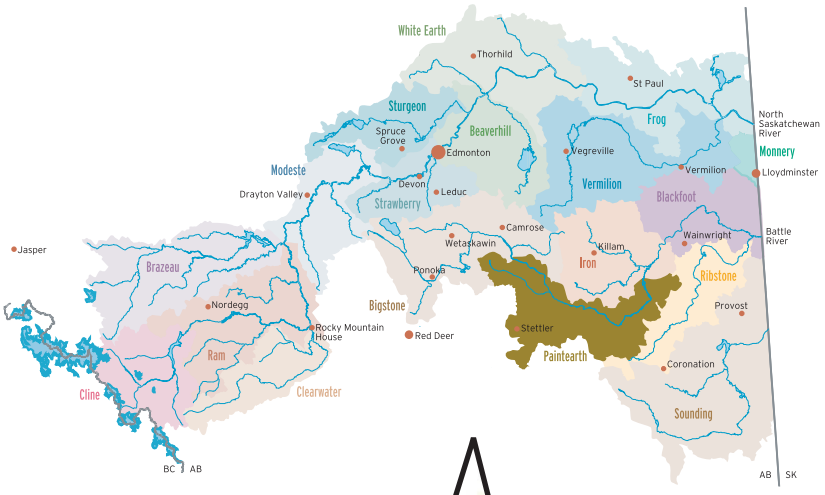
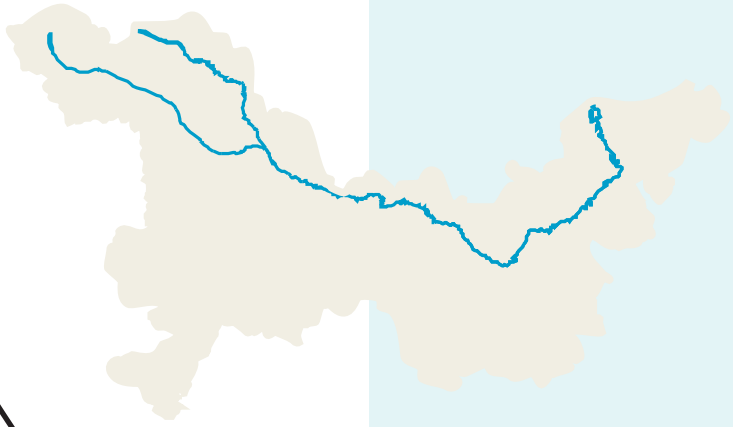
Paintearth





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5.14 PAINTEARTH SUBWATERSHED

The Paintearth Subwatershed lies in the Battle River watershed and is mostly in the Central Parkland Natural Subregion with some of the southern portion in the Northern Fescue Natural Subregion. The Paintearth Subwatershed encompasses 474,209 hectares including 13,105 hectares (2.7%) of natural and artificial water bodies. The Subwatershed includes Camrose, Flagstaff, Paintearth and Stettler Counties. Settlements in the Subwatershed include Amisk, Alliance, Botha, Brownfield, Castor, Donalda, Galahad, Ferintosh, Fleet, Gadsby, Halkirk, Meeting Creek, Red Willow and Stettler with a total population of about 3,000. Much of the area is extensively covered in badlands and underlain by coal deposits. The economic base of the region is oil, natural gas, agriculture, and mining for gravel and coal.

The Big Knife Provincial Park on the Battle River provides camping, hiking, swimming, canoeing/kayaking, fishing, and boating.

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

5.14.1 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.

5.14.1.1 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 Paintearth 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 the Paintearth Subwatershed.

5.14.1.2 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% (10,159 ha) of the Paintearth Subwatershed lands are affected by linear developments. The majority of linear development (64%) is roads of one form or another, including gravel and unimproved roads (50% of the linear development) and paved roads (9% of linear developments). Other linear developments include pipeline rights of way (13% of the area of linear development), transmission line rights of way (10%), cutlines (9%) and active or abandoned rail lines (5%).

5.14.1.3 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. Water bodies, both natural and constructed, and including lakes, rivers, streams, wetlands, dugouts and reservoirs cover 3% of the


Subwatershed. The vast majority of the Subwatershed is classified in various land uses related to agricultural production: grassland, 56%; cropland, 39%; and forage, 6%. About 1.5% (6,697 ha) of the Subwatershed is covered with trees or shrubs. Water bodies including rivers, lakes and dugouts cover about 13,105 hectares; 3% of the area of the Subwatershed.

