



North Saskatchewan Watershed Alliance

# Water Quality Objectives for the North Saskatchewan River

Presentation to:  
Canadian Water Resources  
Association

March 29, 2010



# Outline

- Why WQO's needed
- How proposed WQO's developed
- What the WQO's are
- Stakeholder Role
- Application to other GoA initiatives



# Water Quality Objectives

- Key part of the NSWA's Integrated Watershed Management Plan (IWMP)
- What future water quality do stakeholders want in the North Saskatchewan River?



# WQO Project

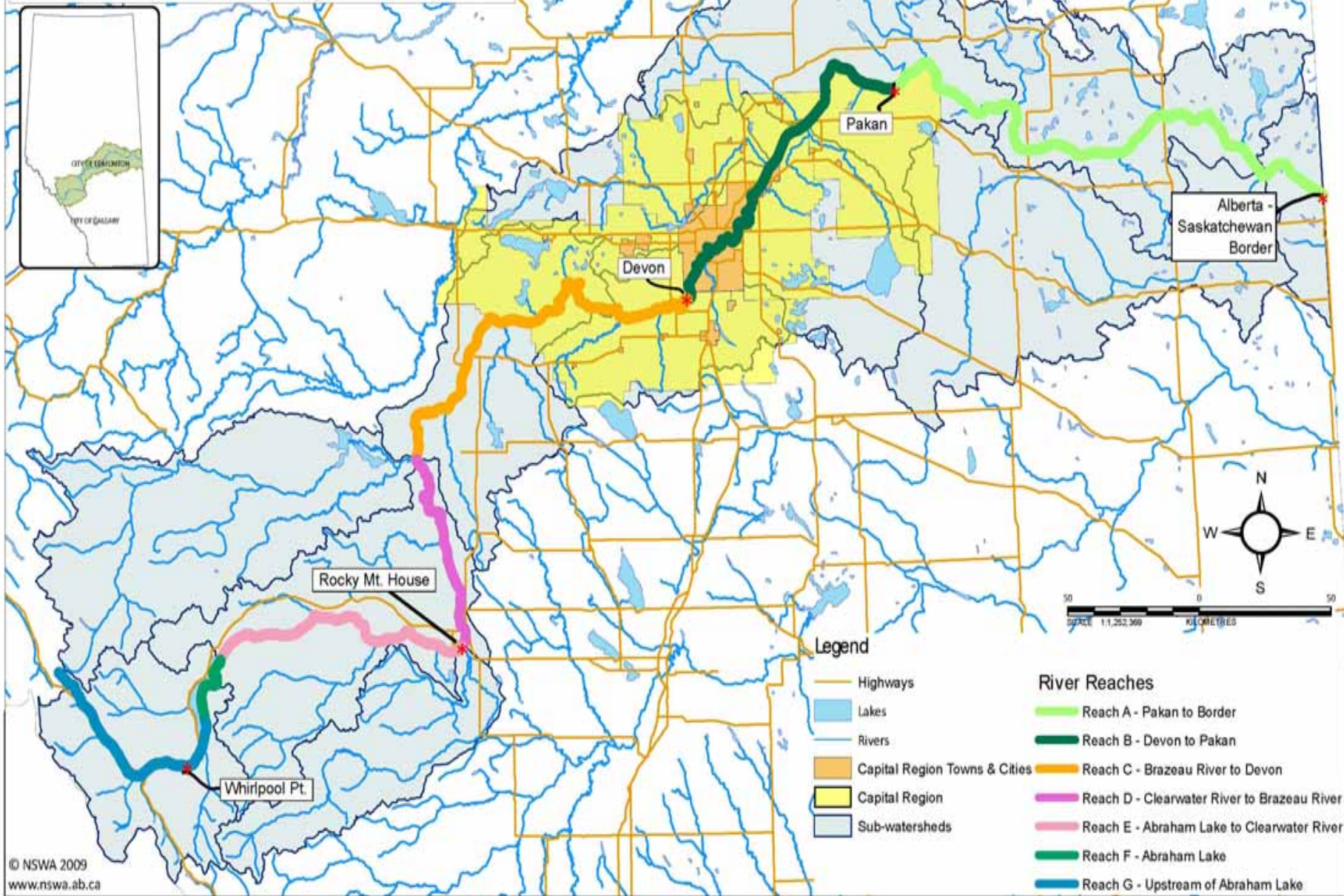
- Purpose:
  - To propose site-specific water quality objectives for the NSR mainstem that protect all its current water uses
- Done by a Technical Advisory Committee working with Golder
- Starting point for stakeholder consultation/collaboration



