

# **Manitoba Water Quality Standards, Objectives, and Guidelines 2002**

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# Outline

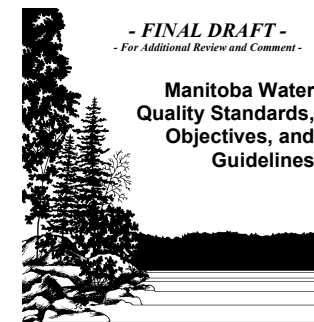
- **Brief history**
- **Review process**
- **Overview of proposed revisions**
- **Introduce concepts likely to be discussed during these hearings**
- **Ammonia objectives**
- **Overview of water quality in Red River in relation to MWQSOG 2002**
- **Concluding comments**

# History of Program

- 1976 - 1979
- 1980 - 1982
- 1983 - 1988
- 1988 - 1990
- 1990 - 1991
- 2000 - 2003

# Review Process

- **Information and initial comments**
  - **April 20, 2000 - September 29, 2000**
- **Detailed technical review**
  - **February 1, 2001 - October 31, 2001**
- **Final draft review**
  - **November 22, 2002 - March 31, 2003**



# Water Quality Protection

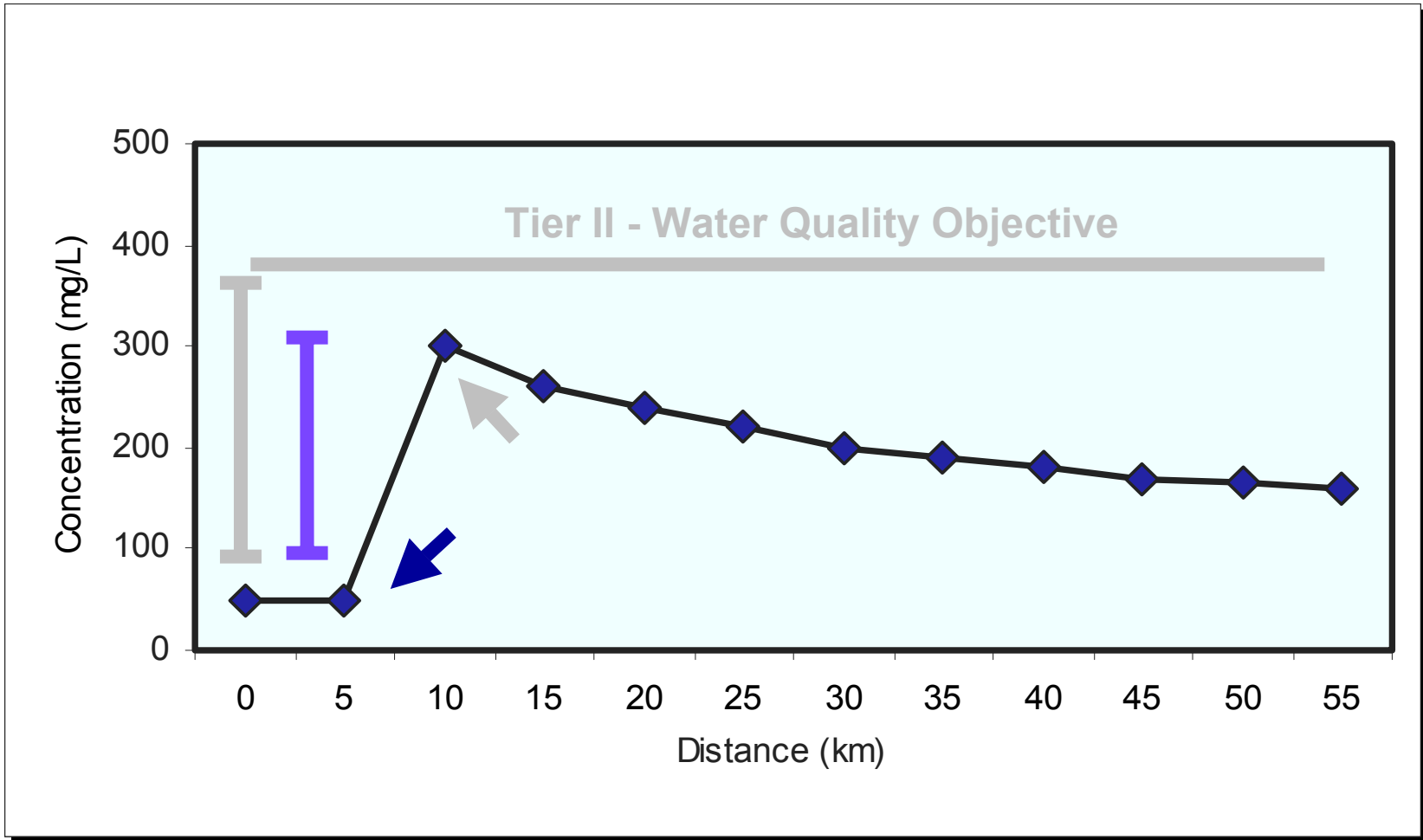
## ■ Technology-Based Approach

- Consistent for each major water discharge sector
- Best Practicable or Best Available Technology

## ■ Water Quality-Based Approach

- Considers unique water uses, stream flow, and water quality at each site
- Ensures that activities do not cause exceedances of water quality objectives
- Includes concept of assimilative capacity

# Assimilative Capacity and Wasteload Allocation



# Principal Changes

- **Three-tiered approach**
- **Surface water and groundwater quality**
- **Ecosystem health - biological communities**
- **Sediment and tissue residue guidelines**

# Tier I: Water Quality Standards

## ■ Technology-based standards

### ➤ Municipal wastewater effluents

- Fecal coliform densities (200 organisms/100 mL)
- Biochemical Oxygen Demand (30 mg/L)
- Total Suspended Solids (30 mg/L)

