



20 Years of Watershed Partnerships

Presented at the NSWA Educational
Forum
February 27, 2020



- The Northeast Capital Industrial Association (NCIA) is a not-for-profit industry cooperative representing industry in:
 - Strathcona County,
 - Sturgeon County,
 - The City of Fort Saskatchewan, and
 - Lamont County.
- The Fort Saskatchewan Regional Industrial Association (FSRIA) began in 1981 and rebranded to NCIA in 2004.



- NCIA is the Voice of Industry in Alberta's Industrial Heartland.
- We spend over 10,000 person hours/year working with government (municipal, provincial and federal) on policy matters related to the Edmonton Metropolitan Region (which includes Alberta's Industrial Heartland).



- NCIA has 23 members as of January 2020.

PRAXAIR.



Community Partners





Industrial Association Partners





Regulators we work with



THE WATER MANAGEMENT FRAMEWORK

FOR THE INDUSTRIAL HEARTLAND AND CAPITAL REGION

Past/Present/Future



- On October 7, 2007, Rob Renner, Minister of Environment announced a new cumulative effects management framework approach to protect air, land and water.
- The first application of the broad cumulative effects strategy was a management framework for water use in the Industrial Heartland and Capital Region (now referred to as the Edmonton Metropolitan Region).
- To advise on the Framework, a Water Committee for the Industrial Heartland and Capital Region was formed.
- The Committee was asked to advise on an integrated regional solution to address the water quantity and quality issues surrounding the use of the North Saskatchewan River beginning at the town of Devon and ending at the Pakan bridge/water quality station.

