Minnesota’s Nutrient Reduction Strategy

Tracking Progress in the Mississippi Headwaters State

Strategy implementation to reduce nutrients in water

Large-scale Program Advances

Local Watershed Approach

Changes in Rural & Urban Lands

Changes in Water
Nutrient Reduction Strategy 5-year Progress Report

https://www.pca.state.mn.us/water/nutrient-reduction-strategy

Presentation Outline

Progress Part 1
Large-scale Program Advances

Progress Part 2
Local Watershed Approach

Progress Part 3
Changes in Rural & Urban Lands

Progress Part 4
Changes in Water
Minnesota Clean Water Fund – boosted state BMP $$

More than 30 program advances since 2014

<table>
<thead>
<tr>
<th>Education, Outreach and Research</th>
<th>Voluntary Programs</th>
<th>Regulatory Programs</th>
<th>Watershed Partnerships and Tools</th>
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</thead>
<tbody>
<tr>
<td>Nitrogen Smart training for farmers and farm-advisors</td>
<td>Minnesota Agricultural Water Quality Certification</td>
<td>Municipal and Industrial Wastewater Program</td>
<td>Watershed Restoration and Protection Strategies (WRAPS) in over 50 HUC 8 watersheds</td>
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<td>Annual nutrient management and conservation tillage conferences</td>
<td>AR Certification led by private industry (cropland nutrient management)</td>
<td>Groundwater Protection Rule (Nitrogen Fertilizer)</td>
<td>One Watershed, One Plan (1W1P) Program</td>
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<tr>
<td>Discovery Farms</td>
<td>Minnesota Conservation Reserve Enhancement Program</td>
<td>Feedlot and land application of manure rules and program</td>
<td>Watershed Conservation Planning Initiative</td>
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<tr>
<td>Minnesota Office of Soil Health</td>
<td>Board of Water and Soil Resources Cover Crop Demonstration Program</td>
<td>Urban Stormwater Runoff Program</td>
<td>Small focus watersheds – Federal Section 319 Program (10 watersheds)</td>
</tr>
<tr>
<td>Guidance manuals for agricultural best management practices, drainage, urban stormwater management</td>
<td>Clean Water Fund – increases for BMP implementation</td>
<td>Subsurface Sewage Treatment Program</td>
<td>Guidance on Lake Protection for WRAPS and 1W1P</td>
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<tr>
<td>Conservation professionals training and certification</td>
<td>Point - nonpoint trading</td>
<td></td>
<td>National Water Quality Initiative and Mississippi River Basin Healthy Watershed Initiative</td>
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<tr>
<td>Nutrient Management Initiative</td>
<td>Rainwater in Minnesota</td>
<td></td>
<td>Watershed-based Funding Implementation Program</td>
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<tr>
<td>Center for Changing Landscapes</td>
<td>Multi-purpose drainage-water management</td>
<td></td>
<td>Root River Field to Stream Partnership</td>
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</tbody>
</table>

All 30+ programs described in:

https://www.pca.state.mn.us/water/nutrient-reduction-strategy
Voluntary Partnership:
- Producers
- Government agencies
- Private sector

WQ certified farmers get:
- 10 yrs of regulatory certainty
- Priority $ for new practices
- Community recognition

Growth since 2015:
- 900+ farms
- 600,000+ acres
- 1800+ new practices
- 46,000+ lbs P reduced

Forever Green Program
- Developing new cropping systems for continuous living cover
  - plant breeding
  - agronomic systems
  - food science
  - economics
- Supply Chain Development
- Market Development
MN Groundwater Protection Rule

Nitrogen fertilizer restrictions adopted in 2019

Fall N fertilizer restrictions in vulnerable areas

- BMPs can phase from voluntary to regulatory in drinking water supply management areas, depending on nitrate levels/trends & BMP adoption rates

https://www.mda.state.mn.us/nfr

Wastewater Permitting Program - Phosphorus

Over 70% reduction from:

- **2000** - 1 mg/L effluent performance standard for new/expanded plants
- **2008** - Lake Eutrophication Standards & wastewater rules
- **2014** - River Eutrophication Standards
- **2014** - Nutrient Reduction Strategy
Wastewater Permitting Program – Nitrogen (N)

Wastewater N strategy - steps:
1. Monitor influent & effluent nitrogen
2. Evaluate N reduction optimization
3. Develop N management plan templates
4. Encourage voluntary N removal when upgrading facility
5. Establish N effluent limits – after nitrate water quality standards developed
6. Develop point/nonpoint trading options

Presentation Outline: Progress with our watershed approach
Minnesota’s watershed approach aims to meet local & downstream needs

Watershed load reduction targets – to collectively achieve downstream load reduction goals

Milestone/Interim goals

Final goals
Minnesota’s watershed approach works at multiple scales

Watershed science informing local planning across the entire state
Smaller-scale focus watersheds
Farm and field-scale implementation & monitoring

New private-public collaborative watershed partnerships developing

Cannon River Agricultural Collaborative

Headwaters Agricultural Sustainability Partnership (central Minnesota)

Cedar River Watershed Partnership

Central Farm Service
Hormel Foods
Land O’Lakes SUSTAIN

MN Dept. of Agric. MAWQCP
Mower County SWCD
Environmental Initiative
Presentation Outline: progress with BMP adoption