## ■ Key existing legislation is referenced, including ground water

## ■ Not intended to be modified



# Tier II: Water Quality Objectives

- Short list of variables (<20)
- Chronic and acute
- Common pollutants in Manitoba
- Good confidence for Manitoba
- May be modified based upon scientifically-sound site-specific information
- Implementation
  - Mixing zones
  - Design low flows
  - Three levels of protection
  - Develop effluent discharge limitations

# Tier II (continued)

- Ammonia
- Trace metals
- Chlorine
- Cyanide
- Dissolved oxygen
- Fecal coliform and *Escherichia coli*
- Nitrate-nitrite
- Sodium adsorption ratio and major ions or salts
- Suspended sediments and turbidity
- Temperature

# Ammonia

- **Included as a Tier II Water Quality Objective**
- **1988 MSWQO modified from US EPA Criteria published in 1984**
- **US EPA 1984 criteria superceded by new criteria published in 1999**
- **MWQSOG 2002 based on US EPA 1999**

# Ammonia (continued)

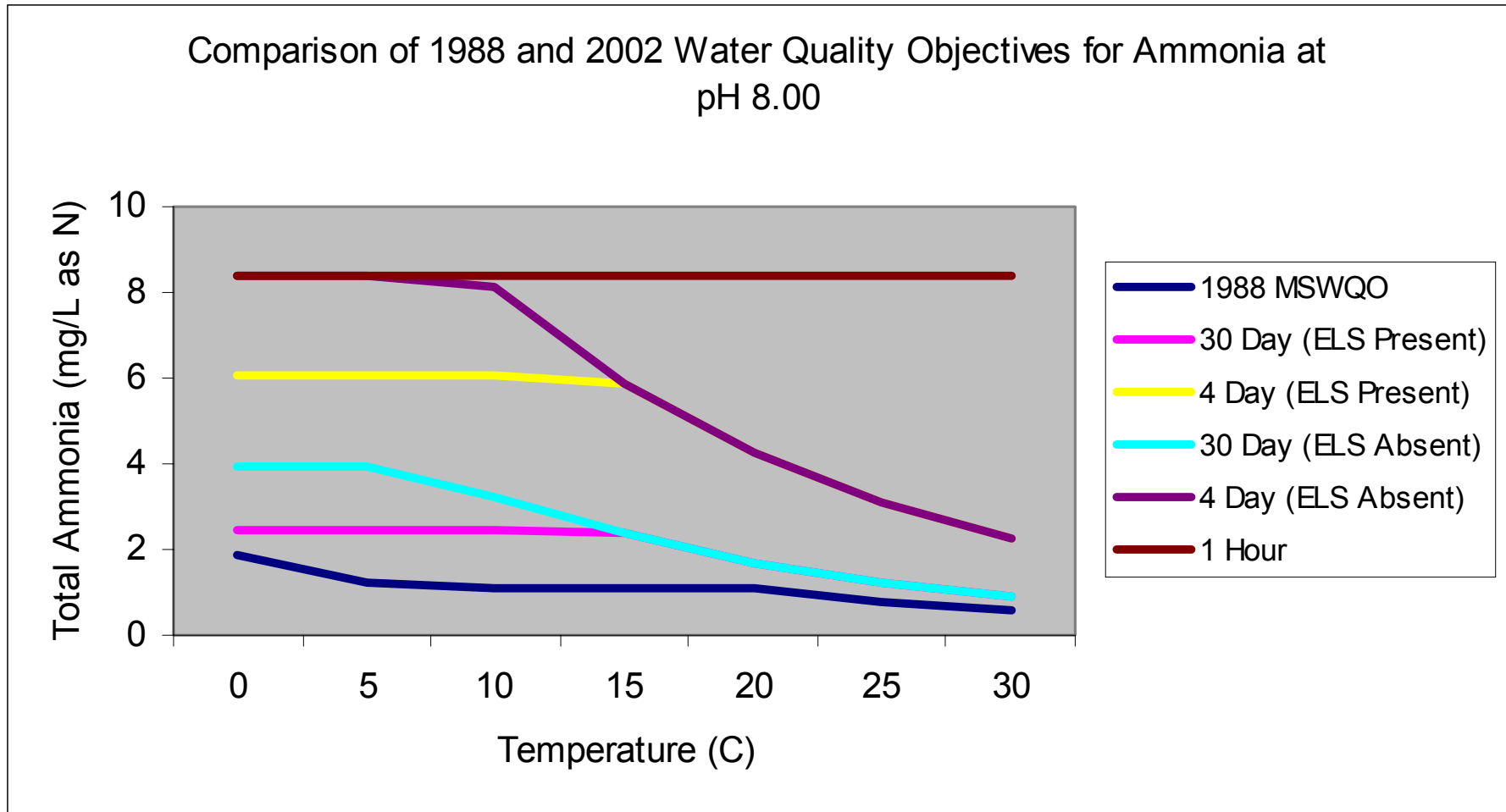
## ■ 12 separate objectives

- 6 apply to cool water assemblages
  - 3 apply when early life stages absent
  - 3 apply when early life stages present
- 6 apply to cold water assemblages
  - 3 apply when early life stages absent
  - 3 apply when early life stages present

# Ammonia (continued)

- Include both chronic and acute
- 30 day average (chronic)
- 4 day average (chronic)
- 1 hour average (acute)

# Comparison of MSWQO 1988 to MWQSOG 2002



# Implementation - Mixing Zones

- Not reasonable to require all objectives to be met at end-of-pipe
- Tier I - Water Quality Standards still apply
- A relatively small area is allowed for mixing to occur where not all objectives have to be met
- Allow a zone of passage
- Not cause acute lethality
- Others

