Sounding

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5.18 SOUNDING SUBWATERSHED

The Subwatershed lies in the Central Parkland and Northern Fescue Natural Subregions and encompasses 1,097,697 hectares including 51,527 hectares of natural and artificial water bodies. This Subwatershed includes Acadian, Paintearth, Provost Counties, the MD of Wainwright and Special Areas # 2, 3 and 4. The Subwatershed includes the towns of Altario, Bodo, Cadogan, Cereal, Chauvin, Compeer, Consort, Coronation, Hayter, Kirriemuir, Monitor, New Brigden, Provost, Sedalia, Sibbald, Veteran and Youngstown. The predominant economic activities are agriculture and oil and gas operations. Recreational activities are provided at Gooseberry Lake Provincial Park.

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

5.18.1 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.

5.18.1.1 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 Sounding 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 within the Sounding Subwatershed.

5.18.1.2 Linear Development

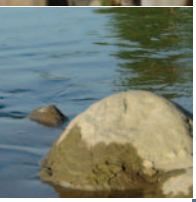
Quantifying linear development in the Subwatershed helps us understand potential changes in water quality and quantity, fish and wildlife populations, and riparian health. About 1% (15,058 ha) of land in the Sounding Subwatershed is affected by linear developments. The majority (55%) is in roads of one form or another, including gravel and unimproved roads (42% of the linear development) and paved roads (7% of linear development). Other linear developments include cutlines (20% of the area of linear development), pipeline rights of way (13%), transmission line rights of way (6%), and active or abandoned rail lines (6%).

5.18.1.3 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, including lakes, rivers, streams, wetlands, dugouts and reservoirs cover 51,527 (5%) of the Subwatershed. The vast majority of the Subwatershed is classified as land uses related to agricultural production: grassland, 61%; cropland, 30%; and forage, 4%. Less than 1% (689 ha) of the Subwatershed is covered with shrubs or trees.





About 3% of the land area has been disturbed by activities including the linear development described above. The greatest area of disturbance following linear development is for active or abandoned well sites. In total, well sites affect 1.4% of the Subwatershed (15,861 ha). Disturbance due to municipalities of various sizes including Cereal, Chauvin, Coronation, and Veteran affects about 0.1% of the Subwatershed (1429 ha). The remainder of land disturbance is related to linear developments (1.4%), and industrial facilities including oil and gas plants, runways, and sand and gravel pits (209 ha).

5.18.1.4 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 Sounding Subwatershed are moderate. Manure production in the soil polygons that cover the Sounding Subwatershed was estimated at between 256,000 and 1,767,000 tonnes.

5.18.1.5 Wetland Inventory

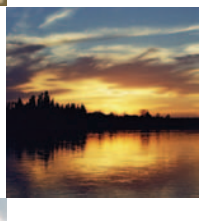
Wetlands serve many functions in the natural landscape. The loss of wetlands to development can have impacts on water quantity and quality to downstream habitats. Data from Alberta Sustainable Resource Development base features hydrology failed to identify wetlands in the Sounding Subwatershed. However, the PFRA Land Classification identified wetlands on 6,608 hectares (0.6%) of land area in the Sounding Subwatershed. Another inventory completed by Ducks Unlimited Canada found a total of 93,561 hectares of wetlands (8.5% of the Subwatershed area). The DUC inventory included both permanent and temporary wetlands.

5.18.2 Water Quality and Quantity

Waterbodies in this Subwatershed include the Sounding Creek Reservoir and the Sounding, Eyehill, Loyalist, and Monitor Creeks. Larger lakes in this Subwatershed include Grassy Island, Killarney, Gooseberry, Reflex, Hansman, Gillespie, Leane, Fleeinghorse and St. Lawrence Lakes. No long term surface water quality information exists for this Subwatershed. This data gap should be addressed in future studies in the Sounding Subwatershed.

