
MINNESOTA POLLUTION CONTROL AGENCY
Phosphorus Limits in the Minnesota River Basin
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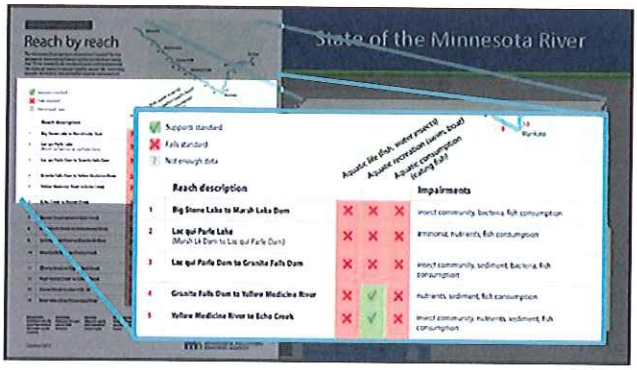
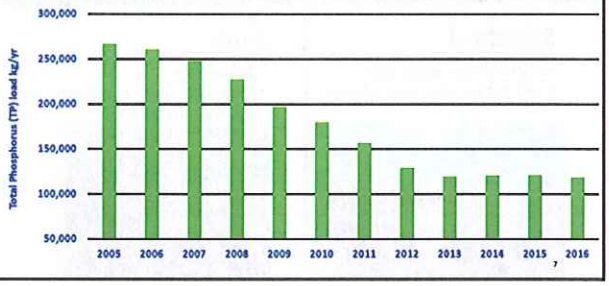
Oct. 18, 2017


Standards vs. Limits
Standard
• Ambient water quality goal
• Lake or river water quality target
Limit
• Effluent goal
• Legal requirement in permit to meet water quality standard

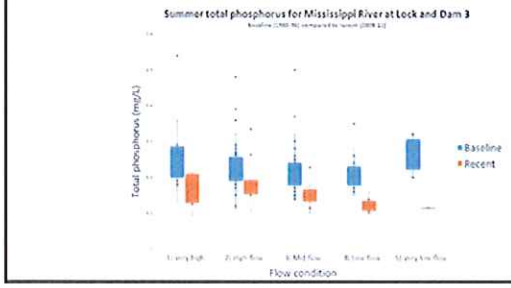

Reach by reach
State of the Minnesota River
Reach description
Impairments


State of the Minnesota River
Bright spots
Cities: Improved waste-water treatment.
Farms: Growing interest in cover crops, soil health, conservation farming.

Wastewater Phosphorus load in the Minnesota River Basin



Improvements due to limits



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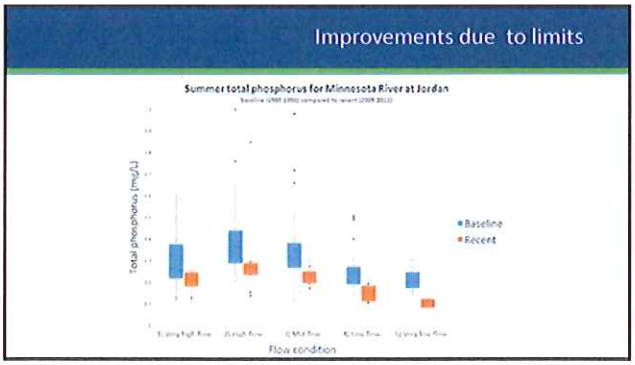
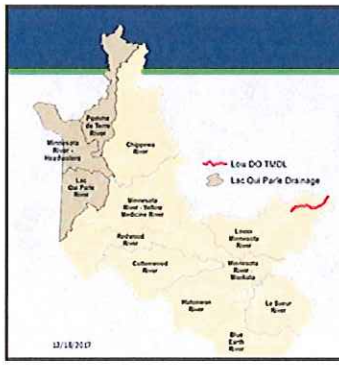
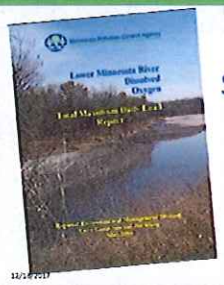


Low Dissolved Oxygen



- Completed phase 1 of General Phosphorus permit (35% ↓)
- Actual discharge *way* below limits

Limit Types – Rivers, low dissolved oxygen (DO)



Similar but

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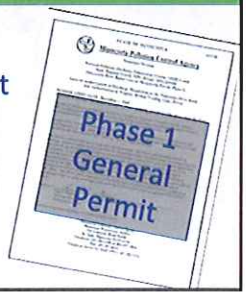
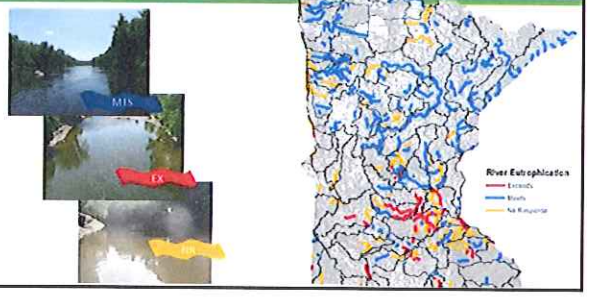