# Implementation - Design Low Flows

- Not reasonable to require wastewater treatment systems to be designed to meet objectives all of the time especially under low stream flows
- Recognizes that healthy aquatic life communities can withstand occasional stress and can recover
- 30Q10
- 7Q10
- 1Q10



# Design Low Flows (continued)

- **Statistical technique to identify the probability of a low flow event based upon historical hydrological record**
- **Longest period of representative historical flow record must be used to confidently predict most likely probability of future low flow event**
  - **fundamental statistical principle**

# Design Low Flows (continued)

- **Similar principle used by Manitoba for predicting the probability of other hydrological events**
  - **low flows to allocate water for withdrawal**
  - **high flows to protect public health and property from flood events**

# Tier III: Water Quality Guidelines

- General statements of desired quality
- Long list of pollutants, mainly from CCME (>100)
- Water quality
- Sediment quality
- Tissue residues

# Tier III (continued)

- **Not all pollutants of concern at present in Manitoba**
- **May not have good confidence for Manitoba**
- **Implementation**
  - **More flexible than Objectives**
  - **Assist to interpreting monitoring data**
  - **Can be used as a basis for developing Objectives or Standards**

# Other Proposed Changes

- **Guidance for mixing zones**
- **Adoption of both acute and chronic objectives**
- **Objectives for metals expressed as dissolved forms**
- **Definition of field crop irrigation expanded to include irrigation of parklands and golf courses**
- **Deleted irrigation category for short-term protection of medium to fine textured soils**

# Other Proposed Changes (continued)

- Deleted secondary recreation category
- Fecal coliform objective identified for protection of groundwater used for drinking purposes
- Guideline for ensuring biological integrity
- Guideline for maintenance of minimum in-stream flows

# Other Proposed Changes (continued)

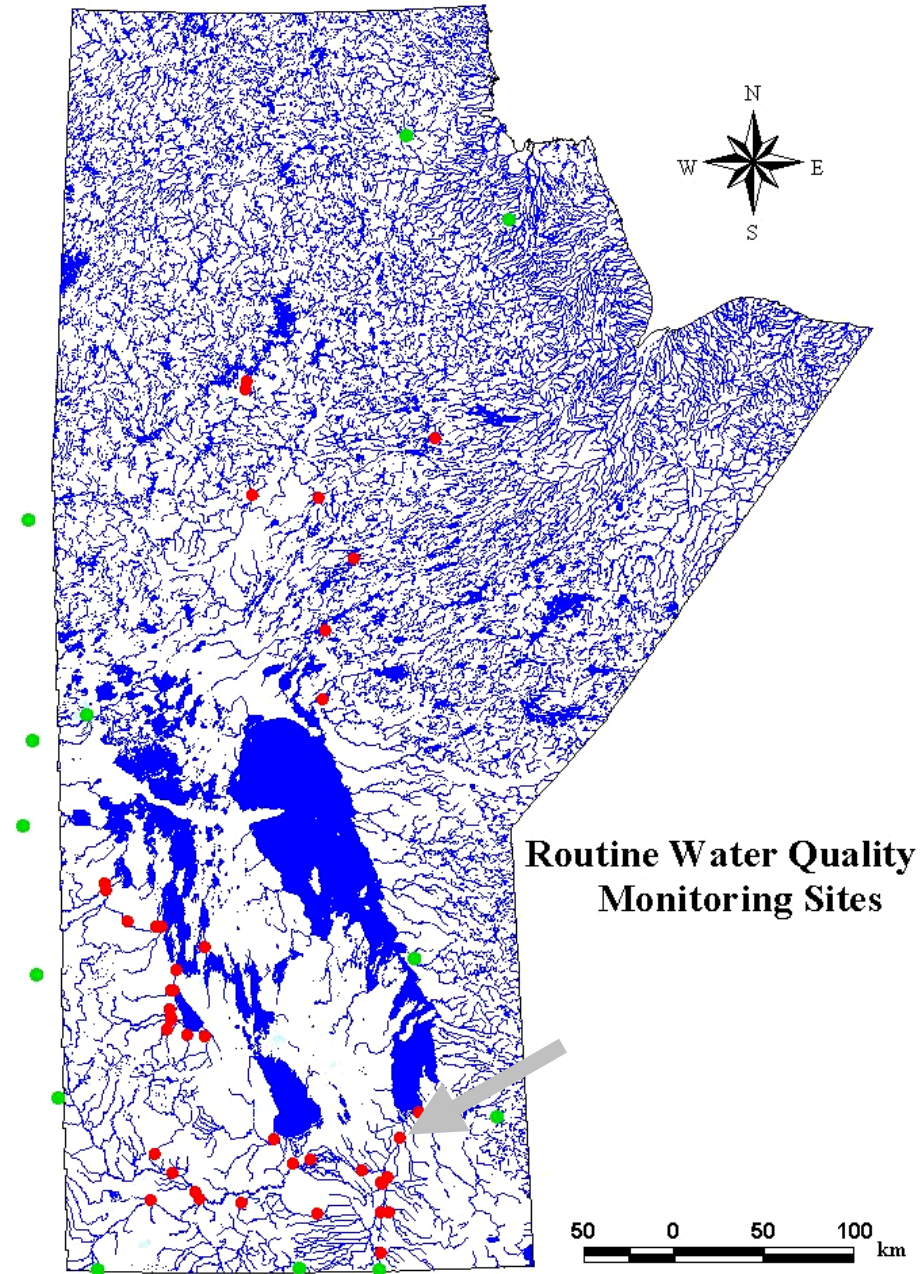
- **Guideline for promoting water conservation**
- **Guideline related to non-indigenous species**

