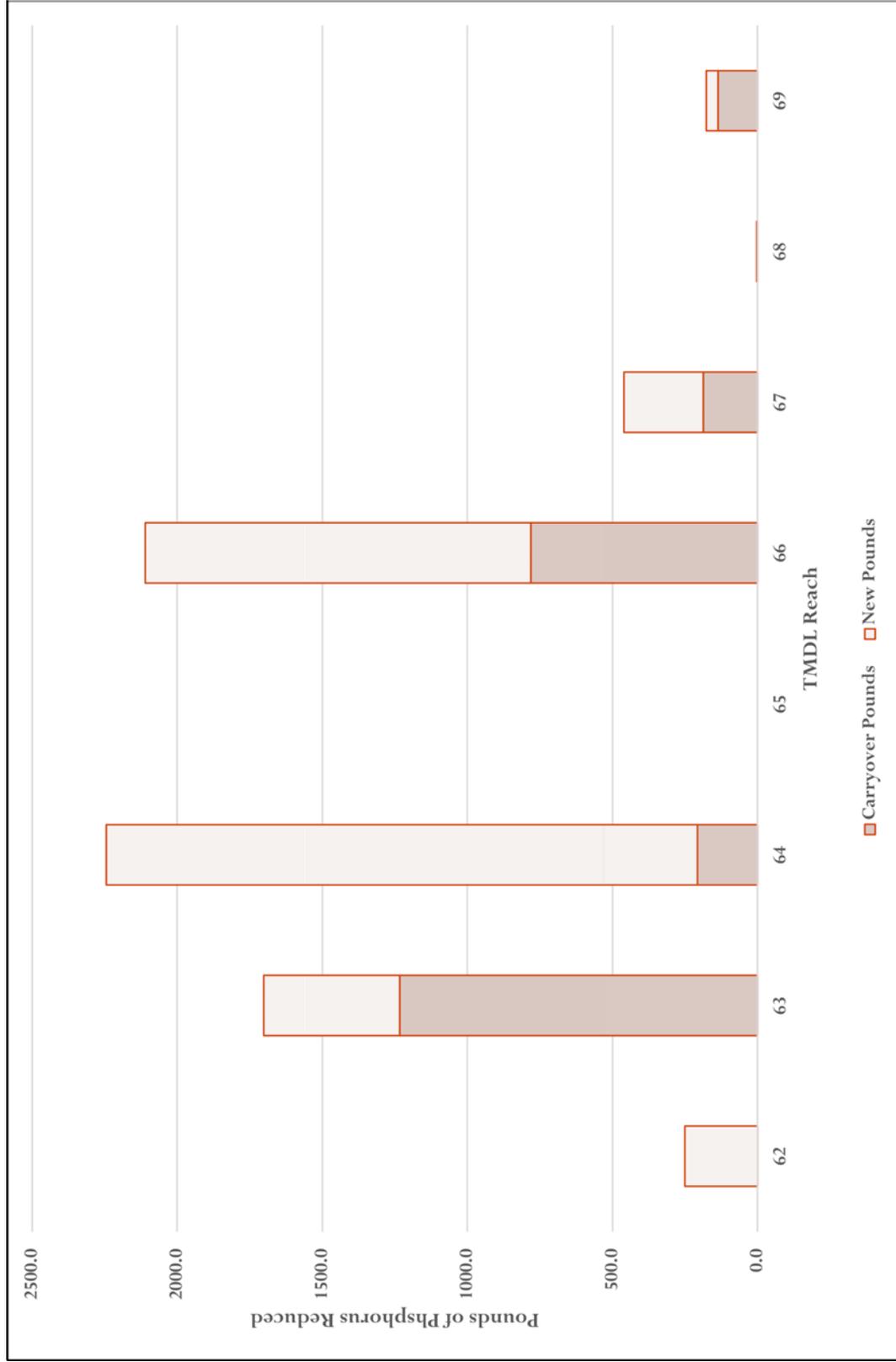
**TABLE 5. TOTAL PHOSPHOROUS REDUCTIONS BY TMDL REACH AS OF 2015.**

TMDL Reach	Total Pounds of Phosphorus Reduced
62	250
63	1,701
64	2,244
65*	0
66	2,111
67	461
68	3
69	177
Total	6,947

\* Note that reach 65 is highly urbanized and has a low proportion of agricultural land.



FIGURE 2. CARRYOVER AND NEW POUND PHOSPHORUS REDUCTIONS BY TMDL REACH.



## 2015 Summary

This past year (2015) was a very successful year in assisting landowners and agricultural producers with implementing phosphorus reducing conservation practices. Implemented practices assisted by Dane County in 2015 resulted in more than 4,400 pounds phosphorus being reduced. This is 850 pounds more than what was reduced in 2014 (3,550 pounds). As of the end of the 2015, Dane County assisted conservation practices that have been verified and functioning have reduced a total of more than 6,900 pounds of phosphorus within the Yahara and Badfish Creek watersheds.

In addition, these reported phosphorus reductions are only from those conservation practices in which county staff directly assisted with implementing. Producers and landowners continue to implement many conservation practices on their own and the phosphorus reductions associated with those practices are not included in this report. Thus, the phosphorus reductions reported here are conservative and an underestimate of what was actually reduced in 2015. Dane County continues to work on developing additional methods for capturing these non-county assisted implemented conservation practices however the focus currently is on those practices involving county assistance.

The environmental benefits that these conservation practices have on improving water quality and the environment is not exclusively tied to phosphorus. Such benefits include habitat improvement as well as the control of additional pollutants such as nitrogen and sediment. For example, nutrient management not only mitigates phosphorus loss but also maximizes nitrogen use efficiency greatly reducing the likelihood of nitrogen converting to nitrate. Nitrate has been identified as a major contaminant in many drinking water wells throughout the county and it is important to encourage practices that help reduce this contamination risk. Even though adaptive management goals currently do not focus heavily on these secondary environmental benefits their importance from a biological and human health stand point need to still be recognized.

