CURRENT AND FUTURE WATER USE IN THE NORTH SASKATCHEWAN RIVER BASIN

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1.0 INTRODUCTION

Alberta's *Water for Life* strategy, released in 2003, created a new agenda for water management in Alberta. The strategy confirmed that Albertans want a safe, secure drinking water supply, healthy aquatic ecosystems and reliable, quality water supplies for a sustainable economy, and established a series of research priorities and action that will ensure that these goals are attained. One of the key directions in the strategy was knowledge and research: Albertans will have the knowledge needed to achieve safe drinking water, efficient water use and healthy watersheds. Information and knowledge of provincial water resources was identified as the most critical element in being able to manage water efficiently.

A starting point in effective water management is to understand the extent to which Alberta's water resources have already been committed to human and economic activity. How much water has been allocated? How much is currently being used? The answers to these questions are fundamental to the calculation of natural flows, which are used as basis for determining available water supply and its variability; as a potential measure for determination of healthy ecosystems; and, for developing management plans for each of the province's watershed. Understanding current water use is also necessary for developing and assessing the effects of water conservation and productivity plans. And, by examining recent trends in water use, forecasts of water use can be developed to assist water managers in identifying potential problems before they occur.

In recognition of the need for a better understanding of current and future water use, Alberta Environment prepared an assessment of the status of water allocations and use in each of Alberta's major river basins. Concurrently, the North Saskatchewan Watershed Alliance (NSWA) commissioned a study to determine current water allocations and use for each of the major types of water use in each of the sub-basins of the North Saskatchewan River Basin. AMEC Earth and Environmental (AMEC) was retained to complete this study and a summary of its findings are presented in this report.

1.1 Approach

This assessment of water demand in the North Saskatchewan River Basin (NSRB) involved four major tasks:

1. Establishing current water use patterns in the basin by examining the maximum amounts of water that can be withdrawn, consumed or lost under the terms of all existing and cancelled surface and groundwater licences and registrations. This water use pattern was derived based on the review of the database of licences and registration information maintained by Alberta Environment (EMS database).

2. Determining actual water withdrawals and use through a review of Alberta Environment's Water Use Reporting System (WURS) plus any applicable available information.

3. Developing socioeconomic profiles for each sub-basin. At the time of writing, the initial

results of the 2006 Census were just being released and only consisted of the population numbers. In the absence of more current information on demographic and economic activity, this analysis draws information from the 2001 Census.

4. Identifying water major use trends and factors and preparing water demand forecasts up to 2025, using five-year intervals from 2005. This analysis of water demand relies predominantly on historic and existing information.

It should be noted that water use estimates and forecasts contained in this sub-basin study may differ from any previously-completed, basin-level assessments of water use. Any discrepancies reflect the availability of better quality information at the sub-basin level and resulting changes to some of the methodology. However the overall trends and conclusions in both the basin and sub-basin study are similar.

1.2 The North Saskatchewan and its Sub-basins

As shown in Figure 1-1, the North Saskatchewan River Basin is comprised of 12 sub-basins. From west to east, these sub-basins include: Cline, Brazeau, Ram, Clearwater, Modeste, Strawberry, Sturgeon, Beaverhill, White Earth, Vermilion, Frog, and Monnery.

Residents and businesses in the basin draw water from surface and groundwater sources. Under the Alberta *Water Act* there are four ways in which a person can legally use water:

