Red Deer River State of the Watershed Report

Red Deer River Watershed Alliance

State of the Watershed

April 01, 2009

This report was written by *Aqua*lity Environmental Consulting Ltd., Edmonton, AB, for the Red Deer River Watershed Alliance, Red Deer, Alberta, Canada.

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Cover image – "*The Lay of the Land*", 40" x 60", oil on canvas.

Dean Francis and Fran Hartsook reside east of Empress, Alberta, near the South Saskatchewan River. Here, they have developed "Sagebrush Studios", home, studio, galleries and gardens, where one can enjoy a unique blend of art and nature. Painting full-time since 1978, Dean captures the Canadian Prairies in a rich array of colour, form and texture. His oil paintings can be found in private and corporate collections throughout Canada and the U.S. Dean Francis paintings are available at Sagebrush Studios gallery and through www.deanfrancis.ca.

Acknowledgements

A State of the Watershed report summarizes the current knowledge of a watershed with respect to land-use, water quality, water quantity, fisheries and selected biological indicators. The information required to complete a state of the watershed report is scattered throughout the scientific literature, reports from federal, provincial and municipal governments, non-governmental agencies, industry, consultants and various other stakeholders in a region. Composing such a report requires the combined efforts of many individuals, committees and agencies over an extended period of time.

First and foremost, we acknowledge the invaluable contributions of members of the Steering Committee and the Technical Advisory Committee.

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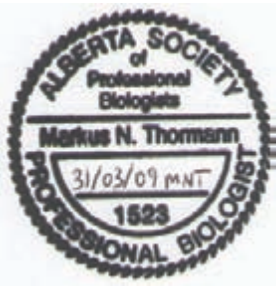

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Executive Summary

The Red Deer River watershed forms the largest sub-basin of the South Saskatchewan River basin. The Red Deer River originates in the Canadian Rocky Mountains in Banff National Park and flows over and through mountains, foothills, rangeland, residential land, industrial land, oil and coal deposits, cities, towns, parks, reserves, forests and croplands across southern Alberta, joining up with the South Saskatchewan River 8 km past the Saskatchewan border. The Red Deer River has a length of 724 km and a drainage area of 49,650 km². The river is fed by meltwater, glacial streams from Mount Drummond and Cyclone Mountain in the Rocky Mountains and numerous freshwater springs and tributaries. Its watershed includes 55 urban centres and 18 rural or regional municipalities.

The major urban centres in the Red Deer River watershed include the Cities of Red Deer and Brooks and the Towns of Strathmore and Sylvan Lake. The largest rural populations are found in Red Deer County, the Municipal District of Rocky View No. 44 and Mountain View County. There are about 13,000 farms in the Red Deer River watershed that cover an area of nearly 4.87 million ha, which is equivalent to about 48,700 km^2 of the watershed. About 43% of the land in the watershed is used to raise crops, principally barley, alfalfa, canola and spring wheat. In addition to municipal and agricultural developments, the Red Deer River watershed is characterized by a diverse commercial and industrial mosaic, including golf courses, bottling and food processing plants, gardening and landscaping establishments, aggregate washing facilities for the construction industry, parks and recreation facilities, fertilizer plants, manufacturing facilities, mines and forestry-related facilities.

In response to a growing population base and economy over the past decade, the Red Deer River Watershed Alliance (RDRWA) was formed in June 2005 to promote watershed health and the good use and proper management of water within the Red Deer River watershed. Its vision is for a healthy, dynamic and sustainable watershed through the efforts of the entire community by (1) providing a forum for information exchange and dialogue, (2) raising awareness on watershed issues, (3) promoting the use of best practices and integrated management of land and water resources, (4) fostering the preservation and enhancement of water quality management, and (5) championing the wise management of water quantity and supply. It was designated the Watershed Planning and Advisory Council for the Red Deer River watershed under the Government of Alberta's *Water for Life Strategy* in September 2005.