# Issues Presently Under Review

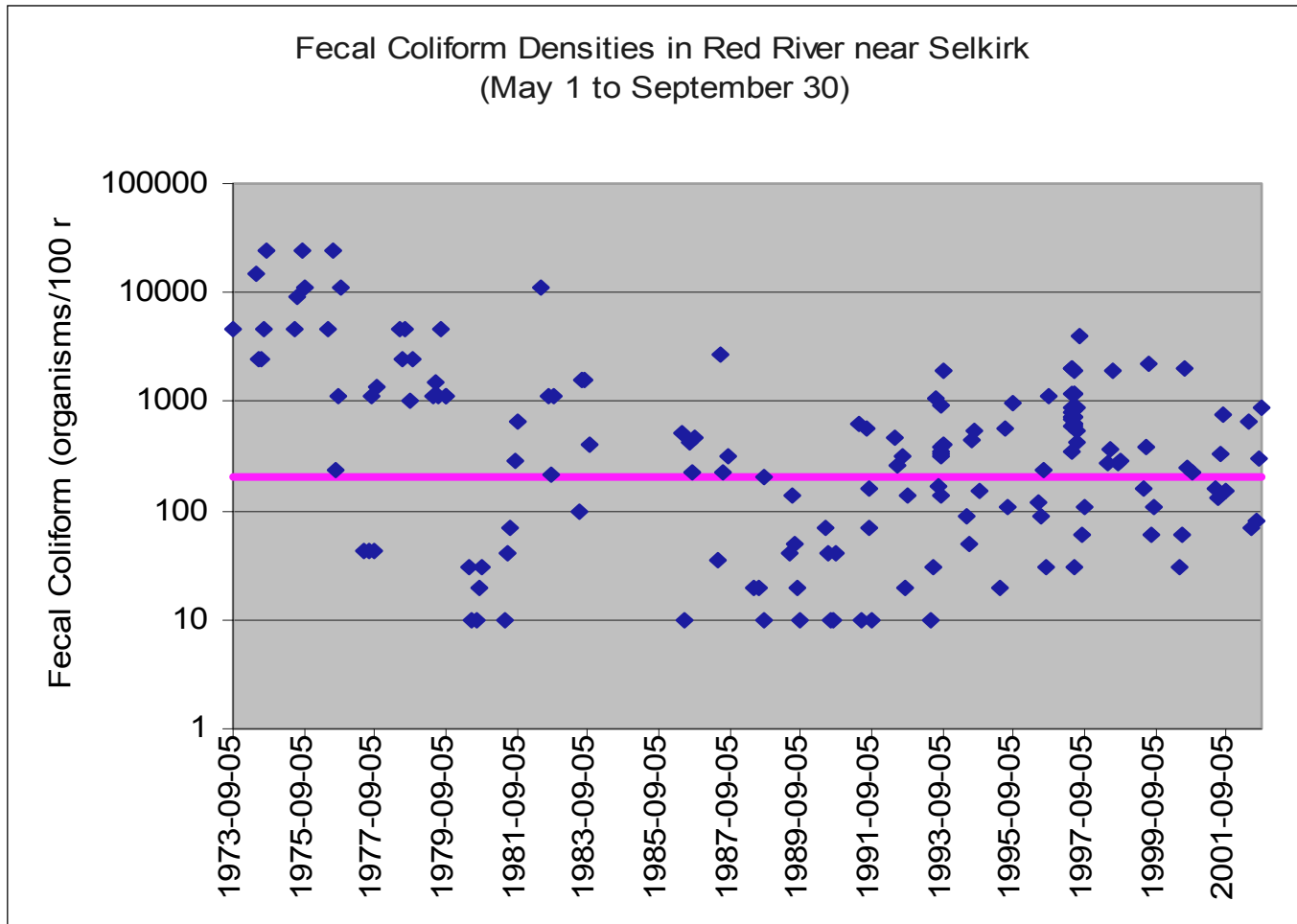
- **Inadequate, scientifically-defensible water quality objectives for nitrogen and phosphorus**
  - **Nutrient Management Strategy**
  - **Once developed, adopt nutrient objectives in the MWQSOG**



