# Response to Public Comments – An Overview

The following Response to Comments summarizes the key issues raised during an Oct. 7 to Dec. 18, 2013 public comment period for the draft Nutrient Reduction Strategy (NRS). The final strategy includes a number of changes reflecting the comments. For each subject, the comments are summarized, a response is provided, and a summary of changes made in the strategy are noted. Comment subjects include:

1. Enhancing the NRS in the future
2. Accelerating adoption of cropland Best Management Practices (BMP)
3. Process to move pilots to programs
4. Tracking change through accountability metrics
5. Goals and milestones
6. Water quality standards
7. Prioritization
8. Local capacity
9. Modeling assumptions and outcome predictions
10. Tile drainage management
11. Living cover
12. Costs
13. MPCA regulatory programs (non-wastewater)

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## 1. Enhancing the NRS in the future

**Comments:**

Many commenters expressed concern that the NRS is not finished, and that more detail is needed on how to reach the level of actions needed to achieve reduction goals. They wondered whether existing programs could deliver the level of changes needed, and if not, what additional motivation and capacity are needed in state and federal programs as well as at the local level of government.

**Response:**

We agree with comments that the NRS is a work in progress and will be dynamic. Even where key state and federal programs are identified, detail about how these programs will deliver such increased levels of Best Management Practices (BMP) assistance and support is still needed. The NRS is being completed at a time when the state has increased stable funding for water quality programs; however this funding is not unlimited. Programs will need additional review and in some cases be improved to increase their output capacity and effectiveness.

With increasing funding for environmental protection, Minnesota has recently initiated multiple new efforts, as described in Chapters 1, 4 and 6. A key part of NRS implementation will be to ensure that the new programs and efforts in the state are leading to the level of BMP adoption called for in the NRS. By 2016, we will identify gaps between anticipated progress with new and recently developing efforts in the state and the BMP needs of the NRS. Where such gaps are identified, we will work collaboratively among complementary programs and stakeholders to develop ways to step up results, so we can meet the objectives and outcomes identified in the NRS. Key categories of marked increases in BMPs include:

1) Crop nutrient management;
2) Drainage tile water treatment and upland water storage;
3) Increased living cover through cover crops and perennials;
4) Cropland erosion control.

While working through the approach to achieve greater delivery, we will need to maintain a balance between state program capacity and local delivery capacity along with landowner awareness and motivation. Increasing the focus on local government delivery of management actions through watershed assessment, planning and implementation support will be important.

Developing metrics for tracking progress of the program implementation actions relative to the NRS goals should be an integral part of any future action vision.

**Changes to the NRS**:

Additional focus was added in the following areas:

1) Increase fertilizer use efficiency,
2) Increase and target cover crops and perennial vegetation,
3) Establish riparian buffers,
4) Increase emphasis on soil health,
5) Encourage reduced tillage and soil conservation, and
6) Address drainage management and treatment of tile discharges.

## 2. Accelerating adoption of cropland BMPs

**Comments:**

Many of the comments emphasized that the action strategies called for higher levels of BMP adoption than federal and state strategies in Minnesota are used to supporting. They wondered whether there would be sufficient motivation for voluntary actions to achieve the high levels of BMP adoption needed, even with higher levels of assistance. Those commenters who thought the primary barrier to adoption was landowner motivation suggested that the NRS identify a regulatory policy for cropland in particular.

There was a lack of consensus on whether new regulatory approaches would be needed and helpful. Some expressed that better education provided on the water quality impacts and needs would accelerate adoption of cropland BMPs, especially if adequate technical and financial assistance and support were provided. Where regulations and disincentives were suggested in the comment letters, very few specific regulatory approaches were outlined.

**Response**:

The NRS emphasizes a need to make substantial changes on landscapes that contribute significant nutrient loads to waters. The fundamental governmental strategy approach for non-regulated activities emphasizes government research, education and technical and financial assistance. The scale of the assistance in the current programs implicitly acknowledges that government programs alone cannot account for all of the BMPs needed to achieve the water quality goals. Rather, programs need to be designed and managed to influence the greatest outcomes.