In January 2008, *Aqua*lity Environmental Consulting Ltd., Edmonton, was contracted by the RDRWA to develop this State of the Watershed report for the Red Deer River watershed. The purpose of this report is to summarize the current knowledge, comment on the environmental integrity of the Red Deer River watershed and provide the basis for a future Integrated Watershed Management Plan. This report focuses on 20 indicators that fall into four major indicator groups (land use, water quality, water quantity and biological indicators) and provides the background information that is required for improved watershed management decisions by regulators, policy makers, landowners and industrial users. Each of the indicators is treated individually for the Red Deer River mainstem and the 15 subwatersheds that form the Red Deer River watershed (Panther, James, Raven, Little Red

Deer, Medicine, Blindman, Waskasoo, Buffalo, Threehills, Kneehills, Michichi, Rosebud, Berry, Matzhiwin and Alkali). Of these 20 indicators, three are indicators of risk and nine are indicators of condition. The remaining eight indicators provide additional background information only. Each subwatershed section concludes with an overall rating that resulted from the combined evaluation of the risk and condition indicators. The state of the watershed report concludes by identifying knowledge gaps and providing recommendations to maintain or strive towards healthy ecosystems and the sustainable use of aquatic resources in the Red Deer River watershed.

Based on the chosen risk and condition indicators, it was determined that 11 out of the 15 subwatersheds have a medium level of risk to their ecological integrity, while four have a low level of risk (Panther, James, Raven and Little Red Deer subwatersheds). The parameters of most concern with regard to risk are oil and gas activity and urban, rural, agricultural, and recreational developments. Manure is problematic in the Blindman, Waskasoo and Kneehills subwatersheds and is close to becoming problematic in other subwatersheds with high feedlot density.

Five subwatersheds in the central portion of the watershed are currently ranked as being in poor condition (Medicine, Blindman, Waskasoo, Kneehills and Michichi). The condition indicators of concern in these subwatersheds are linear development, surface water nutrient levels and land cover. Eight subwatersheds are in fair condition, and only two are in good condition (Panther and Alkali).

Overall, by combining the risk and condition ratings to obtain an overall ranking system, five subwatersheds received a poor grade (C- to C+), eight received a fair grade (B- to B+) and two received a good grade (A- to A+). The subwatersheds receiving a poor ranking are the Medicine, Blindman, Buffalo, Michichi and Kneehills, with land cover, surface water nutrient levels, linear development and oil and gas activity being the indicators of most concern. These areas and indicators should be the first issues addressed in the future Red Deer River Integrated Watershed Management Plan (IWMP). The subwatersheds receiving the best overall ranking were the Panther and the Alkali. It is important to consider preserving this good ranking using appropriate management planning activities.

It should be noted that many knowledge gaps exist, including detailed subwatershed level wetland loss, riparian health assessments, water quality data (particularly bacteria, parasites, pesticide and pharmaceutical data), groundwater quality and quantity, instream flow needs and wildlife diversity. This information will be instrumental in accurately assessing the overall health of the subwatersheds and the Red Deer River watershed as a whole, and should be considered in the IWMP stage as the information becomes available.

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Acronyms, Abbreviations, and Standardized Shorthand Notations

A

a.s.l. – Above sea level
AAFC-PFRA – Agriculture and Agri-Food Canada-Prairie Farm Rehabilitation Administration
AARD – Alberta Agriculture and Rural Development
ABMI – Alberta Biodiversity Monitoring Institute
ACA – Alberta Conservation Association
AENV – Alberta Environment
Ag – Silver
Al – Aluminum
ALMS – Alberta Lake Management Society
AOPA – Agricultural Operations Practices Act
ARWQI – Alberta River Water Quality index
As – Arsenic
ASRD – Alberta Sustainable Resource Development
ASWQG – Alberta Surface Water Quality Guideline
ATPR – Alberta Tourism, Parks, and Recreation
ATV – All-terrain vehicle
AVI – Alberta Vegetation Inventory