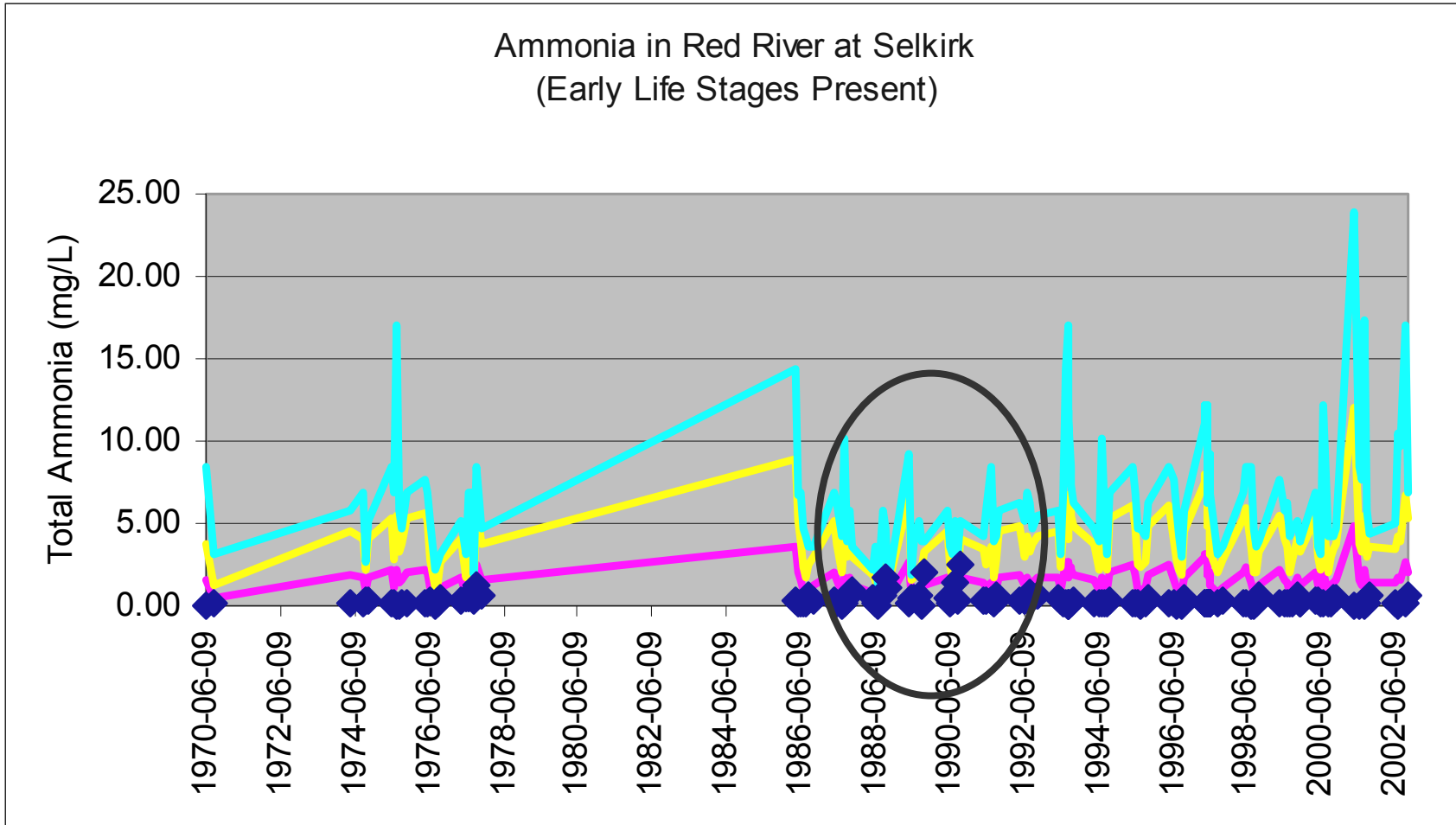
# Stream Water Quality Monitoring



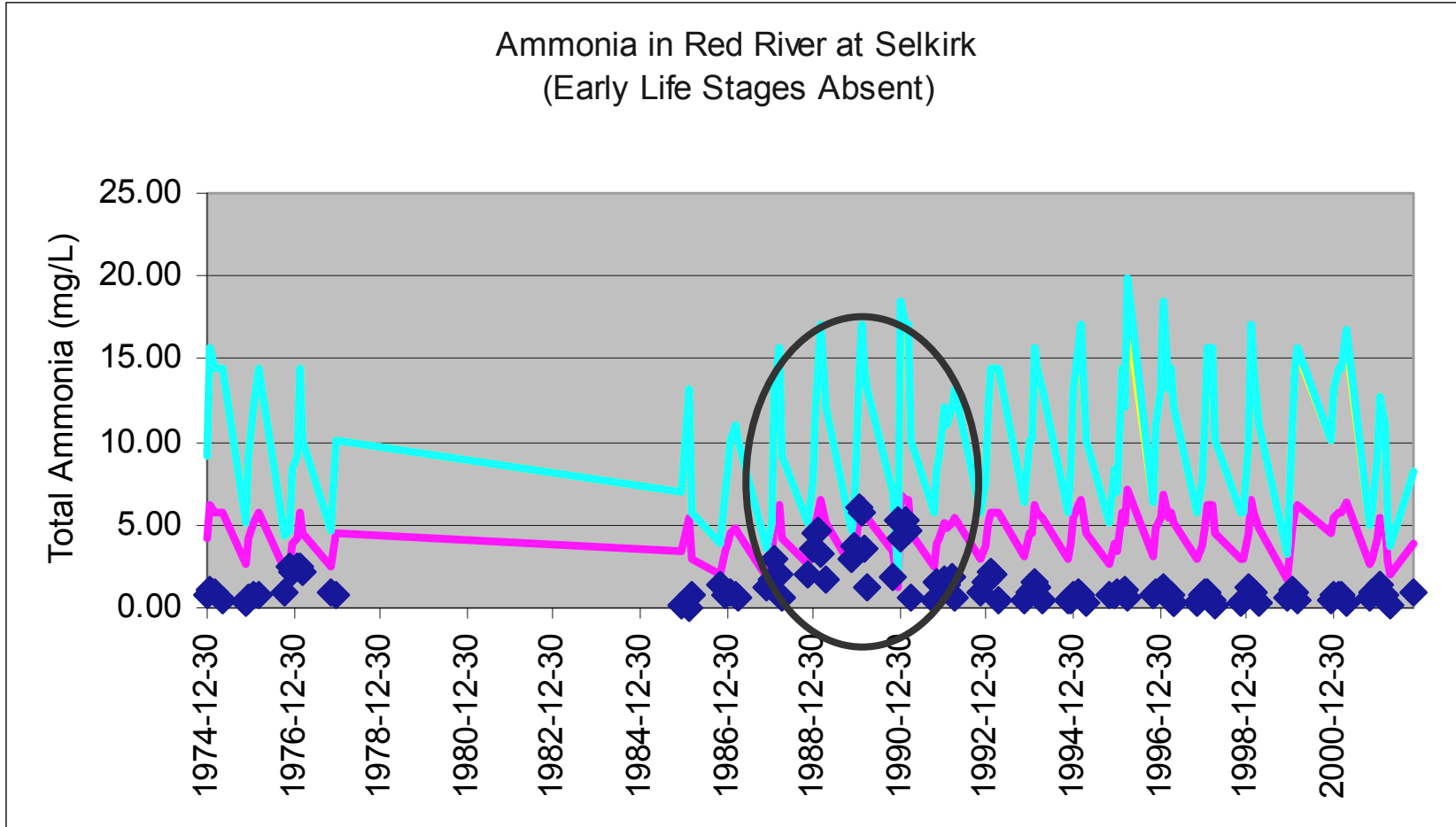