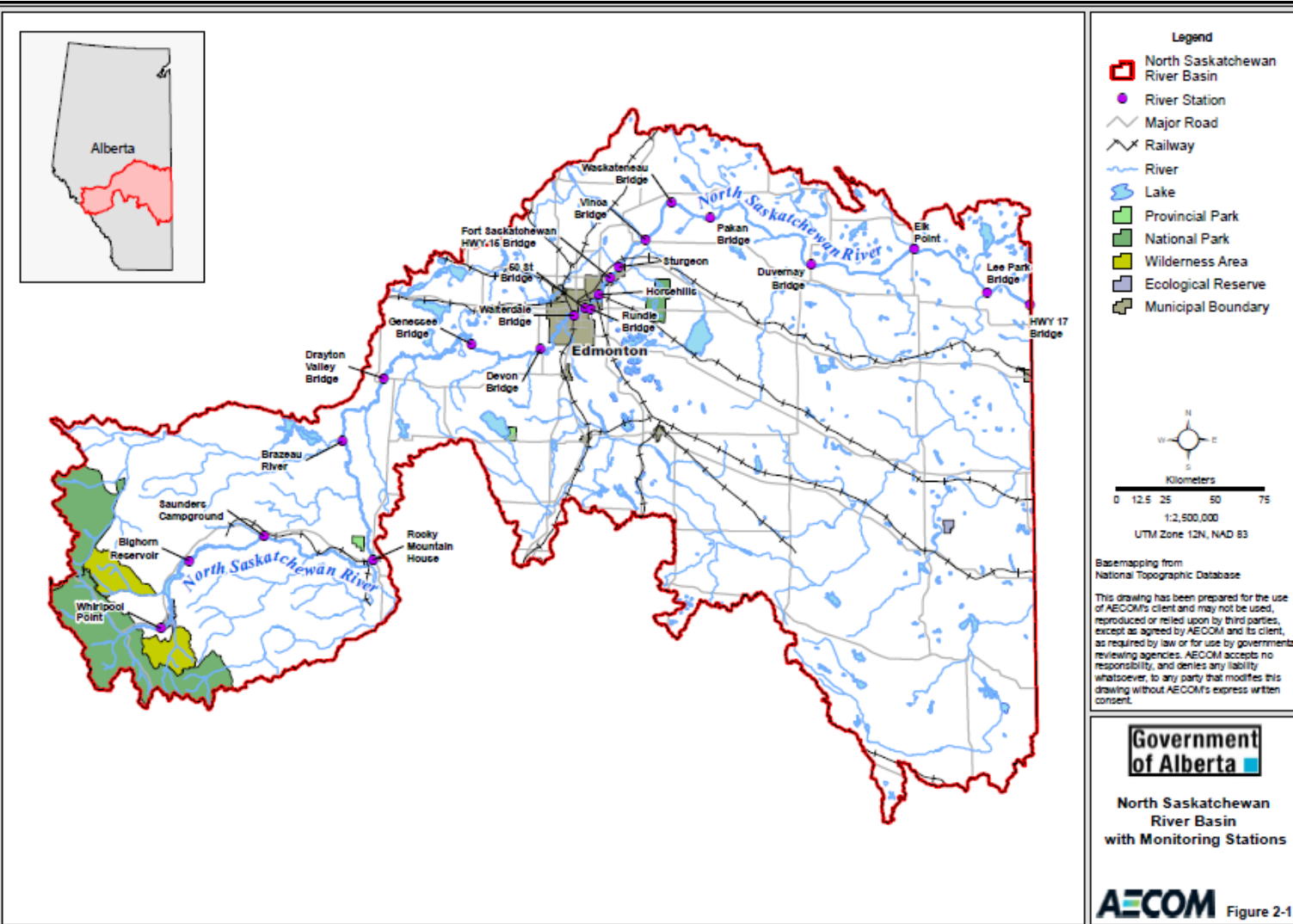


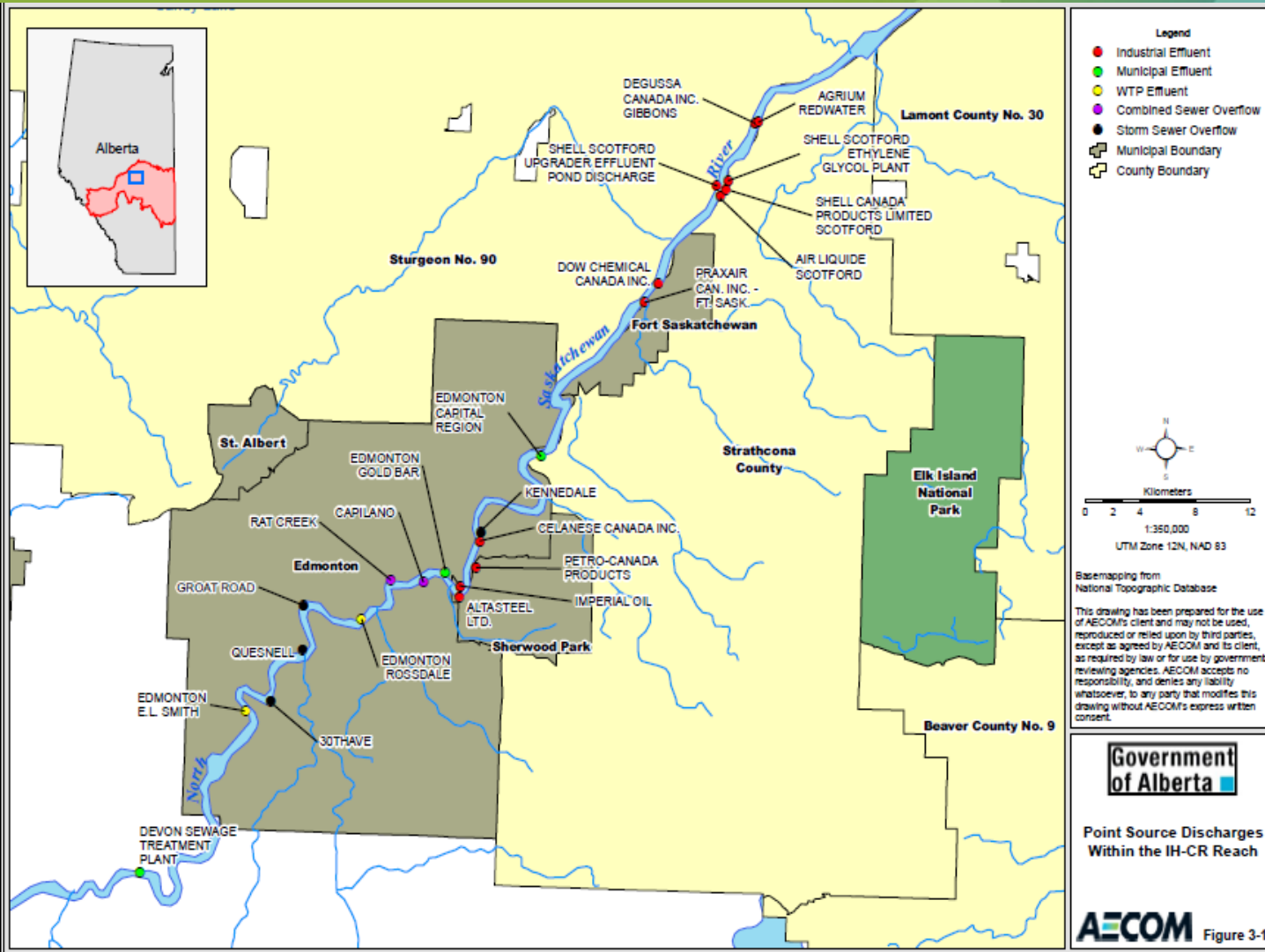
Vision

A world-class integrated water management system within the North Saskatchewan River to sustainably support the environment, and social and economic development.

- In 2007, Alberta's economic momentum led to anticipation of significant development along the North Saskatchewan River.
- In particular, there were 7 proposed bitumen upgraders in Alberta's Industrial Heartland.
- This increased development and increased population challenged stakeholders to consider how best to balance economic and social growth with environment.