# Process

- Identify river reaches & monitoring sites
- Identify water uses by reach
- Select a basic set of water quality indicators for the water uses
- Derive site-specific limits for the indicators from technical guidelines to protect the most sensitive use

Figure 3.1: North Saskatchewan River Sites for Water Quality Objectives



Use	Reach						
	Reach G	Reach F	Reach E	Reach D	Reach C	Reach B	Reach A
	Upstream of Abraham Lake	Abraham Lake	Downstream of Abraham Lake to upstream of Clearwater River	Downstream of Clearwater River to upstream of Brazeau River	Downstream of Brazeau River to Devon	Devon to Pakan	Pakan to Border
Protection of aquatic life (coldwater)	✓	✓	✓	✓	✓		
Protection of aquatic life (cool water)						✓	✓
Drinking water supply	1	1	1	✓	✓	✓	✓
Stock watering				✓	✓		✓
Irrigation				✓	✓	✓	✓
Industry					✓	✓	✓
Aesthetics	✓	✓	✓	✓	✓	✓	✓
Recreation	✓	✓	✓	✓	✓	✓	✓
Downstream water use protection	✓	✓	✓	✓	✓	✓	✓



# Select Indicators

## Criteria:

- Basic physical, chemical, and biological properties, routinely measured
- Data available
- Published, quantitative guidelines to protect uses



# Indicators Used

- total suspended solids
- turbidity
- temperature
- oil & grease
  
- total dissolved solids
- calcium
- sulphate
- chloride
- fluoride
- sodium absorption ratio

- total phosphorous
- dissolved phosphorus
- ammonia
- nitrate
- nitrite
  
- total coliforms
- fecal coliforms
- *e. coli*
- *giardia*

Most indicators apply to more than one use



# Process

- Statistical analysis of water quality data for past 20 years (1988-2007) at specific sites
- Consider variability with season and flow rate
- Compare actual water quality with site-specific limits



# Basic Assessment

Upstream of Capital Region:

- All indicators much better than guideline limits
- Occasional peak runoff conditions affect drinking water treatment (TSS/Turbidity, TOC, pathogens)



# Site-specific Objectives

Upstream of Capital Region:

Preserve existing water quality (non-degradation)