# Fecal Coliform in Red River



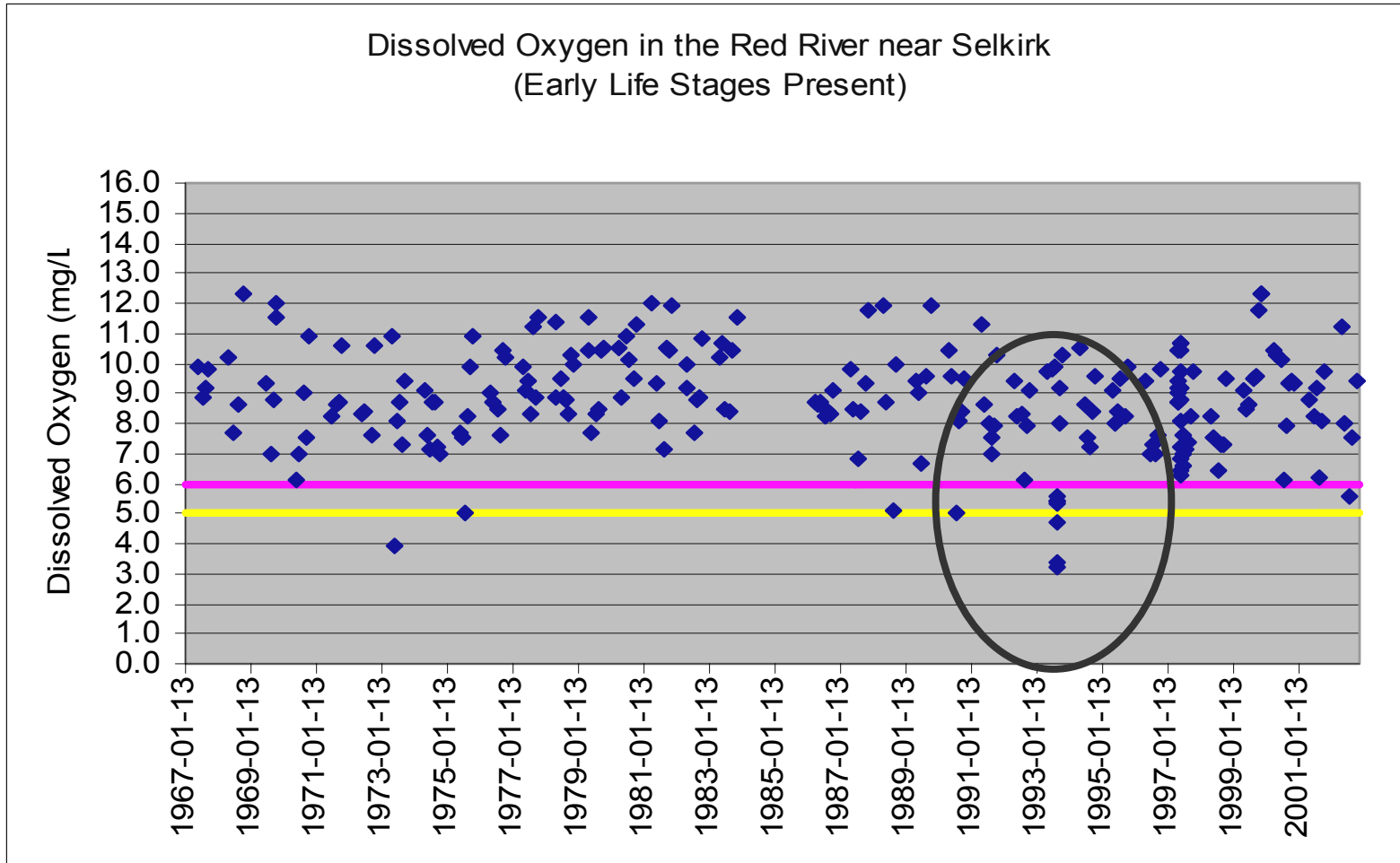
# Ammonia in Red River (Early Life Stages Present)