The NRS is not intended to preclude developing new regulatory policy; however, it predominantly recognizes the current programs, emphasizing science-based education and assistance as a starting point. It also recognizes that regulatory authorities currently exist for some nutrient sources, such as for wastewater phosphorus treatment, urban and industrial stormwater, construction stormwater, feedlots, buffers, manure spreading, lawn fertilizers and septic tanks, and that enforcement of regulatory provisions is a critical step in that approach. The NRS recognizes that even in non-regulatory programs, improving accountability can be a key to progress (see the topic of tracking change).

There are three main pillars of accountability:

1. Clear expectations with support for change,
2. Transparent tracking of actions and outcomes, and
3. Consequences for lack of adoption.

The NRS proposes that our greatest focus be on creating the first two pillars. Additional program analysis may consider recommendations for additional incentives and assistance or a regulatory approach if that would be necessary and beneficial.

Specific to groundwater protection, the Minnesota Dept. of Agriculture will begin a process for developing rules related to: a) restricting certain types of fertilizer application during the fall in areas vulnerable to groundwater contamination, and b) regulatory requirements in areas with a combination of high nitrate in groundwater caused by fertilizers and inadequate adoption of nitrogen fertilizer BMPs (in accordance with a multi-level approach described in the Nitrogen Fertilizer Management Plan).

**Changes to the NRS**:

Additions have been made to Chapter 7 that identify the process for benchmarking progress and a robust process to consider all options to achieve successful achievement of the action targets and environmental outcomes. Recommended activities are identified for completion in the next two years. The NRS was updated to include the MDA plans to develop rules related to groundwater quality protection from nitrogen fertilizers.

## 3. Process to move pilots to programs

**Comments:**

Commenters want programs to be effective. That also applies to innovative pilot projects that may provide new program approaches. There is concern that a new program might become a delaying tactic. They noted that innovations such as pollutant trading and nutrient BMP crop insurance have not had significant participation leading to the state level outcomes being sought. Commenters want more assurance that the previously tested pilots and new pilots, such as Agricultural Water Quality Certification, will be successful before relying on them as approaches to meet nutrient reduction goals. Local government was suggested as a good leader for developing and testing innovative projects.

**Response**:

Each of the program examples described in the NRS (e.g., pollutant trading, nutrient BMP crop insurance, and the agricultural water quality certification initiative) represent an attempt to support BMPs by addressing one or more issues of motivation and support for change. The pollutant trading policy, while still rarely applied, suggests that we should support policies that help us reach the needed results in a cost-effective manner. Nutrient BMP insurance addresses the perception that pushing nutrient efficiency further can be economically detrimental. The program is designed to mitigate economic losses in the years when that might actually occur. Agricultural water quality certification addresses the current concern of moving targets in potential regulation for farmers, and supports farm planning and implementation without waiting for the future policies to unfold.

We acknowledge that most innovations need time to establish effective approaches, and sometimes an innovation that is seemingly ineffective at one point in time can be successful at another. It will be necessary to evaluate improvements to these and other innovations and determine if the timing for success using these approaches is better now than during previous attempts. We have retained the section on innovative ideas in the NRS and will continue to foster innovation. We agree with suggestions about looking to local government as well as private industry for further innovation. Stakeholders and decision makers will influence which innovations promoting increased BMP adoption will gain traction.

**Changes to the NRS**:

The NRS has been edited in Chapter 6 to provide clarification on the three proposed programs (e.g., pollutant trading, nutrient BMP crop insurance, and the agricultural water quality certification) including the need for program development evaluation and adjustments that will ensure success. Innovation is continued to be emphasized.

## 4. Tracking change through accountability metrics

**Comments:**

Commenters, who agree that better accountability will strengthen the Minnesota approach to nutrient reduction, also generally support a robust approach that includes better linkages in environmental monitoring and assessment of BMP implementation effectiveness through government programs and private efforts. They want a system that is sensitive enough to record credit for progress where it is due, and transparent enough to drive needed adaptive improvement and be accountable to public pressure when sufficient progress is not occurring. Several commenters noted that in a long-term strategy such as this, it is important that progress evaluations account for changes in climate, issues of lag time and legacy sources of nutrients, as well as changes in land use and management that exacerbate the problems and/or make it more difficult to reach our goals.

