Ribstone

White Earth
Thorhild
St Paul
Sturgeon
Frog
North Saskatchewan River
Spruce Grove
Beaverhill
Monnery
Edmonton
Vegreville
Vermilion
Modeste
Lloydminster
Devon
Leduc
Vermilion
Drayton Valley
Strawberry
Blackfoot
Jasper
Camrose
Wainwright
Battle River
Brazeau
Wetaskiwin
Killam
Iron
Ribstone
Ponoka
Bigstone
Provost
Nordegg
Rocky Mountain House
Red Deer
Stettler
Coronation
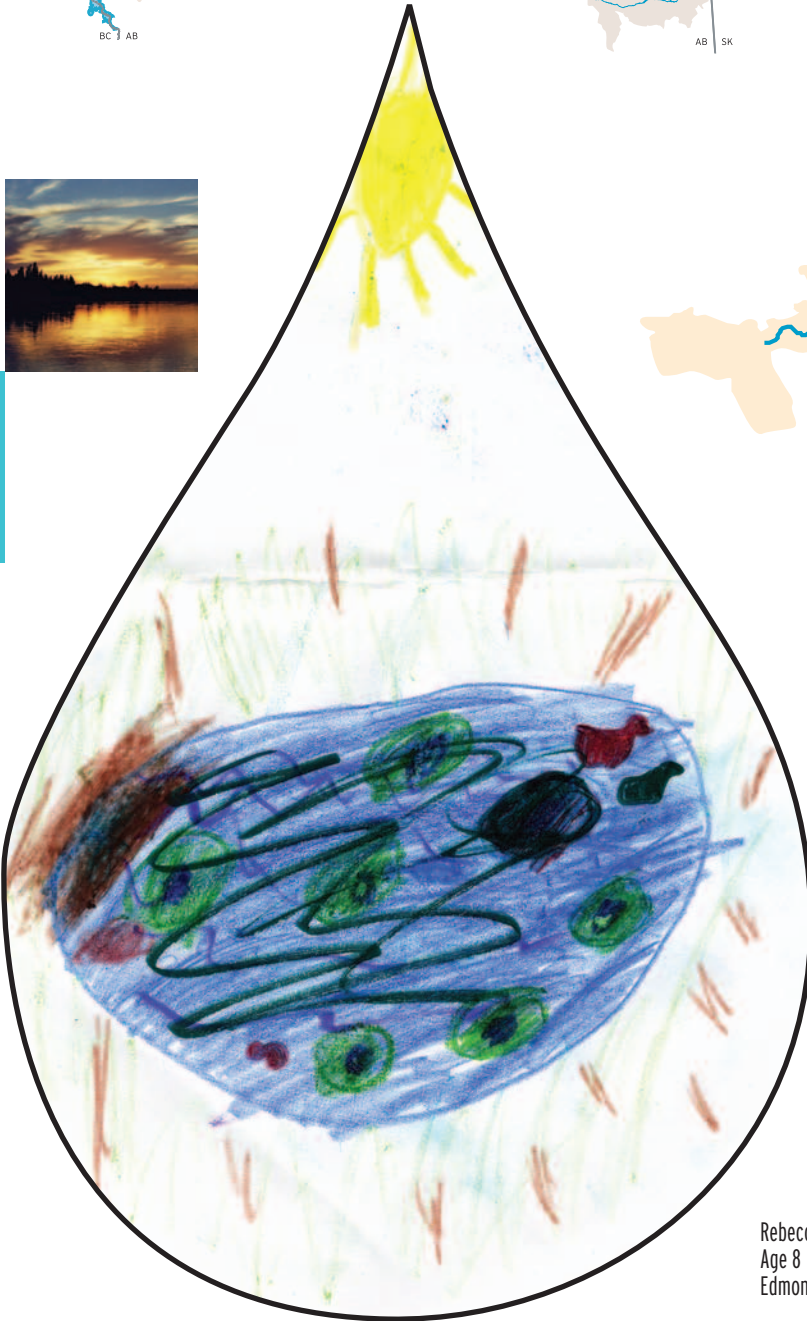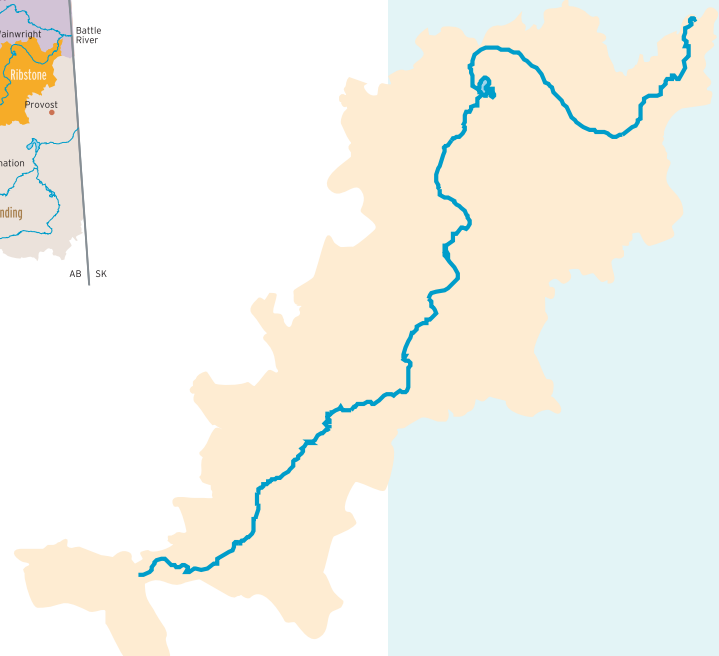Ram
Cline
Paintearth
Sounding
Clearwater
BC | AB
AB | SK