- North Saskatchewan River Basin





- Effluent Dischargers in the Devon to Pakan Reach

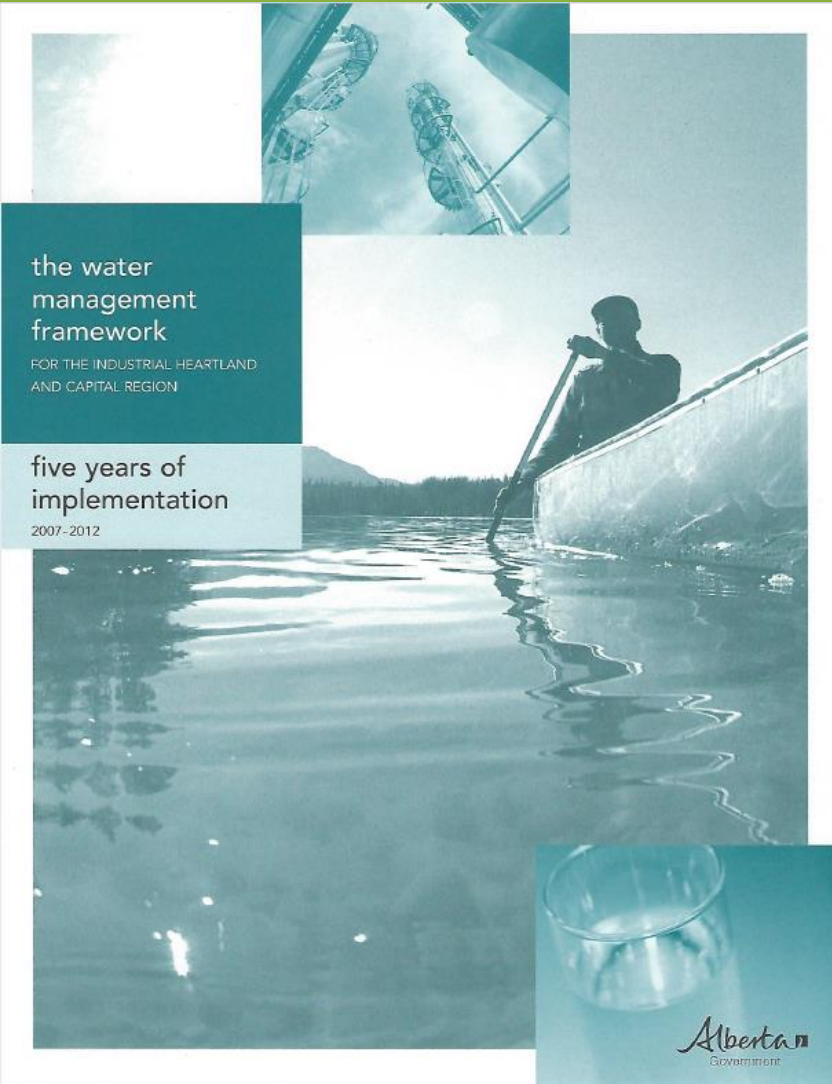
Government
of Alberta

Point Source Discharges
Within the IH-CR Reach

AECOM Figure 3-1

The 2012 Status Report

- Jump forward 5 years and things were a lot different.
- Only one upgrader / refinery moved forward (NWRP).
- During this time, the Committee gathered data on the condition of the river, conducted modelling studies, and created a suite of variables of concern for further study.
- The Committee also looked at long-term development scenarios, including the use of reclaimed municipal wastewater for industrial use.



the water management framework

FIVE YEARS OF IMPLEMENTATION
2007 - 2012

overview

FOR THE INDUSTRIAL HEARTLAND
AND CAPITAL REGION



The quality and availability of the water in the North Saskatchewan River is fundamentally important to the population and economic activity of the Industrial Heartland and Capital Region. The Government of Alberta is working with citizens, communities and industry to improve our resource management systems, protect the environment, develop Alberta's prosperity and support expanded market access, and support population growth. The *Water Management Framework for the Industrial Heartland and Capital Region* is one of several environmental management frameworks collaboratively developed in recent years. This framework aligns with the goals of the Government of Alberta's Integrated Resource Management System that sets and achieves the environmental, economic and social outcomes Albertans expect from resource development while maintaining the social licence to develop resources.

WHERE IT ALL STARTED

The vision of the *Water Management Framework for the Industrial Heartland and Capital Region* is to create a world-class integrated water management system within the North Saskatchewan River, from Devon to Pukin, to sustainably support the environment considering social and economic development. It represents collaborative work and shared responsibility for action among the Capital Region stakeholders, including industry, municipalities, environmental non-governmental organizations, and federal and provincial governments. A three-phased implementation plan was developed (short term, intermediate and long-term sustainability) to tackle the development pressures. Phase 1 (Enabling Current Development) is considered complete.

The framework considers two main issues: water quantity and water quality. It proposed that water quantity be managed based on flow expectations. The goal was to manage water quantity to ensure that sufficient water remained in the river to maintain aquatic life and support current and proposed industrial development. Significant advancements have improved the understanding of the current state of the North Saskatchewan River water quality baseline, which are described in the following sections.



- The Industrial Heartland and Capital Region governance and management of wastewater treatment assets is unique.
- The existing system of shared intakes and comingled effluent treatment is a representative model of a world-class system.

the water
management
framework

FIVE YEARS OF IMPLEMENTATION
2007-2012

north saskatchewan
river quality

FOR THE INDUSTRIAL HEARTLAND
AND CAPITAL REGION

The quality of the North Saskatchewan River changes over the course of the seasons and years, and in response to changes in river flow. During periods of high river flow, the North Saskatchewan River upstream of Devon contributes large amounts of suspended sediments and associated contaminants, to the Industrial Heartland Capital Region reach. At such times, the high levels of suspended material and associated contaminants, challenge the treatment capacity of water treatment plants.