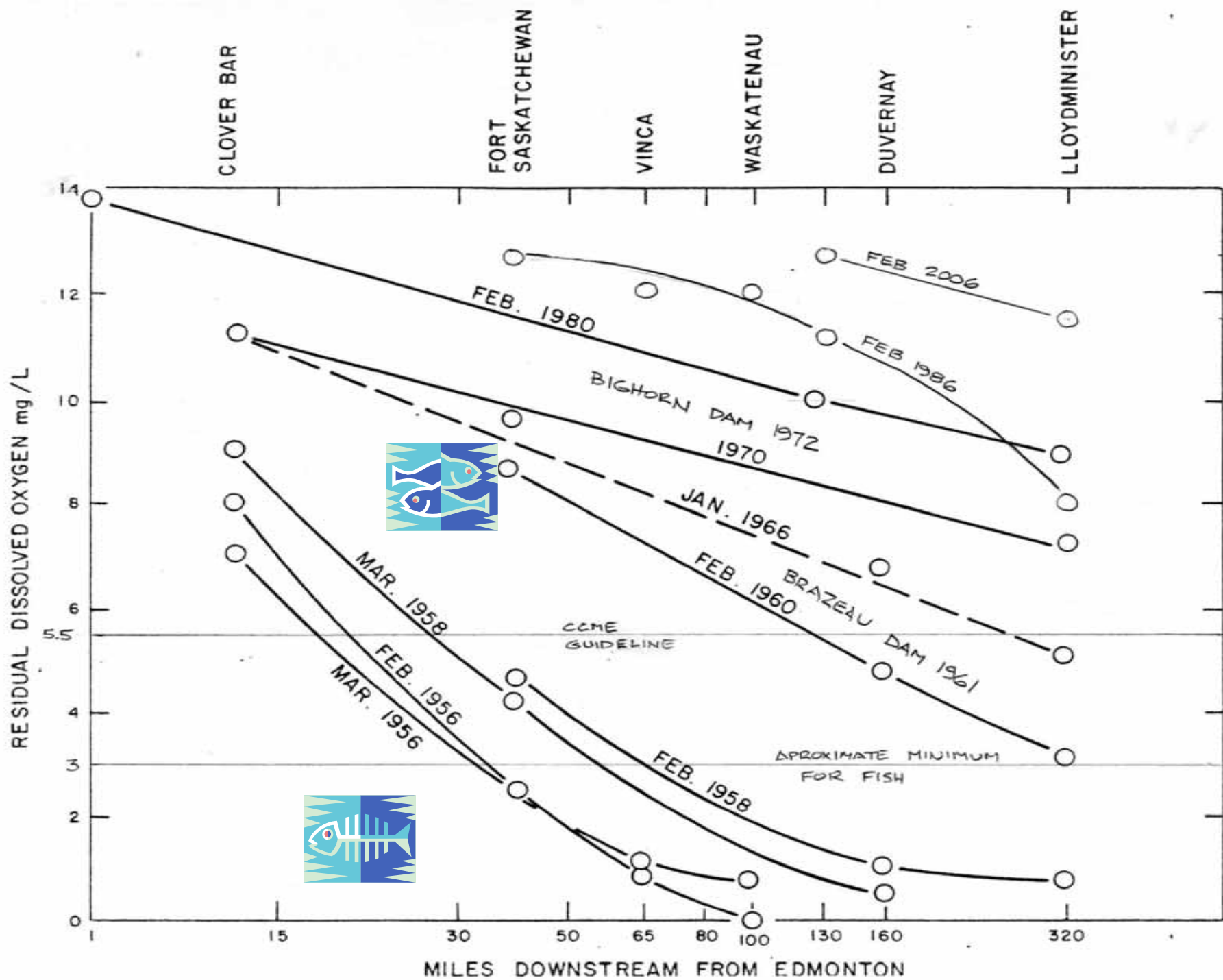
- Maintain current medians, no significant increasing trends
- Maintain current 95<sup>th</sup> percentiles, no significant increasing trends