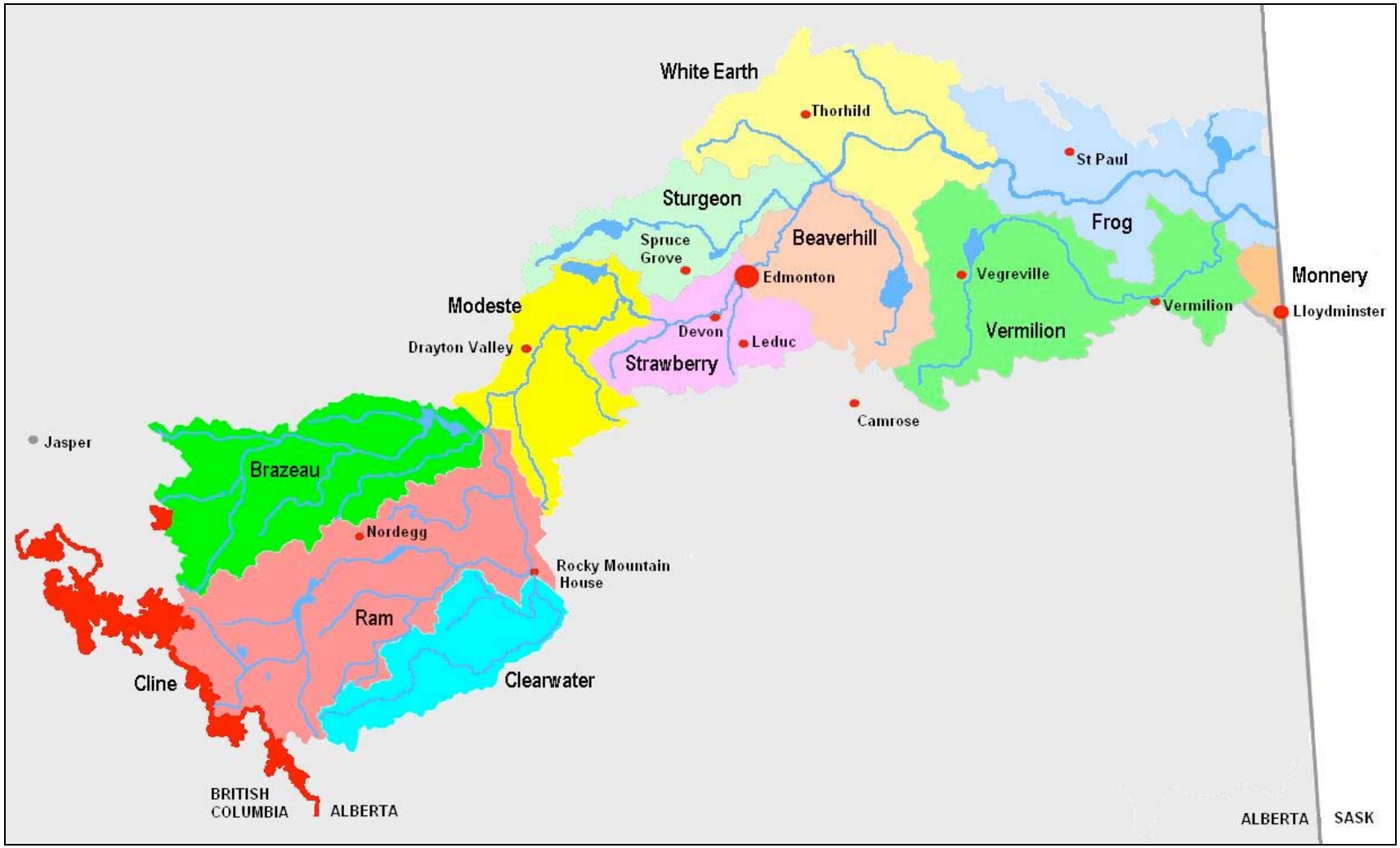
1. Household purposes – People owning or occupying land adjacent to surface water or under which groundwater exist can use up to 1,250 cubic metres (m^3) per year without requiring a licence.

2. Traditional agricultural use – Farmers owning land adjacent to surface water or under which groundwater exists could register to use up to 6,250 m^3 per year with priority based on date when water was first used. Applications for registrations had to be submitted prior to December 31, 2001 (within three years of the proclamation of the *Water Act*).

3. All other uses – A licence is required for all other diversions and water use priorities are based on the date the complete application was received.

4. Exempted agricultural use – The *Water Act* allows farmers who own land adjacent to surface water or under which groundwater exists and who used water for raising animals or applying pesticides prior to 1999, to use up to 6,250 m^3 per year without having to acquire a licence. This use has no priority. Based on available information, this assessment focuses on traditional agricultural users (registrations) and all licensed water uses.

Figure 1-1 The North Saskatchewan River and its Sub-basins



Source: NSWA (2005)

1.3 Terms and Definitions

NSRB North Saskatchewan River Basin

Water allocation refers to the amount of water that can be diverted for use, as set out in water licences and registrations issued in accordance with the *Water Act*. Allocations include a maximum amount of water that can be withdrawn for use as well as the rate of withdrawal, the water source, the purpose for which the water is to be used, and the location at which the diversion can occur. Allocations reflect the amount of water that will be consumed plus any losses that might occur, and may include an allowance for flows that are returned after use. An allocation is generally based on the maximum amount of water that an applicant expects will be required over the licensing period.