WHAT INFLUENCES THE QUALITY
OF THE NORTH SASKATCHEWAN RIVER
IN THE INDUSTRIAL HEARTLAND
CAPITAL REGION REACH?

Superimposed on seasonal and flow related influences, the cumulative effects of municipal and industrial discharges to the river influence water quality and aquatic ecosystem health in the river.

- The treatment of municipal sewage is much better now than in the 1980s and municipal effluent loads of nutrients, oxygen consuming material, and pathogens (bacteria, viruses and protozoans) have dropped considerably. As a result, conditions in the river have improved with respect to these pollutants. The river remains generally well oxygenated in winter, nutrient and bacteria levels are lower, and invertebrates that require good water quality are now common throughout the Industrial Heartland Capital Region reach.

- Despite these improvements, nutrient enrichment remains the most apparent human impact on the North Saskatchewan River in the Industrial Heartland Capital Region reach. Treated sewage is still the single largest man-made source of nutrients on an annual basis, but industries, storm and combined sewers, and urban tributaries also contribute nutrients to the North Saskatchewan River. Algae that grow on submerged rocks are sensitive indicators of nutrient enrichment and their biomass increases noticeably downstream of municipal effluents. This could indicate that nutrient levels in the river are not low enough to limit algal growth to desirable levels.



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the water
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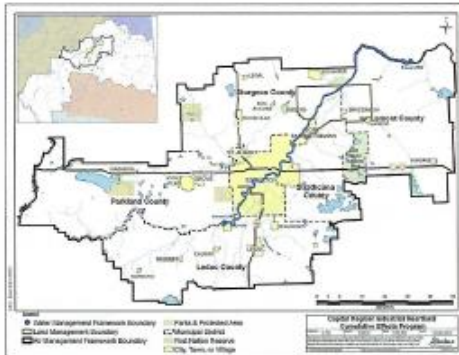
project 2

FOR THE INDUSTRIAL HEARTLAND
AND CAPITAL REGION

The Devon to Pakan reach of the North Saskatchewan River provides potable and non-potable water to municipal and industrial entities in the Industrial Heartland and Capital Region. The North Saskatchewan River also receives back treated wastewater, termed effluent, from these same entities. These subjects are an important part of the Water Management Framework for the Capital Region and Industrial Heartland, which established a Vision, Strategic Objectives and Guiding Principles for an integrated regional framework to manage water quality and quantity in the North Saskatchewan River in this reach.

WHAT IS PROJECT 2?

Project 2 is the Engineering Study for Evaluation of Industrial Water Supply and Wastewater Treatment Alternatives for the Industrial Heartland and Capital Region. In this two-tiered study, five alternate engineering scenarios that encompassed wastewater management for all municipal and industrial entities in the region, and the supply of non-potable water for existing and future industries located in the Sherwood Park, Strathcona County and Fort Saskatchewan areas, were developed and evaluated in consideration of a Year 2041 planning horizon. In their conception these scenarios were deemed capable of meeting the framework principles while at the same time representing the "book ends" of possible strategic directions in meeting this end.



- Project 2 was an Engineering study for *Evaluation of Industrial Water Supply and Wastewater Treatment Alternatives for the Industrial Heartland and Capital Region*.
- 5 alternate engineering scenarios were developed and evaluated.
- In general the scenarios were intended to provide water to industries located in the Industrial Heartland and Capital Region while reducing constituent mass loading to the North Saskatchewan River.
- When viewed through a lens of environmental, social and economic considerations, and risk attributes, **a modified version of the existing management system emerged as the most favourable scenario by a wide margin.**

The 8 year progress report (2015 Status Report)