B

BMP – Best management practices
BDL – Below detection limits
BOD – Biological oxygen demand
BRBC – Bow River basin Council
BTBC – Blackfeet Tribal Business Council

C

CAESAA – Canada-Alberta Environment Sustainable Agriculture Agreement
CBM – Coal-bed methane
CCME – Canadian Council of Ministers of the Environment
CCME – Canadian Council of Ministers of the Environment
Cd – Cadmium
CEAA – Canadian Environmental Assessment Act
CEPA – Canadian Environmental Protection Act
CFO – Confined feedlot operation
CFU – Colony-forming unit
Chl. *a* – Chlorophyll *a*
CO – Carbon Monoxide
Co – Cobalt
COD – Chemical oxygen demand
COSEWIC – Committee on the Status of Endangered Wildlife in Canada
Cr – Chromium
Cu – Copper
CWS – Canadian Wildlife Service

D

dam^3 – Deca metre
dam^3/yr – Deca metre per year
DFO – Department of Fisheries and Oceans
DO – Dissolved oxygen
DUC – Ducks Unlimited Canada

E

EC – Environment Canada
EIA – Environmental Impact Assessment
ENGO – Environmental Non-Government Organization
EPEA – Environmental Protection and Enhancement Act
ER – Environmental Reserve
ERCB – Energy Resources Conservation Board
ESA – Ecologically Significant Area

F

Fe – Iron
FMA – Forest Management Area
FMU – Forest Management Unit

H

H_2SO_4 – Sulphuric acid
ha – Hectare
HADD – Harmful alteration, disruption or destruction

Hg – Mercury

I

IMP – Integrated Management Plan
IRM – Integrated resource management
IWMP – Integrated Watershed Management Plan

L

LTRN – Long-Term River Network
LUZ – Land-Use Zone

M

MGA – Municipal Government Act
Mn – Manganese
Mo – Molybdenum
MUD – Municipal Use Database

N

N – Nitrogen
N_2O – Nitrous oxide
NH_3 – Ammonia
Ni – Nickel
NO_2^- – Nitrite
NO_2^--NO_3^- – Nitrite and nitrate, combined
NO_3^- – Nitrate
NPRI – National Pollution Release Inventory
NRCB – Natural Resources Conservation Board
NSAID – Non-steroidal anti-inflammatory drug
NSWA – North Saskatchewan Watershed Alliance
NVI – Native vegetation inventory
NWA – Natural Wildlife Area

O

OHV – Off-highway vehicle
OWC – Organic Wastewater Contaminants

P

P – Phosphorus
p or p-value – Probability value (statistics)
PAL – Protection of aquatic life (with reference to guidelines)
Pb – Lead
PFRA – Provincial Forest Recreation Area
PGR – Provincial Grazing Reserve
PHJV – Prairie Habitat Joint Venture
PNA – Provincial Natural Area
PP – Provincial Park
PPWB – Prairie Provinces Water Board
PRA – Provincial Recreation Area

R

RDRWA – Red Deer River Watershed Alliance
RHA – Regional Health Authorities

S

SARA – Species at Risk Act
SC – Steering Committee
Se – Selenium
SO_2 – Sulphate
SRD –Sustainable Resource Development (Alberta)

T

TAC – Technical advisory committee
TDP – Total dissolved phosphorus
TDS – Total dissolved solids
TKN – Total Kjeldahl nitrogen
TN – Total nitrogen
TP – Total phosphorus
TR – Total residue
TSS – Total suspended solids

U

UC – Union Carbide
UNESCO – United Nations Educational, Scientific and Cultural Organization

V

Va – Vanadium
VOC – Volatile organic compounds

W

WAC – Watershed Advisory Council
WP – Wildlife Park
WPAC – Watershed Planning and Advisory Council
WQG – Water quality guideline(s)

WS – Wildlife Sanctuary
WURS – Water Use Reporting System
WWTP – Waste-water treatment plant

Y

µg/L – Micro gram per litre
µm – Micro metre

Z

Zn – Zinc