No LTRN water quality stations exist in this Subwatershed, therefore no long term water quality data has been summarized. However, eleven stations along Sounding Creek were sampled for fecal coliforms during the years 1971-74, 1983, and 1991-94. The 11 fecal coliform samples ranged from <1 to 150 counts/100 mL, and averaged 29 counts/100 mL. These samples were below the CCME Surface Water Quality Guidelines for Contact Recreation. No TP data was found for this Subwatershed.

Water quantity is measured at seven HYDEX stations (05GA003, and 05GA008-05GA013): three have real-time online data (05GA008, 05GA011, and 05GA012). Figure 27 shows the Monitor 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 28 shows the Sounding Creek hydrograph for the open water season. This hydrograph is also typical of a small prairie stream with only runoff contributions, with sporadic flows that only occur following spring runoff and summer storm events.



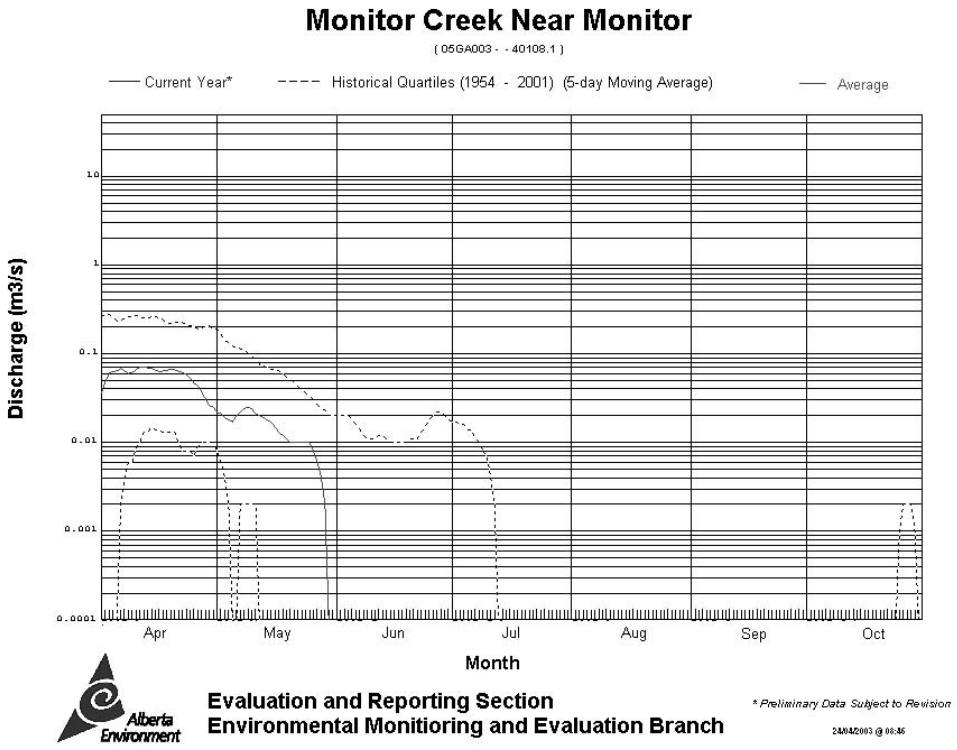



Figure 27: Monitor Creek near Monitor mean monthly discharge for the open water season (Station 05GA003).