Progress Part 1
Large-scale Program Advances

Progress Part 2
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Progress Part 3
Changes in Rural & Urban Lands

Progress Part 4
Changes in Water

New on-line BMP tracking System at multiple scales subwatersheds to statewide

BMPs adopted through Gov’t Programs

- NRCS - federal EQIP, CSP, RCPP
- BWSR - eLINK tracks state cost-shared BMPs
- BWSR - CREP and RIM tracking
- MDA – Ag BMP Loan Program, Ag Water Quality Certification
- MPCA – Clean Water Partnership & 319 program

BMPs Installed 2004-2018

<table>
<thead>
<tr>
<th>BMP Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillage residue management</td>
<td>11,382</td>
</tr>
<tr>
<td>Designed erosion control &amp; trapping</td>
<td>10,236</td>
</tr>
<tr>
<td>Nutrient management (cropland)</td>
<td>9,992</td>
</tr>
<tr>
<td>Septic System Improvements</td>
<td>7,874</td>
</tr>
<tr>
<td>Converting land to perennial</td>
<td>7,696</td>
</tr>
<tr>
<td>Open tile inlet &amp; side inlet improvements</td>
<td>7,136</td>
</tr>
<tr>
<td>Stream banks, ditches &amp; ravines protected or restored</td>
<td>6,073</td>
</tr>
<tr>
<td>Buffers and filters - field edge</td>
<td>5,348</td>
</tr>
<tr>
<td>Add living cover to annual crops in fall/spring</td>
<td>4,908</td>
</tr>
<tr>
<td>Habitat &amp; stream connectivity management</td>
<td>4,076</td>
</tr>
<tr>
<td>Pasture management</td>
<td>3,087</td>
</tr>
<tr>
<td>Drainage ditch modifications</td>
<td>2,715</td>
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<tr>
<td>Agricultural field drainage water treatment/storage</td>
<td>1,184</td>
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<tr>
<td>Urban Stormwater Runoff Control</td>
<td>1,114</td>
</tr>
<tr>
<td>Changing rotations to less erosive crops</td>
<td>1,046</td>
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<tr>
<td>Feedback runoff controls</td>
<td>173</td>
</tr>
<tr>
<td>Forestry Management</td>
<td>138</td>
</tr>
<tr>
<td>Wetland restoration/creation</td>
<td>104</td>
</tr>
<tr>
<td>In Lake Management</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>61,878</td>
</tr>
<tr>
<td>Grand Total</td>
<td>135,123</td>
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</table>

https://www.pca.state.mn.us/water/nutrient-reduction-strategy
www.pca.state.mn.us/water/healthier-watersheds
Statewide tracking example: New acres of living cover added each year through gov’t programs

Government Program BMP adoption 2014-18 compared to scale of adoption goals for 2025

Note: This does not include private adoption outside of government programs
How can we tell if practices are being adopted at needed scales?

A. Adoption through government support programs (previous 3 slides)

B. Indicators of broader overall adoption
   1. Census of Agriculture and surveys
   2. Satellite imagery
   3. Fertilizer sales
   4. Nutrient use efficiency trends

C. Permitting – reporting & inspections

Presentation Outline: trends in the water
10-year nutrient concentration trends

Nitrate – increasing or no significant trend

Total Phosphorus

Phosphorus – decreasing or no significant trend

20-year nutrient concentration trends

Phosphorus (~1999-2018)
21 – decreasing (15-56%)
6 - no trend detected
1 - increase

Nitrate (~1999-2018)
3 – decreasing
11 - no trend detected
14 - increasing
More precipitation leading to higher nutrient loads

**Annual Precipitation Departure, 2000 - 2019**

Difference from 20th Century

- 0 - 1 in.
- 1 - 2 in.
- 2 - 3 in.
- 3 - 4 in.
- 4 - 5 in.
- 5 - 6 in.

Source:
DNR State Climatology Office and the DNR Watershed Health Assessment Framework

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Nitrate and phosphorus loads
Mississippi River at Red Wing

**Nitrate loads increasing since late 1990’s**

**Phosphorus loads with no detected trend since late 1990’s**
In Conclusion

• **5-year progress report recently completed** - found at:  
  [https://www.pca.state.mn.us/water/nutrient-reduction-strategy](https://www.pca.state.mn.us/water/nutrient-reduction-strategy)
  
  - Advanced 30+ large-scale programs affecting nutrients
  - Agricultural BMP adoption not keeping pace with scenarios outlined in nutrient strategy
  - Wastewater – over 70% reduction in phosphorus; nitrogen is now highly-monitored
  - River phosphorus concentrations decreased 20-50% (20 yrs) – but increasing river flow offsetting load reductions
  - River nitrogen concentrations and loads increasing by over 25% (20 yrs)

• **New in September 2020 – 10-year Minnesota State Water Plan**
  
  - Combining nutrient & climate change practices to reduce and mitigate effects of climate change

2020 State Water Plan:  
Water and Climate

[https://www.eqb.state.mn.us/content/water](https://www.eqb.state.mn.us/content/water)

Thank You!

[www.pca.state.mn.us/water/nutrient-reduction-strategy](http://www.pca.state.mn.us/water/nutrient-reduction-strategy)