Blackfoot

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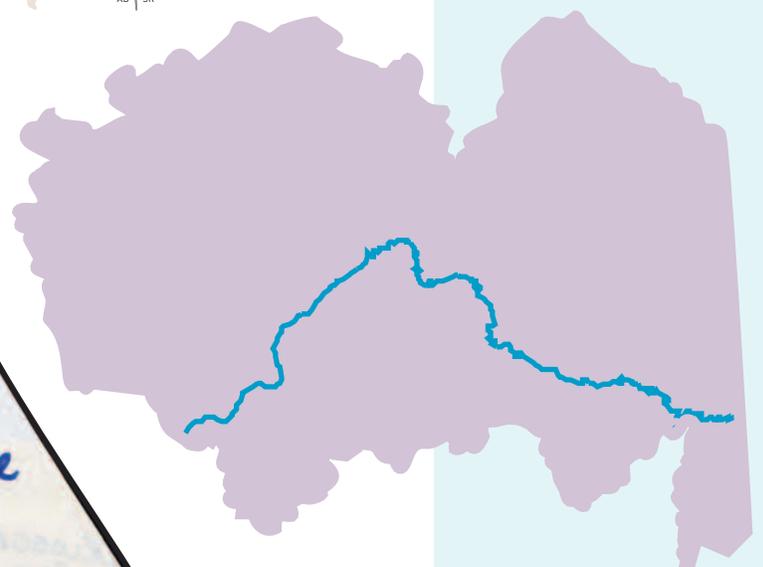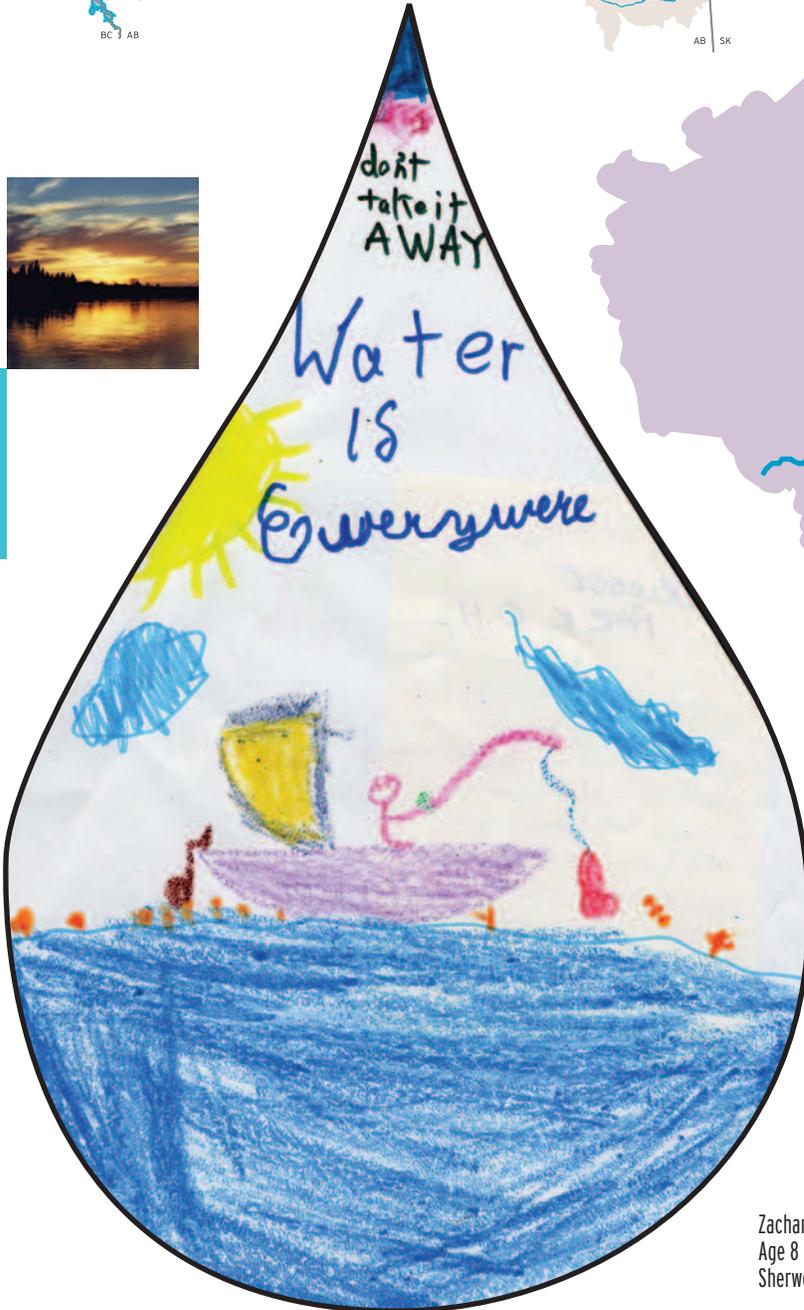Sounding
BC | AB
AB | SK