**Response**:

The NRS emphasizes that whether in a regulatory or voluntary framework, the foundations for success are found in clear expectations and transparent tracking of progress. Minnesota environmental programs have always embraced the value of clear standards for supporting beneficial uses of individual water bodies and stream reaches. Minnesota's water quality standards that are nutrient-related are expected to extend to more state waters over the period of this NRS. With the exception of a phosphorus reduction strategy, developed in 2000, Minnesota has not set clear, large-scale expectations for nutrient reduction strategies. The state has not set up a transparent nutrient reduction tracking system that includes goals with benchmarks and progress milestones along with quantified action planning and implementation of those plans.

This strategy calls for actions and outcomes to be tracked in a complementary approach. The NRS recommends an "accountability team" to oversee and report on progress using existing and proposed measures. Tracking progress will require new tools that will integrate multi-agency datasets and provide for a mechanism to account for BMPs and reductions that are a result of industry or non-government led activities. These critical elements of accountability will guide the NRS and provide assurance to the public whether the NRS is being successfully implemented. The legislature and local authorities will determine if and when additional policy authority is needed.

The NRS identifies the activities and BMPs most critical to reaching our goals, a recommended system to keep track of BMP adoption, and expected effects of those BMPs on water quality. Since the relationship between BMP adoption and changes in environmental outcomes is not a precise science, the NRS also calls for an ongoing program of environmental monitoring and landscape management to take place at various temporal and spatial scales. Because of the issues of uncertain lag times, models to predict change will help assess the potential for achieving long-term progress and thereby inform the public regarding whether or not implementation is on track for success.

**Changes to the NRS**:

Chapter 7 of the NRS has been revised to strengthen the recommendations for accountability while maintaining the desire to remain streamlined. The programs are being challenged to develop an accountability and evaluation protocol to gauge progress. As part of the 2016 NRS update (described now in Chapter 7), accountability and tracking processes will be integrated into overall NRS tracking processes.

## 5. Goals and Milestones

**Comments:**

Commenters asked how we can reach beyond the milestone to meet the end goal of a 45 percent reduction in phosphorus and nitrogen loads to the Mississippi, and how we can accelerate implementation so that we can reach our milestones and final goals earlier.

**Response**:

The NRS was modified to achieve the final 45 percent reduction for phosphorus in the Mississippi River. Further technical analysis showed greater current progress than previously was estimated, and provides a strategy to

reasonably achieve the final goal of a 45 percent reduction in phosphorus as compared to the 1980 to 1996 baseline period for phosphorus loads to the Gulf of Mexico. Minnesota's water bodies have a need for a significant phosphorus reduction. NRS analysis indicates that an approach targeting in-state water improvement for phosphorus will likely achieve our goals for the Gulf of Mexico.

Since the NRS concludes that plans to reach a 45 percent reduction goal in the Mississippi River basin for nitrogen are not economically achievable at this time, it employs an interim progress-based milestone goal for nitrogen. The NRS has been modified to identify the most promising BMPs for moving from the milestone to final goals for nitrogen. Those strategies include continued emphasis on nutrient efficiency, treatment of tile drainage and increases in living cover. Modeling shows that the most potential for reaching higher reduction levels of nutrient load reduction (beyond the milestone) is the addition of living cover via cover crops and possibly perennial bioenergy crops (provided that markets can be established). Other areas for continued development will likely include greater emphasis on forages, pasture-based animal agriculture, and conservation cover on sensitive and marginal lands. If research can significantly advance cover crop establishment success and increase the value of cover crops for food and energy, then this practice alone has the potential to, in concert with other BMPs, enable a future 45 percent nitrogen reduction in the Mississippi River Basin.