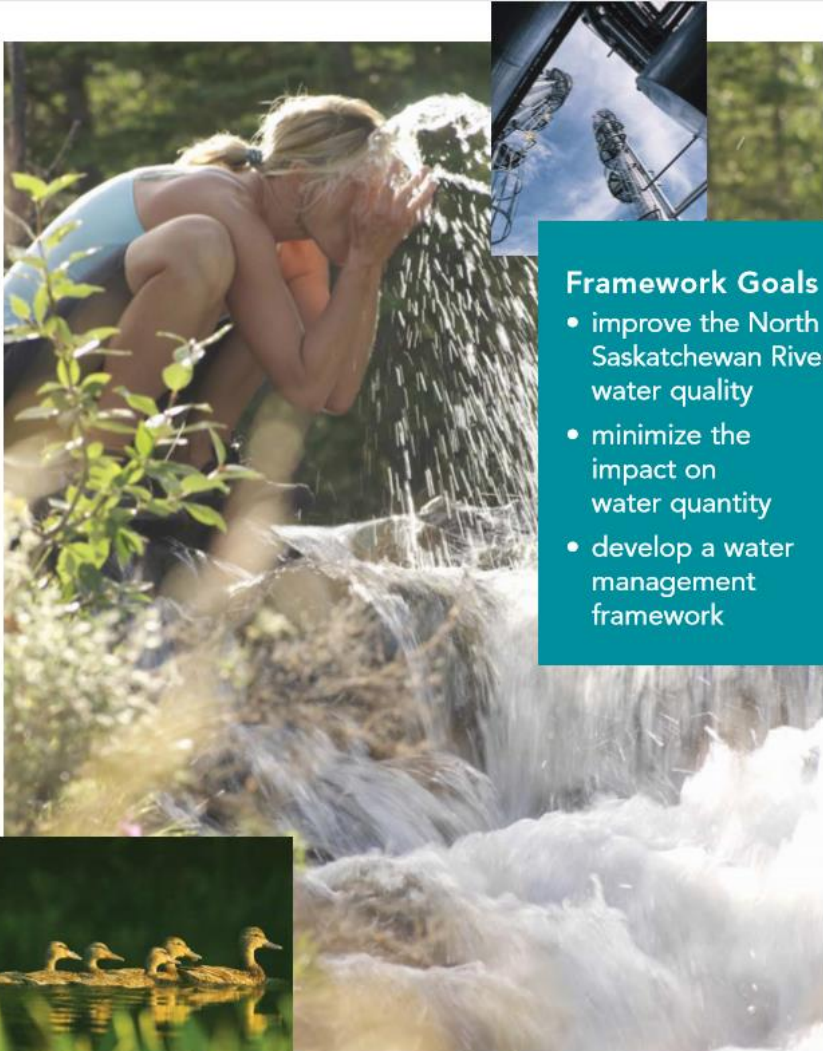
- Developed a pilot suite of 21 Parameters Of Concern (POC).
- With the help of the North Saskatchewan Watershed Alliance, Water Quality Objectives (WQOs) were established to enable the goal of maintaining or improving water quality in the North Saskatchewan River (focused on the Devon to Pakan reach).
- Maximum Allowable Loads (MAL) were calculated for 20 of the POCs.
- Studies into the health of the reach helped to show that water quality is improving.
- The trend over time (1987 to 2011) has shown improvement in water quality at Pakan for dissolved oxygen, nutrients, chlorophyll-a and total copper.
- It also showed an increase in total suspended solids, sulphate, fecal coliform and zinc.



the water
management
framework

FOR THE INDUSTRIAL
HEARTLAND AND
CAPITAL REGION

8 years of
implementation



Framework Goals

- improve the North Saskatchewan River water quality
- minimize the impact on water quantity
- develop a water management framework

The 8 year progress report continued

- A *Synthesis of Recent Knowledge on Water Quality, Sediment Quality and Non-Fish Biota in the North Saskatchewan River*, was completed.
- It compiled and assessed data and reports from 2005 to 2012 and made several recommendations.
- A suite of modelling tools were developed and implemented.

Effluent Characterization Program (ECP)

- As part of the federal CCME requirements, the municipal wastewater treatment plants completed effluent characterization studies in 2013/2014.
- The initial ECP was therefore, focused on industrial effluents discharged into the North Saskatchewan River, and was completed in 2016/2017.
- 300 parameters were included in this monitoring program.

NSR Water Users (Devon to Pakan)	NSR Effluent Dischargers (Devon to Pakan)
City of Edmonton (EL Smith and Rossdale WTPs)	Devon WWTP
Capital Power (once through cooling water)	Edmonton EL Smith WTP
Imperial Oil Refinery	Edmonton Rossdale WTP
Suncor Refinery	Edmonton Gold Bar WWTP
AltaSteel	Imperial Oil Strathcona Refinery
Sheritt International Corporation	Alta Steel Edmonton
Dow Chemical Canada	Suncor Edmonton Refinery
Shell Scotford	Capital Power (once through cooling water)
Air Liquide Canada	Alberta Capital Region WWTP
North West Redwater Partnership Refinery	Praxair Fort Saskatchewan
Nutrien Redwater Fertilizer Operations	Dow Chemical Canada
	Air Liquide Canada Scotford
	Shell Scotford
	Nutrien Redwater Fertilizer Operations