Water diversion (or withdrawal) describes the amount of water being removed from a surface or groundwater source, either permanently or temporarily. Water diversions may be less than water allocations in those situations where the licence includes an allowance for some water to be returned to water bodies after use.

Water consumption is the amount of water included in an allocation that is expected to be used for the intended purpose (*e.g.,* crop production, oilfield injection) and is not available for reuse.

Losses refer to water included in an allocation that can be withdrawn for a particular use but may be lost, either due to evaporation or seepage, and is not available for immediate reuse.

Return flow is denotes water that is included in an allocation and is expected to be returned to a water body after use and may be available for reuse, although the water quality characteristics may have changed during use. Typical return flows include discharges from sewage treatment plants, run-off from irrigated fields, and water discharged from cooling ponds. Not all return flow, however, is returned to the original source of diversion or withdrawal.

Water use is considered to be the combination of actual water consumption and losses or, alternatively, represents the difference between the amount of water actually diverted and the return flow.

A graphical representation of these terms and their definitions are provided in Figure 1.4. This report uses metric units of measurements. Imperial units of measure can be calculated using the conversion factors provided in Table 1.1.

Figure 1-2 Key Water use Concepts and Terms

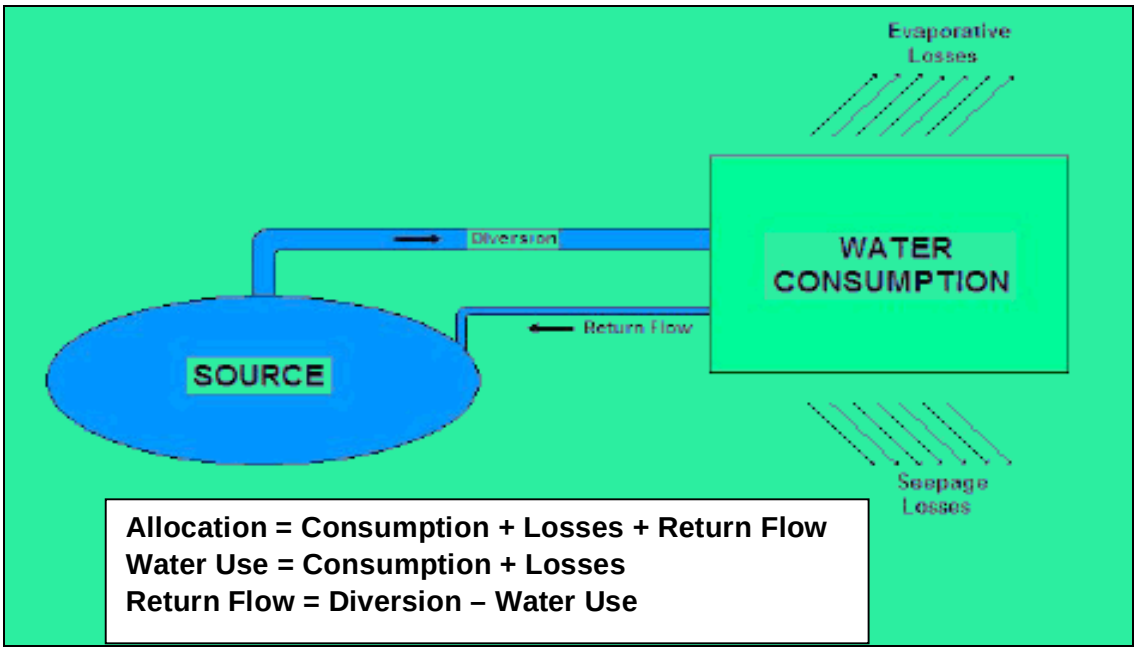


Table 1-1 Unit Conversion Factors

	Metric Units	Imperial Units
Length	1.0 millimetre (mm)	= 0.039 inches (in)
	1.0 metre (m)	= 3.281 feet (ft)
	1.0 kilometres (km)	= 0.621 miles (mi)
Area	1.0 hectare (ha)	= 2.471 acres (ac)
	1.0 square kilometre (km^2)	= 0.386 square miles (mi^2)
Volume	1.0 litre (l) = 0.001 cubic metre (m^3)	= 0.0353 cubic feet = 0.21998 gallons
	1.0 cubic metre (m^3)	= 35.315 cubic feet (ft^3) = 220.1 gallons
	1.0 cubic decametre (dam^3) = 1,000 m^3	= 0.811 acre-feet (ac.ft.)