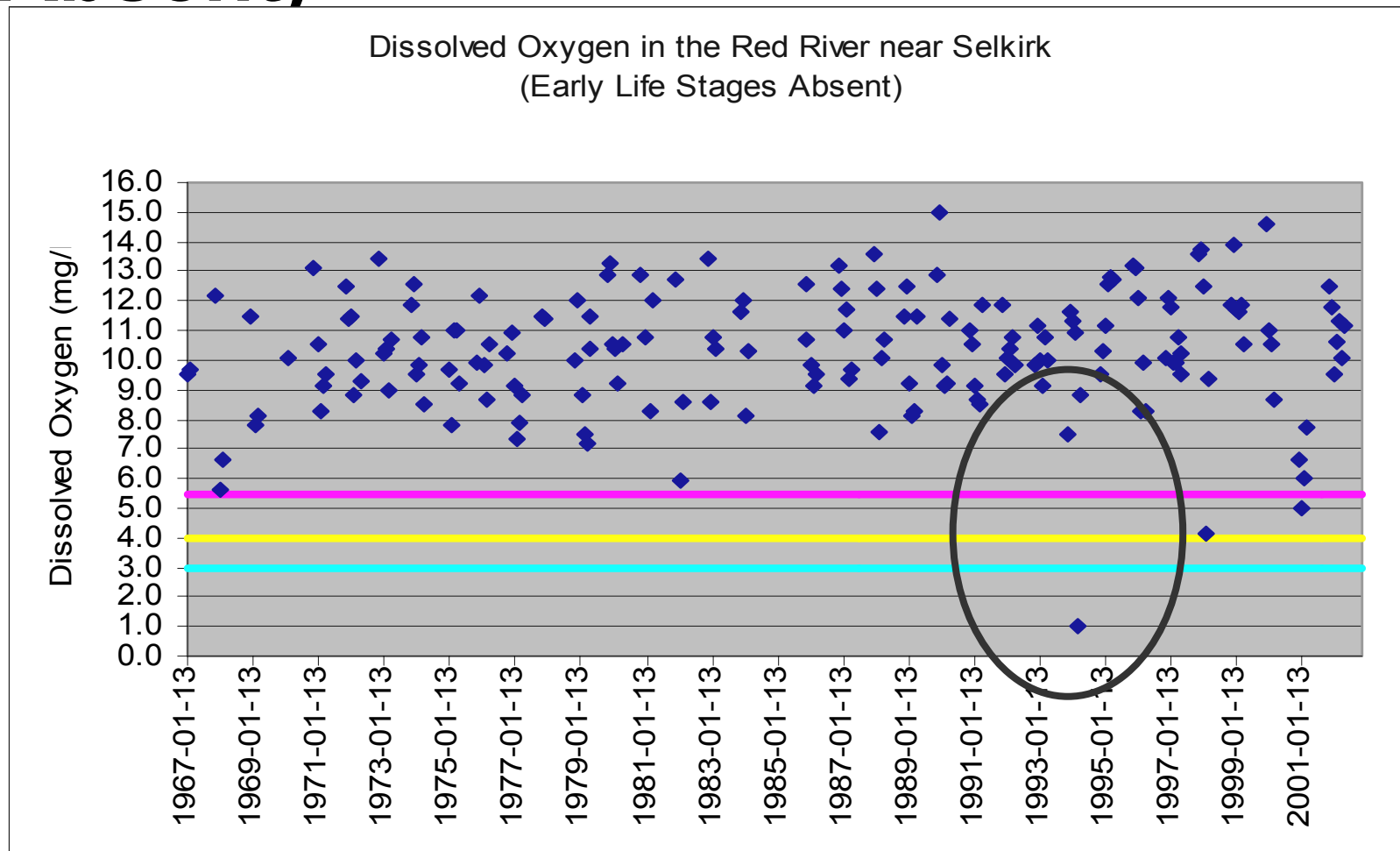
# Ammonia in Red River (Early Life Stages Absent)



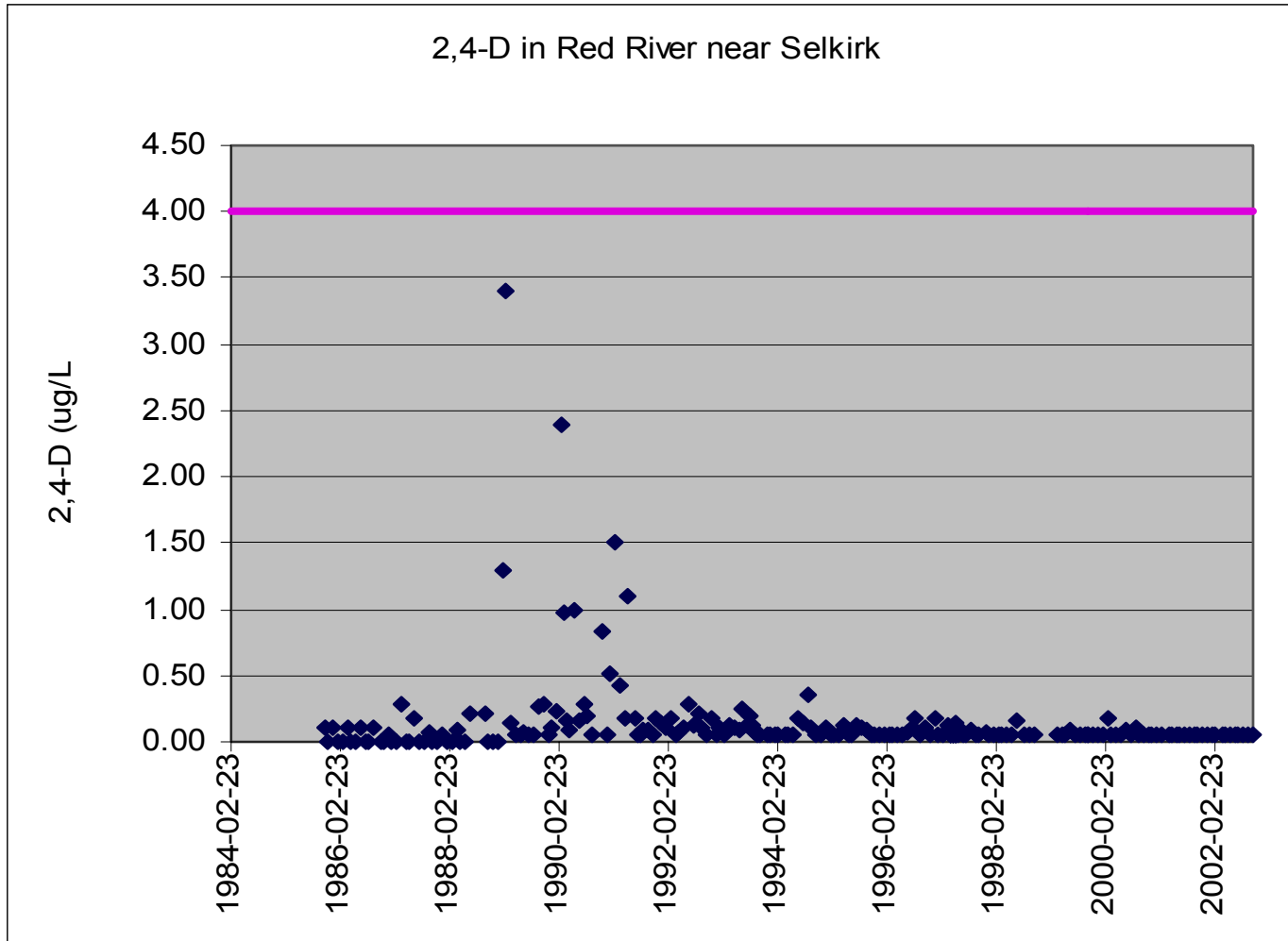
# Dissolved Oxygen in Red River (Early Life Stages Present)