Limit Types – Rivers

Statewide look at river eutrophication standards



Big Question

Are wasteload allocations (WLAs) for Low DO TMDL good enough for RES?

not quite

But, current actual discharge is *very* close

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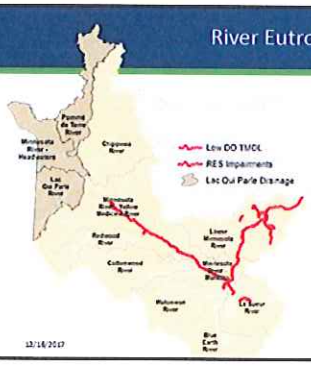
River Eutrophication Standards (RES)



- Used HSFP computer model
- Phase I Genera Permit limits – not protective
- Low DO TMDL WLA (51% ↓)– close but also not protective

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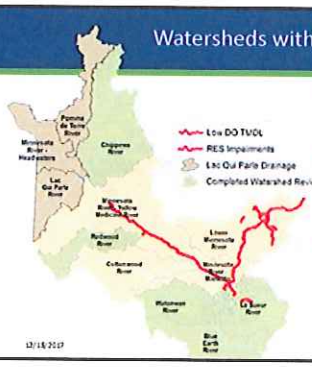
Watersheds with Completed Limits Review



- Major watershed within basin also have algae/impairments
- Dilution equations used to evaluate protection for major watersheds. (Greater Blue Earth, Redwood, Chippewa)
- Limits for Minnesota River RES, good enough to protect local reaches, generally

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Limit Types

State Discharge Restrictions (SDRs)

- 1.0 mg/L if....
- Technology-based approach

Lakes

- Prevent nuisance algae
- 12 month rolling total mass limits (i.e. 732 kg/yr)

Rivers

- Ensure sufficient dissolved oxygen (DO) – 2004
- May – Sept. 5 month seasonal mass limit (i.e. 533 kg/season)

- Prevent Nuisance Algae
- June – Sept. 4 month monthly avg mass limit (i.e. 0.87 kg/day)

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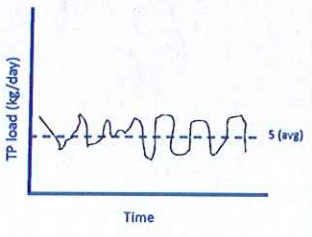
Limits and waste load allocations (WLAs)

Currently = 10 kg/day TP

WLA = 5 kg/day



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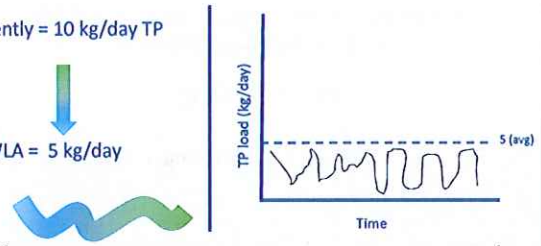

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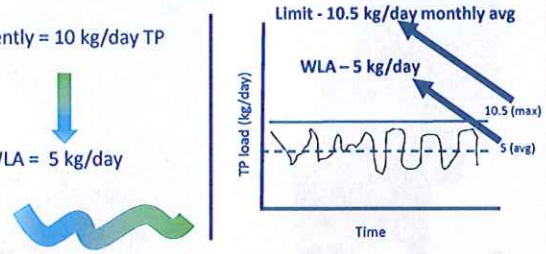
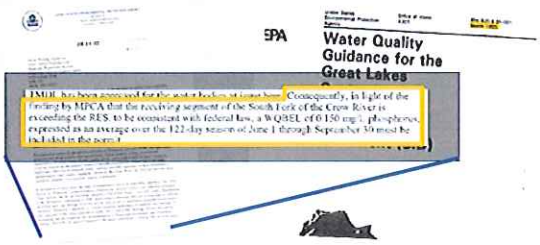
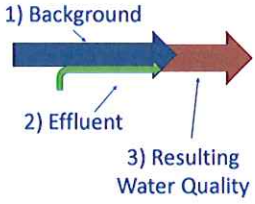


So how do we review and derive limits?



Dilution Equation



If resulting water quality

1) at or below concentration of water quality standard – **no limit**

2) Exceeds concentration of water quality standard – **must include limit in new permit**

- 40 CFR 122.44(d)(1)(i)

Algae growth potential

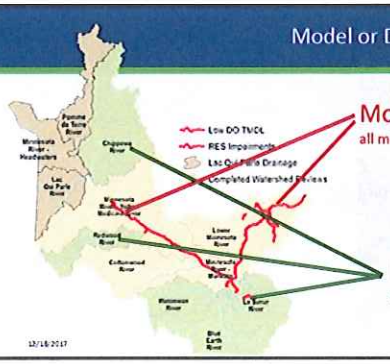
Dilution Equation +

- Residence time
- Shading
- Temperature

Computer model helps us estimate

- fate/transport
- Nonpoint source reductions

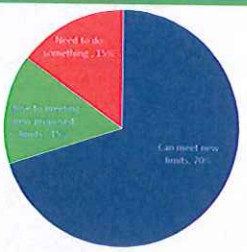
Model or Dilution Equation?