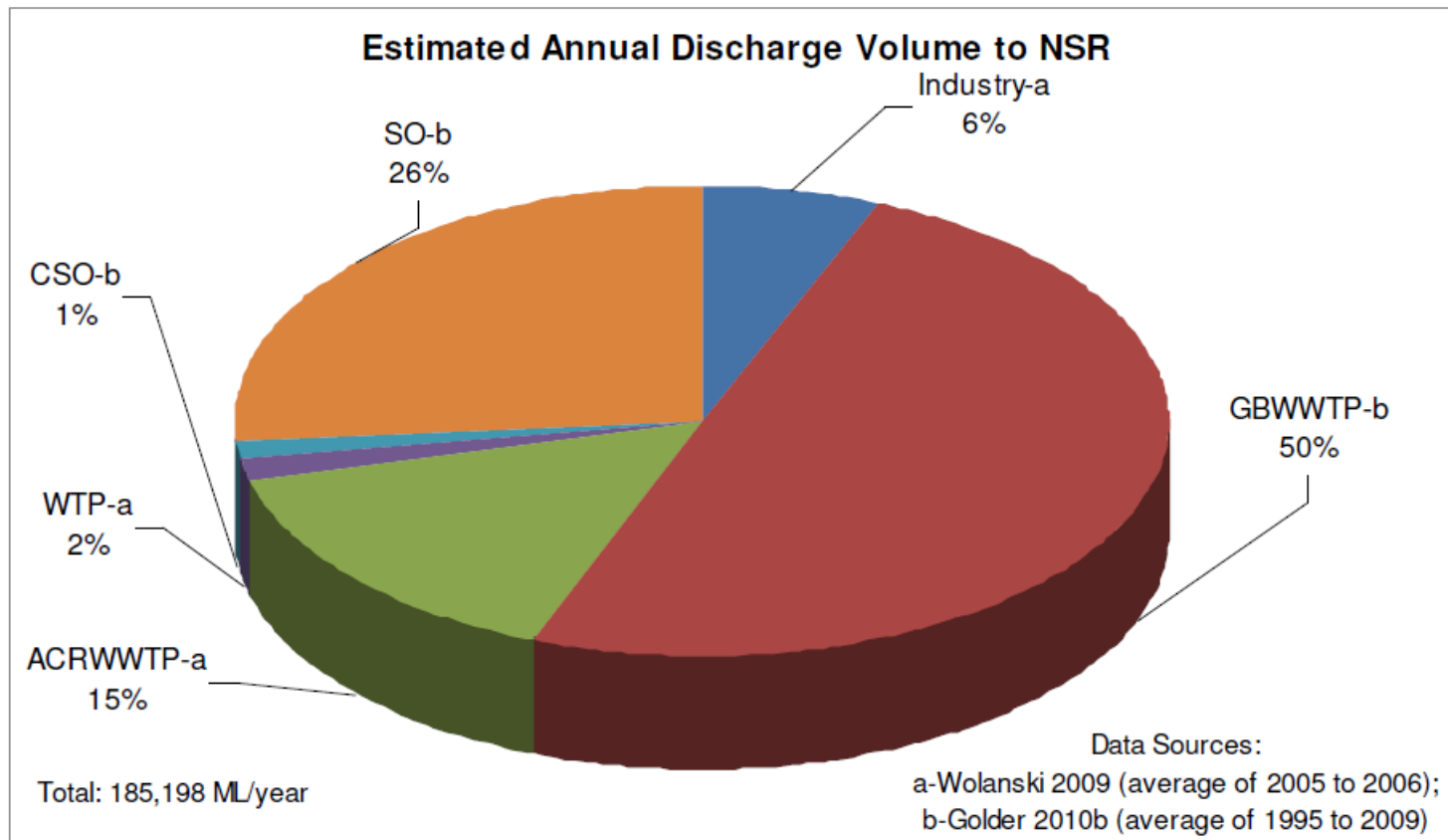


Figure 3-2. Estimated Annual Total Volume Discharged to the NSR in the IH-CR Water Management Region¹

What we know today:

- WWTPs account for about 65% of the effluent entering the North Saskatchewan River.
- Storm water outfalls account for about 27%.
- Industry accounts for about 6%.
- WTPs about 2%.