don't take it AWAY

Water IS Everywere

Zachary Walker
Age 8
Sherwood Park

5.17 BLACKFOOT SUBWATERSHED

The Blackfoot Subwatershed encompasses 434,466 hectares in the Battle River Subwatershed, including 15,595 hectares of natural and artificial water bodies and is bounded by the border with Saskatchewan on the east side. Most of the Blackfoot Subwatershed is in the Central Parkland Natural Region. The Subwatershed contains Minburn and Vermilion River Counties, the MD of Wainwright, and the towns of Fabyan, McLaughlin, Paradise Valley, Rivercourse, Vermilion and Wainwright. The eastern portion of the Canadian Forces Base at Wainwright takes up 3,860 ha (0.9%) of the Subwatershed area.

The main economic base of the region is agriculture and oil and gas activities.

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

5.17.1 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.

5.17.1.1 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. No published assessment of riparian health was found for the lakes, wetlands, rivers or creeks in the Blackfoot Subwatershed, so we cannot make any conclusions about riparian health for this Subwatershed using this indicator. This data gap could be addressed in future research in this area.

5.17.1.2 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.

Almost 3% (11,217 ha) of land of linear developments in the Blackfoot Subwatershed is affected by linear developments. The majority (53%) are roads of one form or another, including gravel and unimproved roads (42% of the linear development) and paved roads (7% of linear development). Other linear developments include pipeline rights of way (17% of the area of linear development), cutlines (16%), transmission line rights of way (8%), and active or abandoned rail lines (2%).

5.17.1.3 Land Use Inventory

An inventory of land uses quantifies natural landscape types and land uses and may be used to explore changes in water quality and quantity, fish and wildlife populations, and riparian health. Natural and constructed waterbodies including lakes, rivers, streams, wetlands, dugouts and reservoirs cover 4% of the Subwatershed. The vast majority of the Subwatershed is classified in land uses related to agricultural production: cropland, 55%;
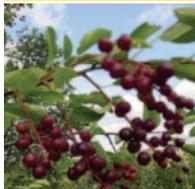
grassland, 41%; and forage, 2%. Less than 1% (2,340 ha) of the Subwatershed is covered with trees. There are no Parks and Protected Areas or Provincial FMUs in this Subwatershed.

About 5% of the Subwatershed has been disturbed by various forms of disturbance including the linear development described above. The greatest area of disturbance following linear development is the area affected by well sites, 1.5% of the Subwatershed (6,492 ha). C.F.B Wainwright covers 0.9% of the Subwatershed (3,860 ha) and municipalities of various sizes including Wainwright, Fabyan and part of Vermilion affect about 0.2% of the Subwatershed (981 ha). The remainder of the land disturbance is related to linear developments (2.3%), and industrial facilities including oil and gas plants, runways, sand and gravel pits, and other industrial sites (189 ha).

Water bodies including rivers, lakes and dugouts cover about 15,595 hectares; almost 4% of the area of the Subwatershed.

5.17.1.4 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 Blackfoot Subwatershed are moderate throughout the Subwatershed. Manure production in the soil polygons that cover the Blackfoot Subwatershed was estimated at between 726,000 and 3,246,000 tonnes.

5.17.1.5 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 Alberta Sustainable Resource Development base features hydrology failed to identify wetlands in the Blackfoot Subwatershed. However, the PFRA Land Classification identified 504 hectares of land in the Subwatershed as wetlands (0.1% of the Subwatershed area).

5.17.2 Water Quality and Quantity

Larger waterbodies in this Subwatershed include Baxter, Clarke, Bushy Head, Albert, Earlie, Baxter, Bauer's, East, Briker and Arcand Lakes.

No LTRN water quality stations exist in this Subwatershed, therefore no long term water quality data has been summarized. However, Stretton 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 1995-1996 (Anderson *et al.* 1998) to the present (Depoe and Westbrook 2003).