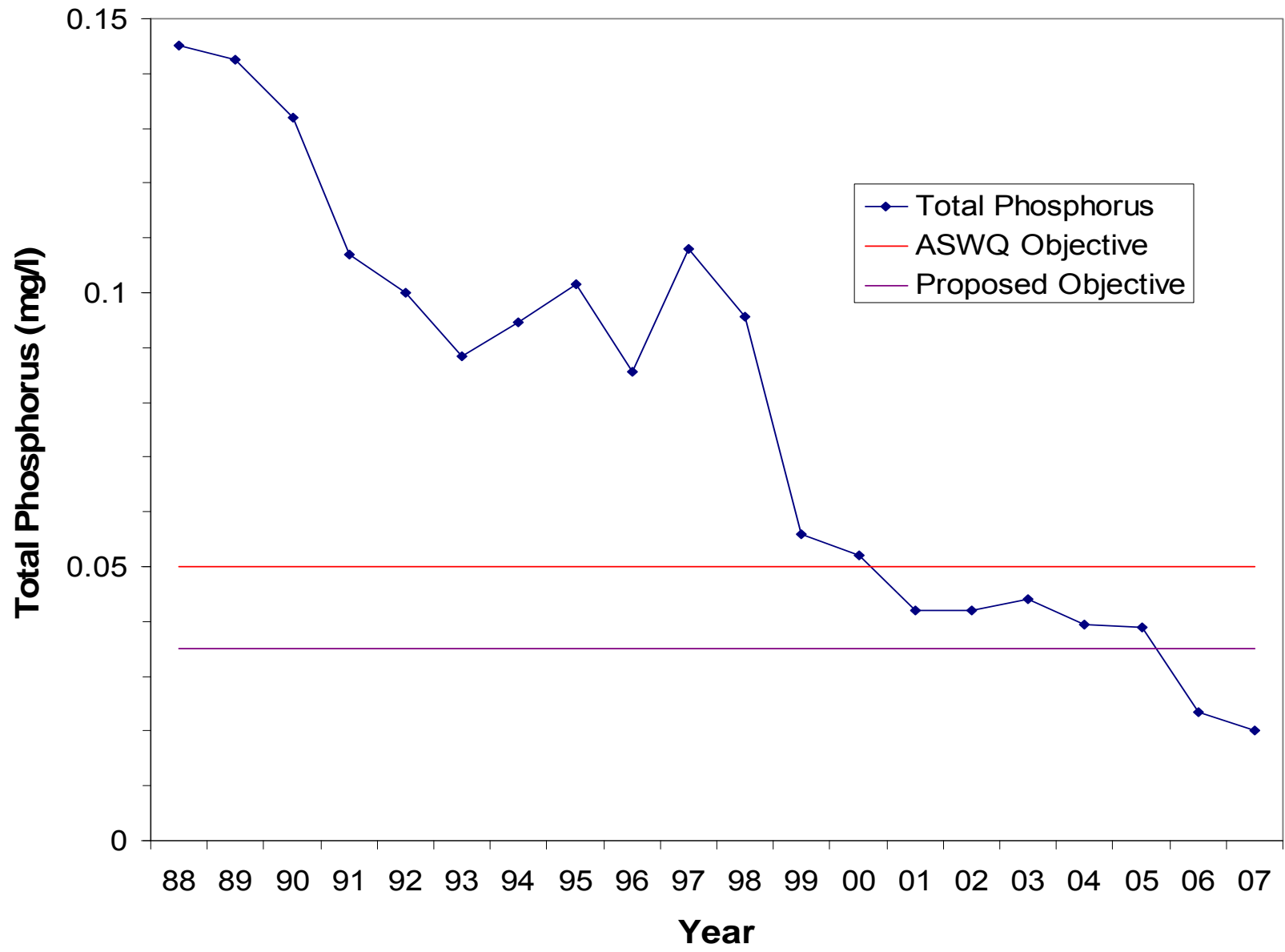
# Basic Assessment

## Downstream of Capital Region:

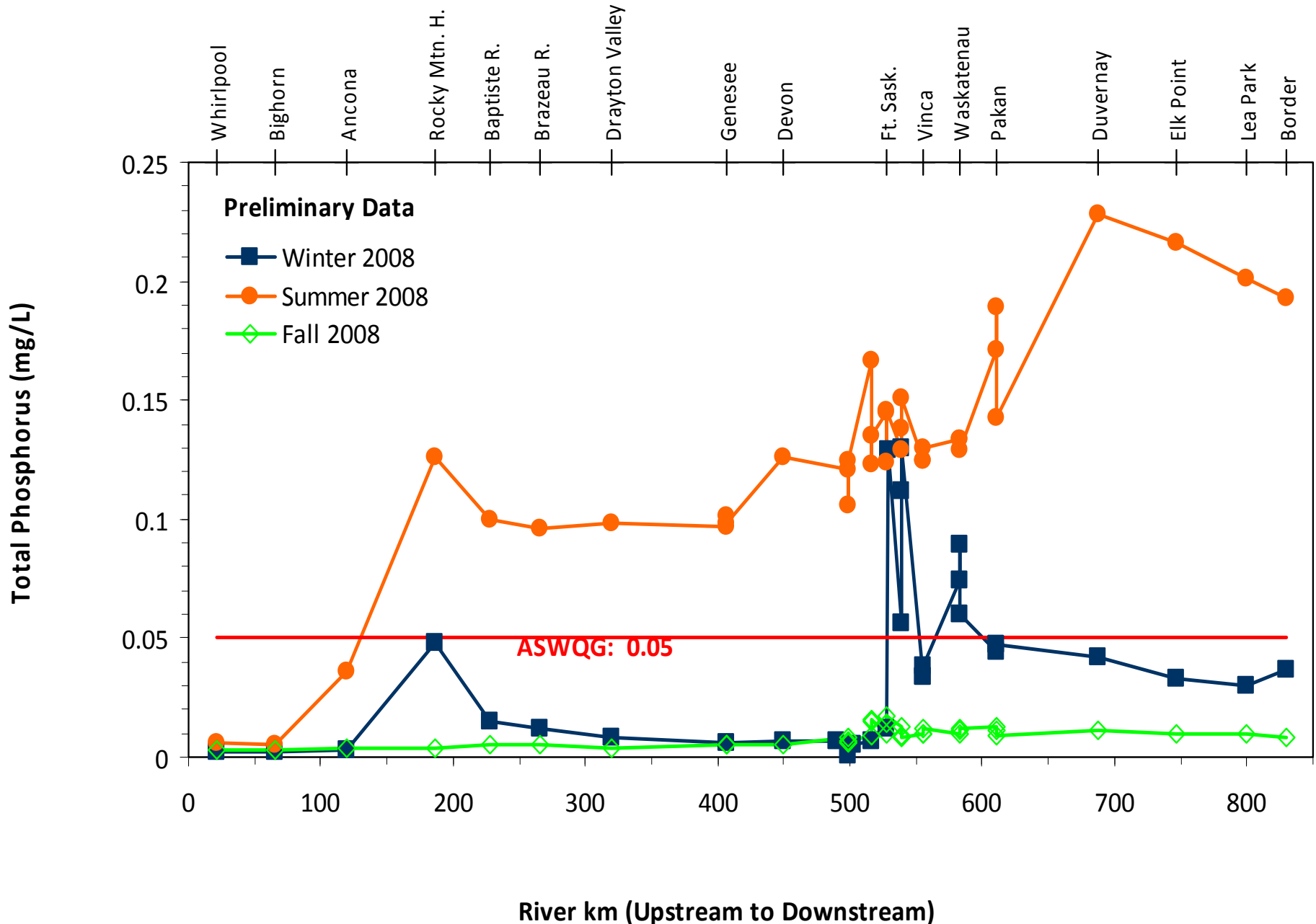
- Over longer term, some significant improvements in basic water quality
- Some urban, industrial & other impact
- Most indicators better than guideline limits but a few exceed (TSS/Turbidity, F, pathogens, TOC)



# Median Annual Phosphorus at Pakan



# NSR 08 Synoptics - Total P





# Site-specific Objectives

## Downstream of Capital Region:

- For indicators exceeding guideline, meet guideline (declining medians until at or below guideline)
- For indicators better than guideline, maintain existing water quality (no increasing trend in medians and 95<sup>th</sup> percentiles)



# WQO Implications

- New loads due to growth & development will need to be minimized
- Further increases will need to be offset by reducing existing loads
  - Has been ongoing (eg municipal WWTP's)
  - Key element of the IH WMF
  - Within or between stakeholders
- Lower river flows or increased use would require load reductions



# Proposed WQO's → IWMP

## Stakeholders role:

- Evaluate implications
- Consider environmental, social and economic balance
- Accept objectives or propose alternatives (more or less protective)
- Collaborate to set final, consensus, objectives for the IWMP



# IWMP WQO's

- IWMP is submitted as advice to Alberta Environment
- May be accepted as part of a water a water management plan or approved water management plan under Water Act
- Guide decision-making by stakeholders



# Application of WQO's

## Cumulative Effects Management:

- Intent to define desired, place-based end states that protect water, air, land and biodiversity
- IWMP WQO's could inform this process



# Application of WQO's

## Industrial Heartland Water Management Framework:

- Intent is major reduction of contaminants from municipal and industrial discharges to improve water quality downstream of Capital Region
- Includes guidelines and “targets” for 100 compounds
- IWMP WQO's should be aligned



# Application of WQO's

## Land Use Framework / Capital Region and North Saskatchewan Regional Plans

- Will use cumulative effects management to achieve healthy ecosystems
- IWMP WQO's may be used to set limits on effects of development on water for the planning region



# Summary

- Starting point for answering “What water quality do stakeholders want in the NSR”
- NSWA stakeholders will determine the final set of objectives
- Expect the objectives will inform several GoA environmental and planning initiatives