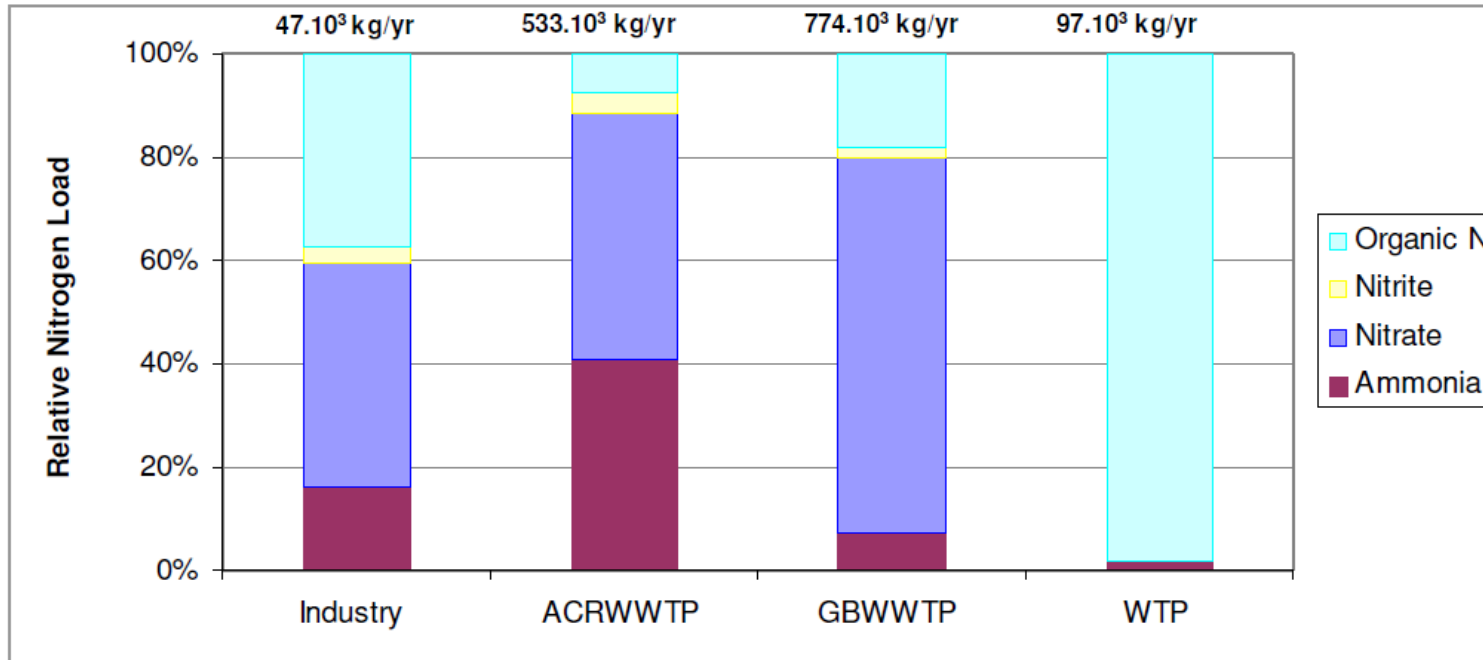


Figure 3-8. Relative Contribution of Ammonia and Nitrate from Industry and Municipalities (WWTP, WTP)

Although the average daily loads contributed by municipal discharges have declined substantially since 2005, municipal wastewater treatment plants remain the largest sources of inorganic nitrogen (ammonia and nitrate) to the NSR.

What we know today:

- 90% of the nutrient loading to the North Saskatchewan River comes from the two WWTP.

What we know today:

- 75% of the Phosphorous loading to the North Saskatchewan River comes from the WWTPs and the WTP.
- 25% comes from industrial effluent.