To reach the 45 percent reduction goal for nitrogen, we will need research and development to increase nutrient removal efficiencies and improve BMP deployment strategies. In addition to cover crop research for Minnesota conditions, research is needed on markets for perennials, tile drainage treatment with saturated buffers and wetlands, and further nitrogen fertilizer and manure efficiencies including adoption of precision approaches. The NRS highlights the importance of an adaptive approach for these BMPs and strategies. Our ability to learn from current approaches and develop new and better living covers and other BMPs will help us speed up our reductions. We will have a more realistic idea of the final goal timeframe for nitrogen at the end of the first milestone period (2025).

**Changes to the NRS**:

A hypothetical scenario thought to be the most promising to achieve the final goals in the Mississippi River basin has been added to Chapter 5 (45 percent reduction in nitrogen). The needed nitrogen reductions are contingent on successful research.

A discrepancy in baseline loads was addressed in the final NRS document, which led to an adjustment to recent phosphorus reduction progress and a new 45 percent reduction scenario (from the 1980-96 baseline period) for phosphorus in the Mississippi River Basin, presented in Chapter 5. This new scenario takes into consideration updated analysis on suitable acres for each BMP type (see Modeling Assumptions and Outcome Predictions for further information).

## 6. Water quality standards

**Comments:**

Commenters noted the important role that water quality standards serve, and suggested that relative to point sources in particular, the NRS should wait for new state standards to be developed. Commenters thought that having standards in place would enable us to better understand the role of wastewater point source nutrient load reductions in helping meet downstream water quality needs. In the case of wastewater point sources, standards are a critical step prior to establishing water quality based effluent limits in permits.

**Response**:

Water quality standards are foundational to the state's strategies for protecting and restoring beneficial uses such as recreation, aquatic life, and drinking water. Water quality-based effluent limits for wastewater point source discharges are mandated and developed based on water quality standards to protect beneficial uses. Water quality standards also serve as the basis for assessing water impairments leading to Total Maximum Daily Loads. Currently, Minnesota has numeric lake and reservoir eutrophication water quality standards. River eutrophication standards are pending adoption. Minnesota Rules also include a numeric nitrate water quality standard to protect drinking water, and the MPCA is developing a draft aquatic life nitrate standard that is anticipated to be ready for

rule making considerations in 2015-2016. Minnesota Rules also include narrative standards that prohibit "undesirable slime growths or aquatic plants, including algae" that can result from excessive nutrients.

Effluent limits based on existing numeric phosphorus water quality standards have significantly reduced phosphorus in Minnesota waters. In anticipation of numeric nitrate water quality standards in the future, MPCA is requiring wastewater treatment plants to monitor their discharges for nitrate and total nitrogen. These data will be used to implement the aquatic life nitrate standard into discharge permits once it is adopted. The implementation of new effluent limits based on existing and proposed phosphorus and nitrate water quality standards will be incorporated into future NRS updates.

Some concern was expressed that Minnesota water quality standards do not sufficiently reflect the need for downstream loading reductions. Minnesota water quality standards are expected to be protective of downstream waters as well as protecting the beneficial uses of 'waters of the state'. The implementation of existing and proposed water quality standards, along with the NRS, will result in downstream loading reductions. In the future, if Minnesota receives specific allocations for protection of downstream waters, an evaluation will be done to determine if implementation of existing water quality standards and the NRS meets that allocation.

For restoration and protection of waters downstream of Minnesota's border, the NRS accepts that Minnesota should provide a goal and strategies for a consistent proportional fair-share reduction of its loading to that downstream water body, and reminds Minnesota that we are the headwater for three different continental basins. For Minnesota waters, the NRS recognizes existing nutrient related standards and discusses potential future nutrient related standards where they are under consideration. The NRS recognizes that once standards are in place, point source effluent requirements and restoration and protection plans will be established to help protect and restore our waters. The NRS acknowledges existing regulatory requirements and contemplates what level of state program capacity will likely be needed to support nutrient reductions for Minnesota waters and for downstream waters as well. The NRS identifies a series of actions that can appropriately precede permit limits such as the nitrogen monitoring described above, and in some cases will result in loading reductions.