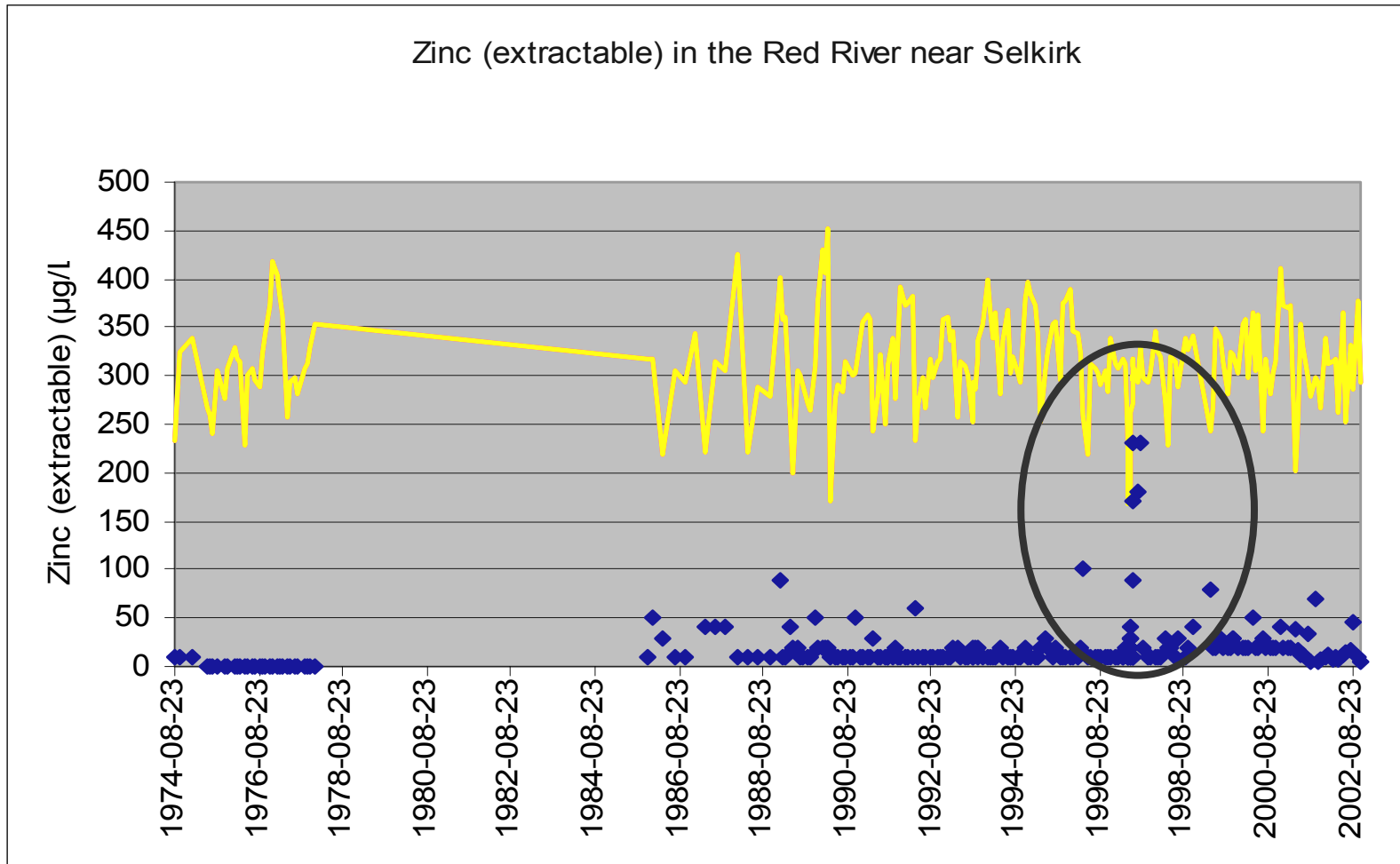
# Dissolved Oxygen in Red River (Early Life Stages Absent)



# 2,4-D in Red River



# Zinc in Red River





# Concluding Comments

- **Substantive revisions incorporated to MWQSOG**
  - **Final draft presently available for public review**
- **MWQSOG 2002 are the most comprehensive in Canada**
- **Represent the most current scientific information available and therefore, are being used to guide water quality management**

# Concluding Comments (continued)

- **Water quality issues of concern**
  - **bacteria**
  - **ammonia**
  - **dissolved oxygen**
  - **nutrients**

# Concluding Comments (continued)

- **Emerging water quality issues**
  - **pharmaceuticals**
  - **endocrine disrupting substances**

# Thank You