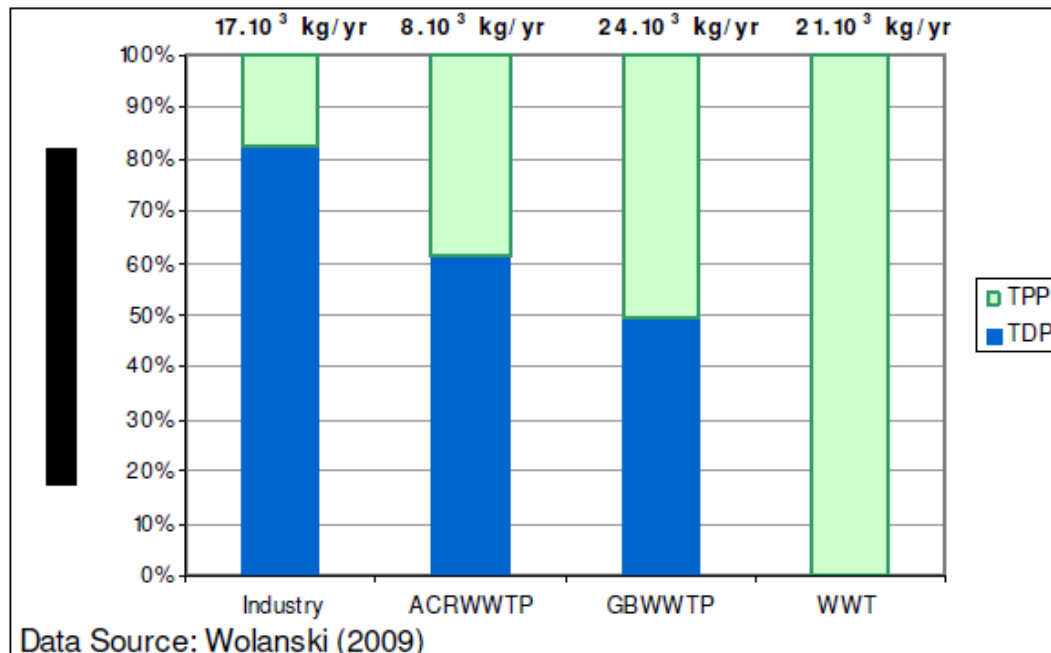


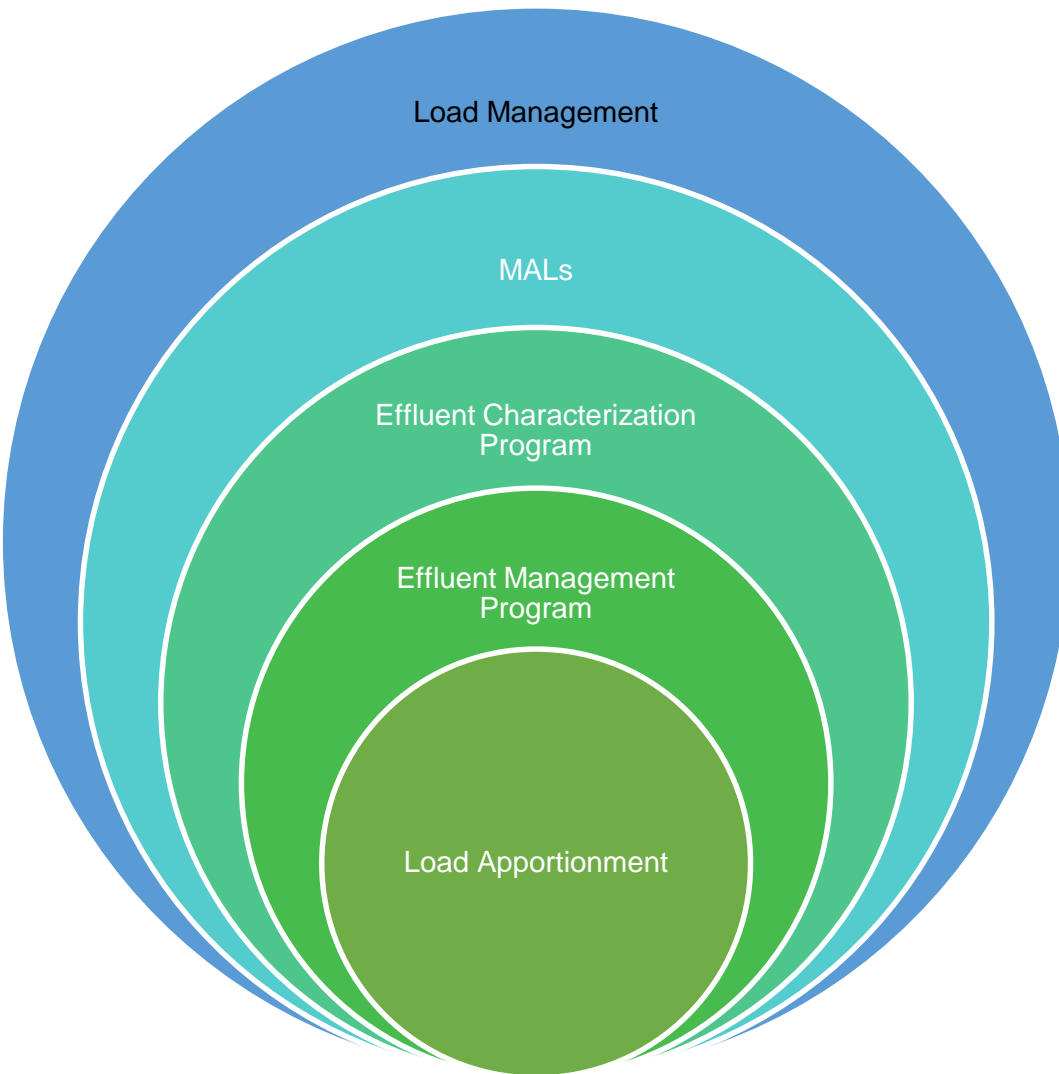
Figure 3-12. Relative Contribution of Phosphorus from Industry and Municipalities (WWTP, WTP)

Effluent Characterizations:

- Completed by the WWTPs in 2013/2014 and by Industry in 2016/2017.
- Learned that the following continue to present challenges for the North Saskatchewan River:
 - Ammonia
 - Phosphorous
 - Nitrite + Nitrate Nitrogen
- All other measured parameters were well below the Maximum Allowable Loads (where an MAL exists).

Where to From Here?

- A second more targeted (from a parameter of concern perspective) round of effluent characterizations will begin in March of 2020.
- Samples will be taken approximately every 15 days for 12 months.
- Industry and Municipal discharges are participating in this round.
- Once we have that in hand, we will be better positioned to understand where to focus our efforts to improve the North Saskatchewan River water quality for the future.



10 Year Plan:

- Load Management
 - water quality management
- Maximum Allowable Loads
 - acceptable loading levels and seasonality
 - upstream conditions
- Effluent Characterization Program
 - sector management
- Effluent Management Plan
 - facility management
- Load Apportionment
 - parameter limits in facility approvals

Industry working Together:

- Shared infrastructure (reduces the number of straws in the river);
- Sending industrial effluent to WWTPs to provide better treatment and reduce ultimate footprint on the river.
- Increasing reuse of water on industrial sites.
- Management of storm water on sites prior to discharge to the North Saskatchewan River.



Fast Facts 2019

- 23 members from large integrated global chemical and petro-chemical companies, fertilizer and metals manufacturing facilities to smaller industrial service companies [property assessed values from \$5 million up to \$5 billion).
- NCIA member companies directly employ just over 7,000 people (including long term contract employees), which create an additional 24,700 indirect jobs. This translates into a **payroll of \$700 million** (direct jobs) and provincial tax revenues from our employees of **\$70 million annually** (direct jobs).
- NCIA member companies spend over **\$2 billion annually** to purchase goods and services in the region, not including utilities and feedstock for their operations.
- Current industrial investment in manufacturing plants and infrastructure in the region **exceeds \$42 billion**, and an additional \$10 to \$15 billion in investment is possible in the next 5-10 years.
- Municipal taxes paid by NCIA members in 2019 were just **over \$97.8 million** (plus \$6.5 million in Education taxes):
 - \$18.67 million to the City of Fort Saskatchewan
 - \$59.66 million to Strathcona County
 - \$15.90 million to Sturgeon County
 - \$2.88 million to the County of Lamont and
 - \$0.73 million to the City of Edmonton.



Dr. Laurie J. Danielson, P.Chem.
Executive Director
Northeast Capital Industrial Association
780.992.1463

www.ncia.ab.ca