**Changes to the NRS**:

Clarifying text was added to the NRS throughout; however, no significant content changes were made.

## 7. Prioritization

**Comments:**

Commenters strongly supported establishing priorities for state and local programs. Commenters didn't always agree on what should be a priority, but generally supported the idea that before we provide more resources to work harder, we should develop prioritized actions that help us get the most from our current expenditures. Several comments suggested that local prioritization at the sub-Hydrologic Unit Code (HUC)-8 scale and prioritization below the scale of this state level strategy would be the most useful.

**Response**:

Priorities are an important part of the NRS, and include geographic, source and solution-related priorities. The NRS emphasizes that local reductions should be targeted in those areas where nutrient loading is the greatest, and reductions can be achieved at a comparatively lower cost per pound of nutrient reduced or where multiple ecosystem benefits will be realized. Information identifying the most suitable lands for recommended BMPs will help make sure that our BMP actions are effective. Minnesota's Water Management Framework, which is implemented through a watershed approach and includes Watershed Restoration and Protection Strategies (WRAPS) and comprehensive watershed planning (e.g., One Watershed One Plan), includes a requirement to prioritize at the sub-HUC8 watershed scale. This local process will further identify those sources and places where reductions are likely to provide the most efficient and effective results at the local scale. The NRS describes the watershed approach in detail in Chapter 1, discusses sub-HUC8 level targeting in chapter 4 and emphasizes development of local implementation strategies in Chapter 6.

**Changes to the NRS**:

Prioritizing areas at a smaller watershed scale is deferred to development of WRAPS and comprehensive local water planning (e.g., One Watershed One Plan). Additional information has been added to throughout to further describe how sub-HUC8 watershed prioritization will take place during the local planning process as part of WRAPS development.

In addition, the *Strategy: Integrate Basin Reduction Goals with Watershed Planning Efforts* in Chapter 6 has been clarified concerning the watershed outlet nutrient load reduction goals, which should be part of the WRAPS and local water planning process. An appendix has been added providing suggested load reductions by HUC8 watershed to collectively achieve downstream goals and milestone.

## 8. Local Capacity

**Comments:**

While the NRS is state Level with emphasis on state and federal programs, to be effective it must become operational at the local level. Commenters recognized the key role that local organizations, landowners, and municipalities play in NRS implementation. Emphasis on local adoption of strategies, local enforcement of existing regulations and local tracking of results are supported in the comments. The comments include recognition that for the NRS to get traction it has to become relevant to local decision makers, and sufficient local service delivery capacity will be needed to promote, educate and assist at the desired implementation levels.

**Response**:

Minnesota has a long-standing partnership between state, federal, and university programs, and local delivery efforts. The key to the NRS will be enabling an increase in local capacity for the identified key BMP adoption strategies. Minnesota State University-Mankato is providing additional NRS communication linkages for watersheds through rapid watershed nutrient assessment support. Web access to information through this effort will help meet the local informational needs for planning at local governmental organizations and ultimately with land owners and municipal decision makers who will implement changes. The essence of the NRS will be realized when local watershed planning authorities and land management decision makers in Minnesota's communities and farms consider ways to not only meet local water quality goals and business needs, but are aware of downstream needs and act effectively to reduce the watershed's contribution to loadings in downstream rivers, regional lakes, reservoirs, and international waters.

The process described in "Enhancing the NRS in the Future" above will also consider ways to increase support at the local level for delivery of programs and state/federal support.

**Changes to the NRS**:

A new strategy has been added to Chapter 6 to address the need for increased local capacity: *Strategy: Create a Stable Funding Source to Increase Local Capacity to Deliver Agricultural BMPs.* One of the ways that local government action and stakeholders are supported is through the development of rapid nutrient assessment information. Minnesota State University Mankato has developed a web Nutrient Planning Portal for HUC 8 watersheds. This information is designed to provide for rapid assessments prior to and during local planning (Nutrient Planning Portal).