Model
all mainstem of Minnesota River

Dilution equation
major watershed tributaries

RES impact on mechanical WWTFs in MN R. Basin



RES impact on mechanicals WWTFs in MN R. Basin

- Facilities that consistently meet 1.0 mg/L in summer will be able to meet RES limits at current flows

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- **70%** of all mechanical facilities in the basin **can meet RES**

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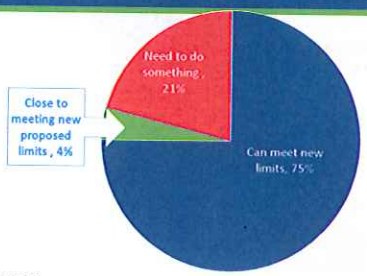
- **15%** of facilities are **very close** to meeting limits

RES impact on mechanicals WWTFs in MN R. Basin

- Facilities that consistently meet 1.0 mg/L in summer will be able to meet RES limits at current flows
- 70% of all mechanical facilities in the basin can meet RES
- 15% of facilities are very close to meeting limits
- **15% need to improve** performance
  - Upgrade
  - Offset

RES impact on stabilization ponds in MN R. Basin



RES impact on ponds in MN R. Basin

- Ponds that consistently meet 2.0 mg/L is summer will be able to meet RES limits

RES impact on ponds in MN R. Basin

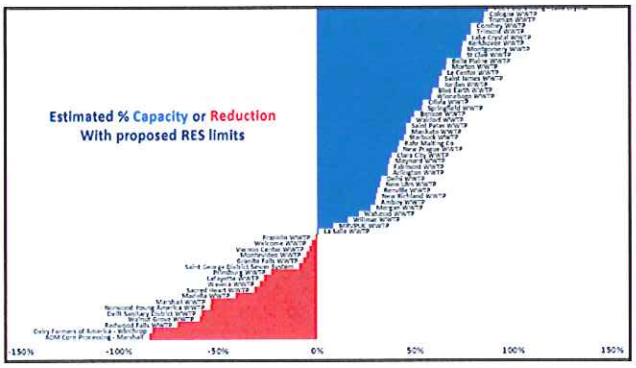
- 75% of all pond facilities in the basin can meet RES limits

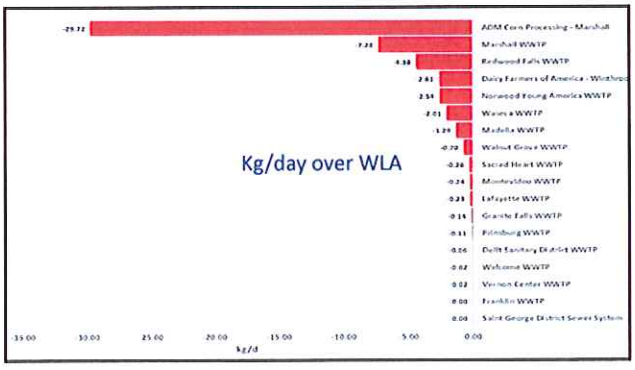
RES impact on ponds in MN R. Basin

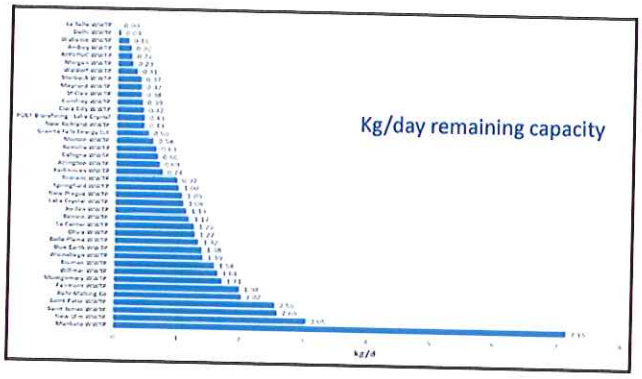
- 4% of facilities are very close to meeting limits

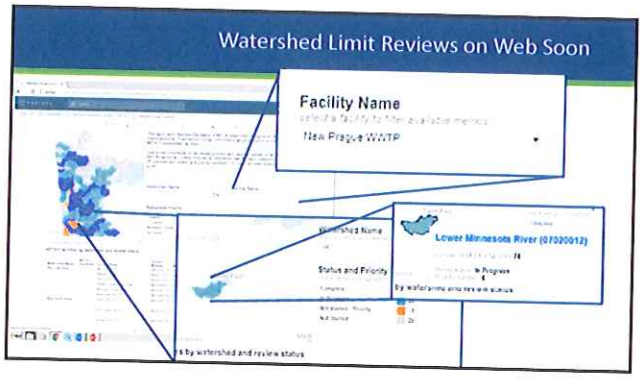
RES impact on ponds in MN R. Basin

- 21% need to improve performance
  - Avoid summer window, may require larger pond
  - Trade
  - Add boat ramp for chemical treatment









For facility-specific details, speak with MPCA staff after talks.