About 4% 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 due to well sites and open pit mines, which affect 1% and 0.5% of the Subwatershed (5,102 ha and 2,154 ha, respectively). Disturbance due to municipalities of various sizes including Stettler and Castor affects about 0.3% of the Subwatershed (1,648 ha). The remainder of the land disturbance is related to linear developments (2.1%), and industrial facilities including oil and gas plants, runways, sand and gravel pits, and a power generating station (0.5%; 2,282 ha).

5.14.1.4 Livestock Density

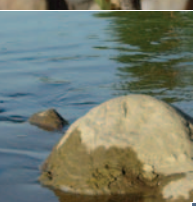
Areas of higher livestock density may be expected to have greater impacts on downstream aquatic systems. Manure production was used as a surrogate for livestock density. Manure production information was available only on the basis of soil polygons. These polygons do not correspond to the Subwatershed boundaries and provide only a rough estimate of manure production within the actual Subwatershed. Based on the available information, livestock densities in the Paintearth Subwatershed are moderate. Manure production in the soil polygons that cover the Paintearth Subwatershed range between 256,000 and 2,448,000 tonnes.

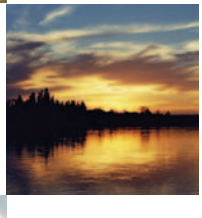
5.14.1.5 Wetland Inventory

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. Both the Alberta Sustainable Resource Development base features hydrology data and the PFRA Land Classification data failed to identify wetlands in the Paintearth Subwatershed. However, an inventory completed by Ducks Unlimited Canada found a total of 34,771 hectares of wetlands (7.3% of the Subwatershed area). The inventory included both permanent and temporary wetlands. The western part of the watershed includes the Buffalo Lake First Step Project for the North American Waterfowl Management Plan (NAWMP) in Alberta.

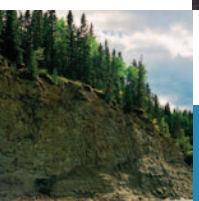
5.14.2 Water Quality and Quantity

Water bodies in the Subwatershed include the Battle River, and the Nelson, Paintearth, Castor, Young, Big Knife, Red Willow, Meeting and Frenchmans Creeks. Some of the larger waterbodies in this Subwatershed include Driedmeat, Lonepine, Lowden, Beltz, Hughender, Barnett, Lowden and Little Beaver Lakes. Many of the towns have wastewater detention ponds that discharge into tributaries of the Battle River. Stettler discharges into Red Willow Creek, and Castor into Castor Creek.





No LTRN water quality stations exist in this Subwatershed, therefore no long term water quality data has been summarized. This data gap should be addressed in future studies in this Subwatershed. However, three stations along Paintearth Creek were sampled for fecal coliforms and TP during 1987-1990. The 3 fecal coliform samples ranged from 8 to 72 counts/100 mL, and averaged 37 counts/100 mL. All of these samples were below the CCME Surface Water Quality Guidelines for Contact Recreation. The 7 TP samples ranged from 0.084 to 0.544 mg/L, and averaged 0.313 mg/L. There has been no sampling for pesticides in this Subwatershed.



Water quantity is measured at eight HYDEX stations (05FC001-05FC007 and 05FC904): one station has real-time online data (05FC001). Figure 23 shows the Paintearth Creek hydrograph for the open water season. This hydrograph is typical of a small prairie stream with only runoff contributions. Flows are highly sporadic, and only occur following spring runoff and summer storm events.