## 9. Modeling assumptions and outcome predictions

**Comments:**

Commenters noted that inaccurate modeling assumptions and modeling errors can create inaccurate predictions and false expectations. One area of assumptions questioned was current progress with BMPs and a realistic sense of current progress and future action needs. Commenters indicated that the cost assumptions for the needed practices may be making NRS implementation seem more or less achievable, than would be determined if using highly accurate data and accounting for additional factors. Many comments were aimed at ensuring that predicted reductions would result in meeting milestones and goals. The suggestion was made that BMP progress has been greater than the NRS suggests, and as a result, the NRS has the potential to reach milestone and long-term goals at

a faster pace. Another area of comment is a caution related to assumptions in state level analysis being directly transferred to local planning and decisions. An example would be using state level BMP effectiveness averages when developing field scale plans.

**Response**:

The primary purpose of the modeling conducted for the NRS was to gain an understanding of the general magnitude of BMP implementation needed at the state and large basin scale to reach the goals and milestones. While the modelers and models used the best approaches and data available, we agree that caution is needed, especially concerning use of baseline BMPs and practice adoption. We agree with the comments that it is important to use the best available information and methodologies so that reasonable expectations can be provided through the NRS and one of the key strategies is to obtain better data going forward.

The comments have prompted us to review certain assumptions in the modeling approaches to ensure that the findings are based on the best available data and modeling approaches. Several assumptions have been adjusted including: (1) suitable acres for particular BMPs and accurate cropping and practice patterns being used to determine BMP applicability; and (2) evaluation of statewide riparian buffers to provide an assessment of existing levels of adoption. In addition, the nitrogen analysis is now based on the completed NBMP Tool, developed by the University of Minnesota, which provides an additional level of analysis.

After making some improvements to the modeling approaches, we found that the net effect of those changes did not appreciably change the general magnitude of the BMP adoption needed to reach the milestones. We did find, however, that we now believe more significant phosphorus reduction progress has been made in the Mississippi River Basin than previously estimated. We now believe that we have made even further progress toward reaching phosphorus reductions than was reported in the draft NRS.

Further understanding of farming practices and BMP adoption in the future will enable refinements to state-level estimates. In addition, comprehensive monitoring and modeling data is being expanded for most of the HUC-8 watersheds and can be used in the future to evaluate trends and water quality conditions.

It is important to note that the outcomes presented in the NRS reflect the changes expected at the HUC-8 outlet and downstream from those pour points, not at the community or farm level. The analyses for this state level strategy were not intended to provide specific direction concerning the best way to approach management changes in local watersheds. The specific plans for watersheds are determined through the local watershed planning approach, where smaller scale monitoring, modeling and analysis with more detailed data are used.

**Changes to the NRS**:

The NRS has been edited in Chapter 5 to reflect the updated assumptions and analysis completed.

Chapter 4 includes a new summary of the statewide riparian buffer analysis, which is then reflected in the suitable acres contained within Chapter 5 for riparian buffers. An appendix has been added that provides the detailed methods used to determine the extent of perennial riparian buffers. In addition, suitable areas for various BMPs have been adjusted to more closely match the NBMP tool suitable acres and also to better align with the various crop types. Suitable acres have been updated to reflect the more comprehensive 2012 cropland data layer land cover dataset; assumptions are documented in Chapter 5. A summary of the USDA NRCS Conservation Effects Assessment Project (CEAP) has also been included in Chapter 5 as an additional line of evidence supporting the NRS's contention that considerable phosphorus loss reductions are still achievable on cropland.

Analyses of the amount of BMP adoption to meet nitrogen milestones and goals was determined with the NBMP tool (developed by the University of Minnesota), replacing the previously used spreadsheet analysis.

## 10. Tile drainage management

**Comments:**

Some commenters linked subsurface drainage significantly to altered stream hydrology, and others dismissed this connection. Some noted that new subsurface drainage being added in the state could contribute to increased nutrient loadings for nitrogen and also for soluble phosphorus, especially in the Red River Basin, where tile drainage has historically been minimal. Finally, several commenters requested additional strategies be included to address streambank erosion and near channel sources of phosphorus-bound sediment.

