Effectiveness of BMPs for Reducing Nitrogen to the Black Hawk Lake Watershed, Iowa

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INTRODUCTION

- Black Hawk Lake (BHL) watershed is 5,324 hectares of tile drained, intensively managed agricultural landscape (Fig. 2).
- BHL is designated for primary contact recreation (Fig. 1).
- In 2015, BHL watershed became the focus of a 5-year monitoring project.
- Three sub watersheds are being monitored: 87.5%, 30%, and 22.5% best management practice (BMP) implementation.
- Water samples are collected and analyzed for nutrients in both surface and tile flows.
- The goal of this study is to identify the effectiveness of BMPs in reducing nitrogen export.
- BMPs considered include reduced tillage, cover crops, filter strips, terraces, grassed waterways (GWWs) and nutrient management plans (NMPs).

MONITORING LOCATIONS

- Sub watershed 8
  - Area: 804.5 ha
  - Samples collected from end of grass waterway (S8) and large tile outlet (T8)
  - Low BMP implementation 22.5% of area
  - Some terraces, GWWs, and NMPs

- Sub watershed 11
  - Area: 229.5 ha
  - Samples collected from stream (S11)
  - Low BMP implementation 30% of area
  - Some terracing, no-till and NMPs

- Sub watershed 12
  - Area: 221.4 ha
  - Samples collected from stream (S12) and small tile outlet (T12)
  - High BMP implementation 87.5% of area
  - Extensive terrace work, NMPs and filter strips

FLOW EXCEEDENCE CURVES

- Low BMPs
  - T8 Nitrate Flow Exceedance Curve
  - S11 Nitrate Flow Exceedance Curve

- High BMPs
  - T12 Nitrate Flow Exceedance Curve
  - S12 Nitrate Flow Exceedance Curve

RESULTS

- 2015 was the wettest year in over 50 years.
- BMPs (S12) reduced TN by 30 - 50% when compared to low BMP implementation (S11).
- Nitrate levels exceed the drinking water standard, 10 mg L⁻¹, over all flows in low BMP sub watersheds.
- Long-term studies provide important information on level of BMP implementation needed to reduce nitrate loads under a variety of weather conditions.

CONCLUSIONS

- BMPs considered include reduced tillage, cover crops, filter strips, terraces, grassed waterways (GWWs) and nutrient management plans (NMPs).

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REFERENCES


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