Rebecca Maron
Age 8
Edmonton

5.16   RIBSTONE SUBWATERSHED

The Ribstone Subwatershed encompasses 374,155 hectares in the Battle River watershed, including 14,133 hectares of natural and artificial water bodies. Most of the Ribstone Subwatershed is in the Northern Fescue Natural Subregion, with some in the Central Parkland Natural Region. The Wainwright Dunes Ecological Reserve, situated just east of Ribstone Creek, encompasses 2,821 ha. The Subwatershed contains Paintearth, Provost, Special Areas # 4 and Wainwright Counties, the settlements of Chauvin, Coronation, Czar, Edgerton, Greenshields, Hughenden, Metiskow, Veteran, and the majority of the Canadian Forces Base at Wainwright. The CFB takes up 24,059 ha (6.43%) of the Subwatershed area. The total permanent population of the area is approximately 3,000. The main economic base of the region is agriculture and oil and gas activities.

Dillberry Lake Provincial Park is known for its shorebird migration and also provides recreational activities including canoeing and kayaking, sport fishing, power boating, water skiing, swimming, sailing, and windsurfing.

Many of the indicators described below are referenced from the "Ribstone Hydrological Overview" map located in the adjacent map pocket, or as a separate Adobe Acrobat file on the CD-ROM.
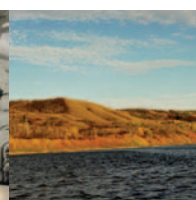
5.16.1 Land Use

Changes in land use patterns reflect major trends in development. Land use changes and subsequent changes in land use practices may impact both the quantity and quality of water in the Subwatershed and in the North Saskatchewan Watershed. Five metrics are used to indicate changes in land use and land use practices: riparian health, linear development, land use, livestock density, and wetland inventory.

5.16.1.1 Riparian Health

The health of the riparian area around water bodies and along rivers and streams is an indicator of the overall health of a watershed and the impact of changes in land use and management practices. The MD of Wainwright is active with riparian initiatives in the Ribstone Creek Subwatershed. Riparian health was assessed in 2001 for 9.5 kilometres of Black Creek in the MD of Wainwright (ARHMP Cows and Fish 2002b). Nearly three quarters (70%) of the quadrats were assessed as 'healthy, but with problems', with the remainder (30%) assessed as 'unhealthy'. None of the quadrats were deemed 'healthy'. Major problems included invasive and disturbance causing plants, preferential grazing, and pugging or hummocking. In 2001, riparian health was assessed along Ribstone Creek by Cows and Fish for the County of Paintearth. This information was not available for this watershed summary report. The County of Paintearth can be contacted directly for these results.