**Response**:

The draft NRS emphasized treatment of tile drainage nitrate as part of the solution, since high levels of nitrogen are observed in tile lines that underlie row crop land in large parts of the state. Even after improving nutrient efficiency on tiled lands, it is expected that tile line drainage concentrations of nitrate will still be relatively high. The NRS puts less emphasis on solutions for the potential impacts of drainage on increasing erosive stream flows, which is a concern for phosphorus losses to surface waters, but the NRS does not dismiss this concern. The potential impacts of tile drainage on downstream hydrology are continuing to be studied. Hydrology is affected by many different factors such as climate, land use, and water management. To achieve the nitrogen milestone, the NRS calls for widespread adoption of wetland treatment and controlled drainage structures on about 20 percent of the lands suitable for such practices. Both of these practices will hold water on the landscape and reduce peak flows into rivers. To reduce nutrients beyond the first milestone, we anticipate that additional water retention practices and more vegetative cover during spring months will be needed.

The costs for drainage water management practices are generally lower when they are designed into initial tile installations or upgrades; therefore, the NRS encourages that new drainage installations be designed to minimize off-site impacts whether in farm or urban landscapes. The NRS recommends that drainage and/or watershed authorities in the state take into account approaches to avoid and minimize effects on hydrology when considering new drainage systems or drainage improvements, and that they implement appropriate mitigation techniques, such as surface water storage, to minimize alterations to hydrology. The NRS calls for a prevention plan to reduce the effects of nutrients entering waters where tile drainage systems are rapidly being installed, such as in the Red River Valley.

**Changes to the NRS**:

A new series of strategies have been added to Chapter 6 including *Strategy: Drainage Water Retention and Treatment,* which include the following elements:

- Identifying and targeting funding sources to support drainage water retention and treatment practices such as the Targeted Drainage Water Management Grants Program implemented by BWSR.
- Working with watershed groups and drainage authorities to develop tools and incentives to promote drainage water retention and treatment practices for both existing tile drainage and when new tiling is being proposed.
- Providing financial and technical assistance to implement BMPs for storing and treating tile drainage water in new and existing drainage systems.
- Mapping of drained fields and drain tile outlets on a county or watershed scale.
- Accounting for altered hydrology when drainage and watershed authorities consider new drainage systems or drainage improvements, and recommending appropriate mitigation techniques to minimize alterations to hydrology that can negatively impact water quality.

In addition, the following has been added as a research need under Research Strategies: Increased knowledge of the potential hydrologic effects of tile drainage on downstream flows and near channel erosion.

## 11. Living Cover

**Comments:**

Several commenters emphasized that a major emphasis of the NRS should be placed on establishing high levels of living vegetative cover, including: Pastures, buffers, conservation lands, and other BMPs that include perennial vegetation as well as extending living cover on row cropped lands through the application of cover crops. Commenters noted that cover crops would be more widely adopted if in addition to the current benefits of soil health and nutrient scavenging, they were more effective at nutrient capture and recycling, or if markets for cover crops could be established so that a direct economic benefit could be realized. Some suggested that the milestone target for cover crops be increased, and that long term vegetative cover goals be identified in line with the long term nutrient reduction goals (i.e. 45 percent in the Mississippi River basin).

**Response**:

The NRS recognizes the importance of vegetative cover options in reducing both phosphorus and nitrogen. Cover crops are a means to have high economic value row crops such as sugar beets, corn and soybeans while mitigating the nutrient loss generally associated with these cropping enterprises. Cover crops can be used to scavenge unused nitrogen, improve soil tilth and soil biological processes, and increase soil carbon and organic matter. The NRS envisions increases in adoption of these practices focusing on sugar beets and short season crops such as sweet peas and sweet corn during the first phase of NRS implementation, while at the same time significantly increasing research so that future strategy phases can benefit from vegetative cover solutions. Soil health initiatives are also described in the NRS. An important part of soil health is increasing roots, extending rotations, protection from wind and water erosion, and other practices associated with vegetative cover. Vegetative cover increases will also help to reduce wind erosion, which will in turn reduce atmospheric phosphorus deposition into surface waters. In summary, we agree that there are limits to the extent of nutrient reduction which can be achieved by other non-vegetative cover BMPs, and that extensive vegetative cover is needed to reach our goals.