Seventeen pesticide samples collected between 1997-2000 from Stretton Creek included 2,4-D, Bromoxynil, MCPA, MCPP, Triallate, Trifluralin and Picloram, all of which were below the CCME Surface Water Quality Guidelines for the Protection of Aquatic Life.
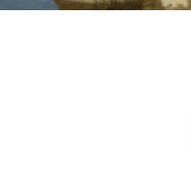
Water quantity is measured in the Blackfoot Subwatershed at four HYDEX stations (05FE002-05FE005): one has real-time online data (05FE004). Figure 26 shows the hydrograph of Buffalo Creek. This hydrograph is typical of a non-glacial fed stream, which has flows dominated by spring runoff and summer storms only.
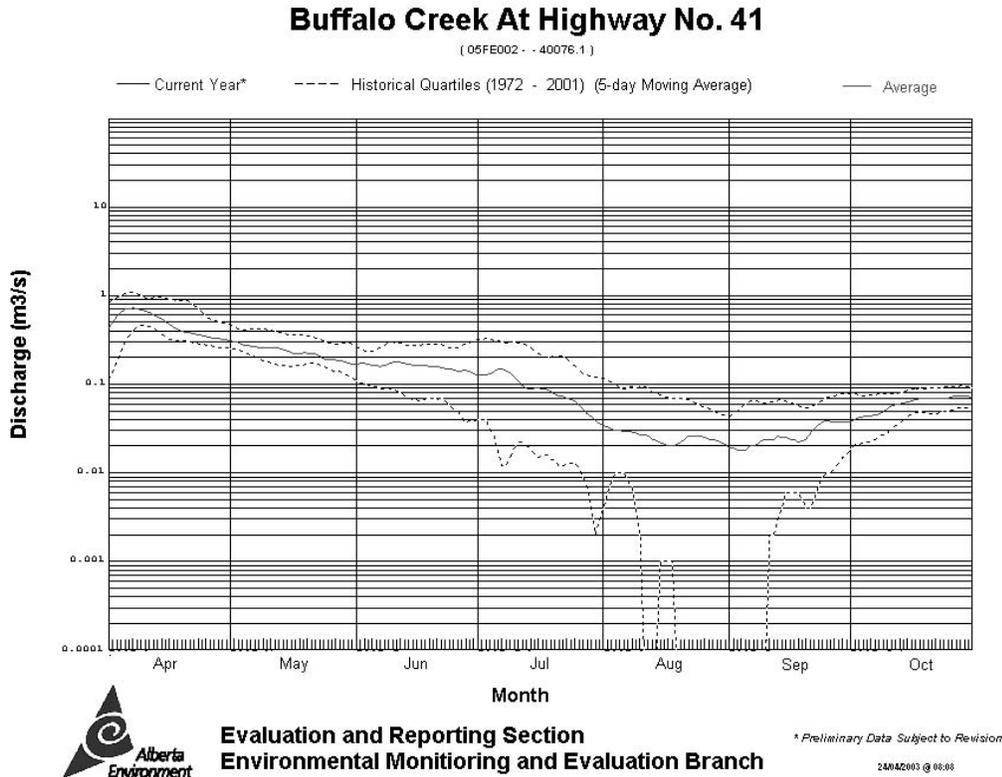

Buffalo Creek At Highway No. 41
(05FE002 - - 40076.1)

— Current Year*   - - - - Historical Quartiles (1972 - 2001) (5-day Moving Average)   — Average

Evaluation and Reporting Section
Environmental Monitioring and Evaluation Branch

* Preliminary Data Subject to Revision
24/04/2003 @ 08:08

Figure 26: Buffalo Creek near Highway 41 mean monthly discharge for the open water season (Station 05FE002).

5.17.3   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.

5.17.3.1 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 Blackfoot 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 Blackfoot Subwatershed.

5.17.3.2 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 Blackfoot Subwatershed has not been conducted. This data gap should be addressed in future research in this area.

5.17.3.3 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 Blackfoot Subwatershed is located in the Central Parkland ecological subregion. This subregion 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.

5.17.3.4 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 Blackfoot Subwatershed, so we cannot make any conclusions about ecosystem health using this indicator. This data gap could be addressed in future research within the Blackfoot Subwatershed.

5.17.4 Blackfoot Summary

The majority of the land in the Subwatershed is classified in uses related to agricultural production and livestock densities are moderate. Less than 1% of the area is treed. Water bodies cover 4% of the Subwatershed and PFRA Land Classification shows wetlands on 0.1% of the land area.

About 5% of the Subwatershed has been disturbed. Almost 3% of this is linear developments including roads, pipeline rights of way, cutlines, transmission line rights of way, and rail lines. Other disturbances include well sites, a small part of C.F.B Wainwright, municipalities, and industrial facilities.

Water quantity is measured at four stations: one has real-time online data. No long-term river water quality information, riparian health assessments, or information on water plants, fish populations, benthic invertebrates, or riparian health exists for this Subwatershed.

In summary, there has been little systematic assessment of the Blackfoot Subwatershed and there are significant data gaps for the area. However, of the five indicators assessed, none were good, one was fair, and four were poor, yielding an overall subjective rating of poor. These data gaps should be addressed; in particular, the impacts of various land uses on riparian health, and the state of the aquatic ecosystem including water quality, water plants, and fish populations.