5.16.1.2 Linear Development

Quantifying linear development in the Subwatershed helps us understand potential changes in water quality and quantity, fish and wildlife populations, and riparian health. Over 2% (8,548 ha) of land in the Ribstone Subwatershed is affected by linear developments. The majority of this (45%) is in roads of one form or another, including gravel and unimproved roads (34% of the linear development) and paved roads (7% of linear development). Other linear developments include cutlines (28% of the area of linear development), pipeline rights of way (11%), transmission line rights of way (9%), and active or abandoned rail lines (6%).

5.16.1.3 Land Use Inventory

An inventory of land quantifies natural landscape types and uses and may be used to explore changes in water quality and quantity, fish and wildlife populations, and riparian health. Water bodies, both natural and constructed including lakes, rivers, streams, wetlands, dugouts and reservoirs cover 14,133 (4%) of the Subwatershed. The vast majority of the Subwatershed is classified in agricultural land uses: grassland, 65%; cropland, 29%; and forage, 2%. About 2% (6,812 ha) of the Subwatershed is covered with shrubs or trees. Only 6,618 (1.9%) of the Subwatershed lie in Parks or Protected Areas (Ribstone Creek Heritage Rangeland).

About 10% of the Subwatershed has been affected by various forms of disturbance including the linear development described above. The greatest area of disturbance following linear development is the area within C.F.B Wainwright; 6.4% of the watershed – 24,059 hectares. Well sites affect about 1% of the Subwatershed (4,575 ha). Disturbance due to municipalities of various sizes including Coronation, Czar, Edgerton and Veteran affects about 0.2% of the Subwatershed (724 ha). The remainder of the land disturbance is related to linear developments (2.3%), and industrial facilities including oil and gas plants, runways, and sand and gravel pits (26 ha).

5.16.1.4 Livestock Density

Areas of higher livestock density may be expected to have greater impacts on downstream aquatic systems. Manure production was used as a surrogate for livestock density. Manure production information was available only on the basis of soil polygons. These polygons do not correspond to the Subwatershed boundaries and provide only a rough estimate of manure production within the actual Subwatershed. Based on the available information, livestock densities in the Ribstone Subwatershed are generally moderate although there is a soil polygon with higher manure production indicated near Wainwright. Manure production in the soil polygons that cover the Ribstone Subwatershed was estimated at between 256,000 and 5,422,000 tonnes.

5.16.1.5 Wetland Inventory

Wetlands serve many functions in the natural landscape. The loss of wetlands to development can have impacts on water quantity and quality to downstream habitats. Data from both Alberta Sustainable Resource Development base features hydrology and PFRA Land Classification failed to identify wetlands in the Ribstone Subwatershed. However, an inventory completed by Ducks Unlimited Canada for the Subwatershed found a total of 48,151 hectares of wetlands (12.9% of the Subwatershed area). The inventory included both permanent and temporary wetlands.

5.16.2 Water Quality and Quantity

Water bodies in the Ribstone Subwatershed include the Battle River and Blackfoot, Ribstone, Black, Grizzly Bear, and Buffalo Creeks. Larger lakes include Ribstone, Shorncliffe, Dolcy, Houcher, Hughenden, David, Dixon, Border, Willow, Horseshoe, Bruce and Wallaby, Normandin, Clark, Albert, and McCafferty Lakes. ALMS Lakewatch data are available for 2000 for Shorncliffe Lake.