**Changes to the NRS**:

A new series of strategies have been added to Chapter 6 including *Strategy: Increase and Target Cover Crops and Perennial Vegetation*; *Strategy: Soil Health*; and *Strategy: Riparian Buffers*. In addition, a targeted analysis of cover crops has been included which begins with high levels of adoption of cover crops for crop types that are historically successful, thus achieving more cost-effective reductions. A statewide analysis of existing buffers has been conducted, which is presented in Chapter 4 and is reflected in the buffer suitable acres in Chapter 5. Suitable acres have also been revisited to more accurately reflect the cropping patterns in the state and applicable living cover BMPs.

## 12. Costs

**Comments:**

Many commenters point out the complexity of cost information. Individual comments pointed out the importance of cost to implementers, costs to the environment and downstream users if we are not meeting the goals, and costs of NRS delivery. In some cases the strategies have economic benefits that were not included in the cost-benefit analysis.

**Response**:

The NRS summarized overall cost estimates but lacked the comprehensive detailed analysis that many of the stakeholders were looking for. The aim of the NRS is to provide general estimates of the cost magnitude related to adopting the BMPs and wastewater treatment practices in the NRS, including descriptions of assumptions about the level of changes needed and estimates of the costs and benefits of implementing those strategies. The NRS does not identify costs needed for state, federal and local staff to support increased adoption of BMPs. Changes to program costs needed to support stepped up local watershed programs and costs to individual farm and municipalities is beyond the scope of this initial NRS. Further information on those costs will be developed during WRAPS/One Watershed planning and future updates to the NRS.

**Changes to the NRS**:

Clarifying language was added to Chapter 5 on the lifecycle of BMPs and regarding cost assumptions. Assumptions used to determine costs in the draft NRS were updated, resulting in modified cost estimates which are generally lower than the original cost estimates.

## 13. MPCA regulatory programs (non-wastewater)

**Comments:**

Commenters identified that in addition to reducing wastewater and agricultural nutrient loading, various existing programs contribute to reducing or at least holding the line on nutrient loading. Examples are subsurface sewage treatment systems, feedlots, and stormwater. The comments suggested more recognition for these programs and ways they can be more effective.

**Response**:

Reaching our goals for nutrient reduction will require a continued effort by all of these programs along with substantial increased emphasis in the wastewater and agricultural sector programs. The NRS calls for these existing programs to continue to implement regulatory requirements that are beneficial to our nutrient reduction goals. The individual comments received have been shared with managers of the specified programs for consideration.

**Changes to the NRS**:

New sections were added to Chapter 4 that account for phosphorus reductions since 2000 resulting from improvements to septic systems, feedlot runoff, and lawn phosphorus fertilizer controls. This progress is now also reflected in Chapter 5. Chapter 5 has been expanded to include a subsection on Miscellaneous Sources and associated BMPs specifically for Streambank Erosion and Urban Runoff. Stormwater strategies in Chapter 6 have also been expanded to address non-regulated stormwater runoff. In addition, the following stormwater strategies have been added: *Strategy: Stormwater Technical Assistance* and *Strategy: Stormwater Research and Demonstration*.

Sediment Reduction Strategies (Chapter 6) have been updated to reflect recent work by the MPCA on a basin-scale sediment strategy (2014 draft) and includes the following strategies:

- Reduce peak flow magnitude and duration
- Set water storage goals by watershed
- Define effective water storage practices
- Consider hydrology and downstream waters in local watershed planning efforts
- Funding assistance
- Increase living cover
- Combine state and federal funding for a CRP-RIM partnership for water storage