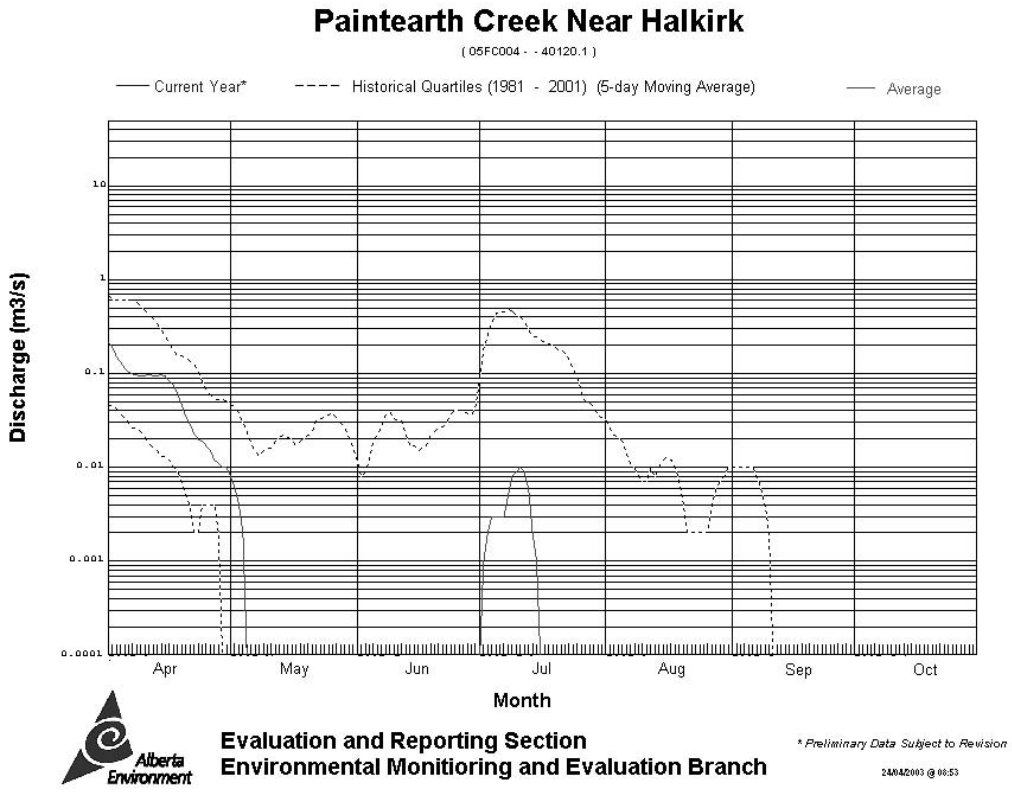


Figure 23: Paintearth Creek near Halkirk mean monthly discharge for the open water season (Station 05FC004).

5.14.3 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.

5.14.3.1 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 Paintearth 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 Paintearth Subwatershed.

5.14.3.2 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 Paintearth Subwatershed has not been conducted. Walleye, goldeye, northern pike occur in the Battle River; however, their numbers are limited by low flows.

5.14.3.3 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 Paintearth Subwatershed is located in the Central Parkland and Northern Fescue Natural Subregions. The Central Parkland Subregion is composed mainly of grassland with aspen, to aspen parkland to closed aspen forest. Tree species include trembling aspen and balsam poplar. The Northern Fescue Subregion is characterized by gently rolling terrain, low-relief ground moraine and hummocky moraine. The dominant vegetation type in this subregion is Rough Fescue.

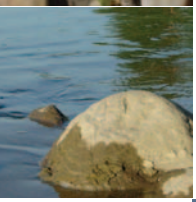
5.14.3.4 Benthic Invertebrates

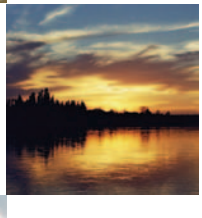
Inventories of benthic invertebrate populations may show changes the presence and abundance of species that may be related to changes in water quality. No published assessment of benthic invertebrates was found for the lakes, wetlands, rivers or creeks in the Paintearth Subwatershed, so we cannot make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

5.14.4 Paintearth Summary

The Paintearth Subwatershed lies in the Battle River watershed. Much of the area is underlain by coal deposits. Livestock densities in the Paintearth Subwatershed are moderate. The economic base is oil, natural gas, agriculture, and mining for gravel and coal. Over 2% of the Subwatershed is affected by linear developments including roads, pipeline rights of way, transmission line rights of way, cutlines, and rail lines. Another 2% is affected by well sites, municipalities, and facilities including oil and gas plants, runways, sand and gravel pits, and a power station. Water bodies cover 3% of the Subwatershed. The majority of the Subwatershed is classified in land uses related to agriculture. About 1.5% of the Subwatershed is covered with trees or shrubs.

The available PFRA Land Classification shows no wetlands in the Subwatershed; however, Ducks Unlimited Canada data show wetlands on 7.3% of the Subwatershed area. This variance needs to be resolved.





No published assessment of riparian health, water plants, benthic invertebrates, or long-term river water quality information was found for the Subwatershed. Water quantity is measured at eight stations: one has real-time online data.

A systematic estimate of fish populations in the Paintearth Subwatershed has not been conducted. Fish species are limited by low flows in the Battle River and other streams.




In summary, there has been little systematic assessment of the Paintearth Subwatershed and there are significant data gaps for the area. However, of the eight indicators assessed, two were good, four were fair, and two were poor, yielding an overall subjective rating of fair. 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 benthic invertebrates, water plants, and fish populations.