No LTRN water quality stations exist in this Subwatershed, therefore no long term water quality data has been summarized. However, Buffalo Creek was part of the CAESA stream network as a site in an area of high agricultural activity. Water quality data (nutrients, organic and inorganic chemistry, suspended solids, color, pH, and bacteria) is available for this creek from 1995-present (CAESA 1998, Depoe and Westbrook 2003). The town of Coronation discharges its treated effluent into Ribstone Creek.
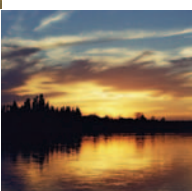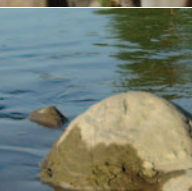
Three stations along Ribstone Creek were sampled for fecal coliforms and TP during the years 1971-73, 1977-78 and 1990. The 8 fecal coliform samples ranged from 0 to 4 counts/100 mL, and averaged 1 count/100 mL. These samples were well below the CCME Surface Water Quality Guidelines for Contact Recreation. The 16 TP samples ranged from 0.043 to 0.205 mg/L, and averaged 0.142 mg/L. Pesticide detections in this Subwatershed included 2,4-D, Bromoxynil, MCPA, and Picloram, all of which were below the CCME Surface Water Quality Guidelines for the Protection of Aquatic Life. 2,4 DP and Imazamethabenz-methyl were detected, but there are currently no guidelines for these compounds.

Water quantity is measured at four HYDEX stations (05FD001, 05FD003 and 05FD005-05FD006); none of these stations has real-time online data. Figure 25 shows a hydrograph for Ribstone Creek. This hydrograph is typical of a non-glacial fed stream, which has flows dominated by spring runoff and summer storms only.
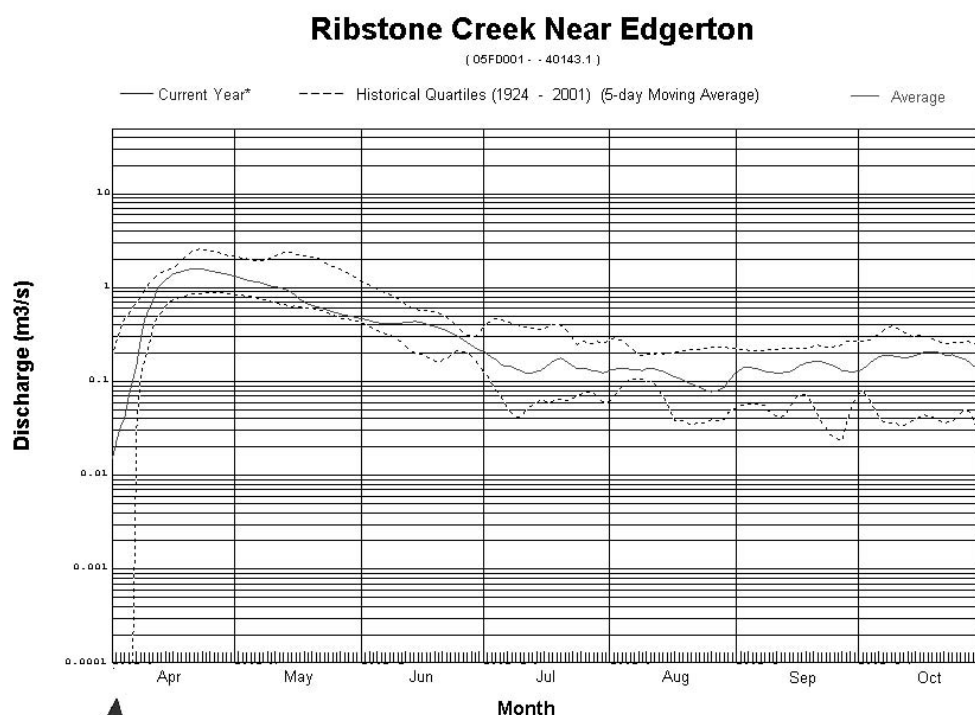
Figure 25: Ribstone Creek near Edgerton mean monthly discharge for the open water season (Station 05FD001).

5.16.3   Biological Indicators

Biological indicators include information on plant and animal species from which various aspects of ecosystem health can be determined or inferred by linking this information to information on water quality and quantity, land use and management practices.

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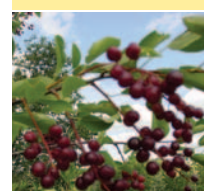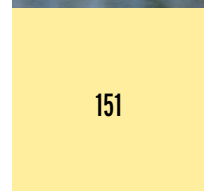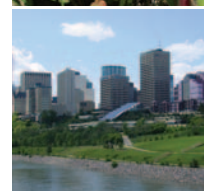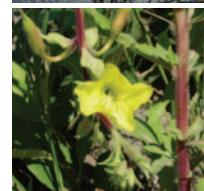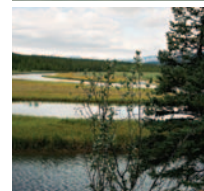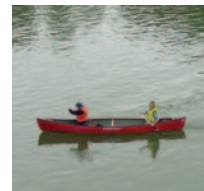
5.16.3.1 Aquatic Macrophytes

The growth of aquatic macrophytes is directly related to the availability of the nutrient phosphorus in the water in which they are growing. Excessive growth may indicate decreased water quality, which, in turn, may be linked to various point (wastewater outfalls) or non-point (general run-off) sources related to municipal development or land use practices.

No published assessment of aquatic macrophytes was found for the lakes, wetlands, rivers or creeks in the Ribstone Subwatershed, so we cannot make any inferences about ecosystem health for this Subwatershed using this indicator. This data gap could be addressed in future research within the Ribstone Subwatershed.

5.16.3.2 Fish Population Estimates

Inventories of selected fish populations may show changes in the presence and abundance of species that may be related to environmental factors including changes in water quality or quantity. A systematic estimate of fish populations in the Ribstone Subwatershed has not been conducted. Future research in the Ribstone Subwatershed should address this data gap.

5.16.3.3 Vegetation Types

Inventories of flora populations may show changes in abundance that may be related to environmental factors including changes in land use practices. The Ribstone Subwatershed is located in both the Northern Fescue and Central Parkland ecological regions. The Northern Fescue Subregion is characterized by gently rolling terrain, low-relief ground moraine and hummocky moraine. The dominant vegetation in this subregion Rough Fescue. The Central Parkland is composed mainly of grassland with aspen, to aspen parkland to closed aspen forest. Tree species include trembling aspen and balsam poplar, while grasslands are dominated by Rough Fescue.

5.16.3.4 Benthic Invertebrates

Inventories of benthic invertebrate populations may show changes the presence and abundance of species that may be related to changes in water quality. No published assessment of benthic invertebrates was found for the lakes, wetlands, rivers or creeks in the Ribstone Subwatershed, so we cannot make any conclusions about ecosystem health using this indicator. This data gap could be addressed in future research within the Ribstone Subwatershed.

5.16.4 Ribstone Summary

The main economic base of the region is agriculture and oil and gas activities. The majority of the Subwatershed is classified in agricultural land uses and livestock densities are generally moderate although there is a soil polygon with higher manure production indicated near Wainwright. About 2% of the Subwatershed is treed and water bodies cover 4% of the Subwatershed.

Riparian health has been assessed for 9.5 kilometres of Black Creek. Seventy percent of the area was assessed as 'healthy, but with problems'; 30% was assessed as 'unhealthy'. Riparian health was also assessed along Ribstone Creek; however, the results of that assessment were not available for this report.
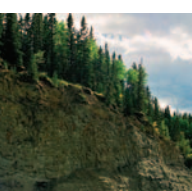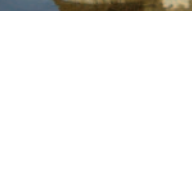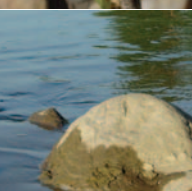
About 10% of the Subwatershed has been disturbed. Over 2% of land is affected by linear developments including roads, cutlines, pipeline rights of way, transmission line rights of way, and rail lines. The remainder of the disturbance is due to C.F.B Wainwright; and well sites, municipalities, and industrial facilities.

The PFRA Land Classification shows no area classified as wetlands; however, Ducks Unlimited Canada information shows wetlands on 12.9% of the land area.

Water quantity is measured at four stations; none has real-time online data. No long-term river water quality information or information on water plants, fish populations, or benthic invertebrates was found for this Subwatershed.

In summary, there has been little systematic assessment of the Ribstone Subwatershed and there are significant gaps in the available information. However, of the eight indicators assessed, two were good, three were fair, and three were poor, yielding an overall subjective rating of poor. The level of agricultural land use, moderate livestock densities, and the results of riparian health assessments suggest that it is important to address the data gaps and to further assess the impacts of various land uses on the Subwatershed.

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