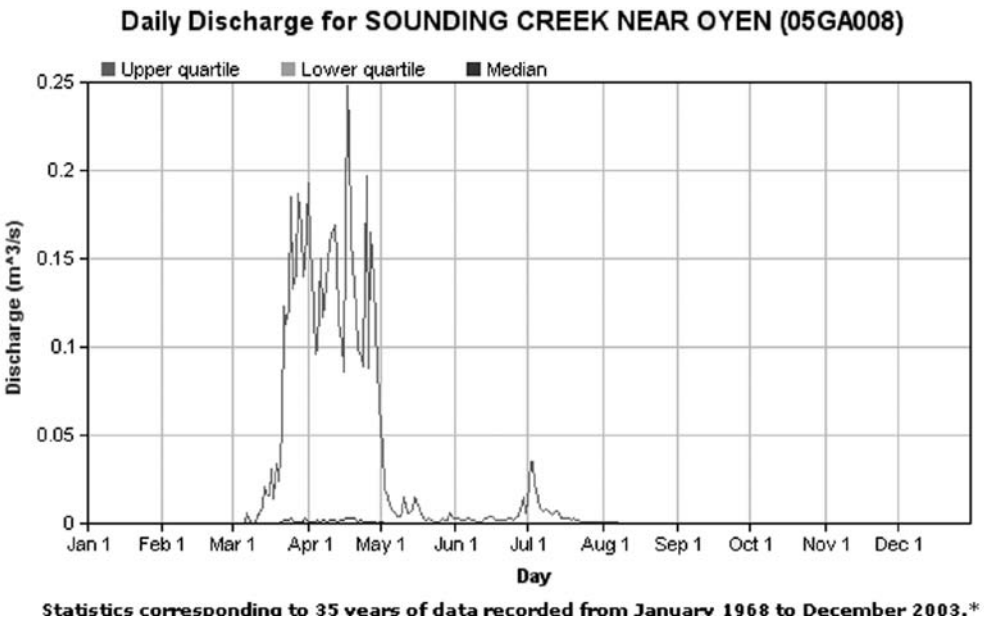
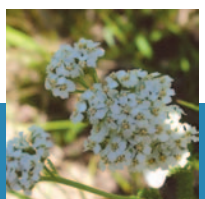
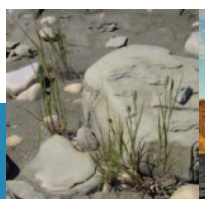
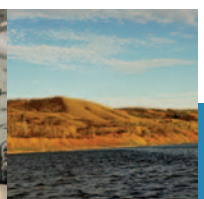


Figure 28: Sounding Creek near Oyen mean monthly discharge (Station 05GA009).





5.18.3 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.

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

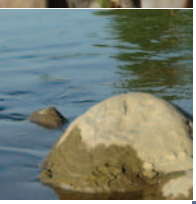
5.18.3.2 Fish Population Estimates

Inventories of selected fish populations may show changes in the presence and abundance of species that could be related to environmental factors including changes in water quality or quantity. A systematic estimate of fish populations in the Sounding Subwatershed has not been conducted. This data gap could be addressed in future research in the Sounding Subwatershed.

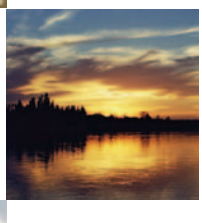
5.18.3.3 Vegetation Types

Inventories of flora populations may show changes in abundance that may be related to environmental factors including changes in land use practices. The Sounding Subwatershed is located in both the Central Parkland and Northern Fescue ecological 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, while grasslands are dominated by Rough Fescue. 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.

5.18.3.4 Benthic Invertebrates

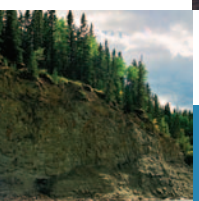


Inventories of benthic invertebrate populations may show changes the presence and abundance of species that may be related to changes in water quality. No published assessment of benthic invertebrates was found for the lakes, wetlands, rivers or creeks in the Sounding Subwatershed, so we cannot make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



5.18.4 Sounding Summary

The predominant economic activities in the Sounding Subwatershed are agriculture and oil and gas operations. The majority of the land use in this Subwatershed is agriculture and livestock densities are moderate. Less than 1% of the Subwatershed is treed and water bodies cover about 5% of the area. About 3% of the land area has been disturbed by activities including roads, cutlines, pipeline rights of way, transmission line rights of way, and rail lines, well sites, municipalities, and industrial facilities.






The PFRA Land Classification shows wetlands occurring on 0.6% of land area; however, Ducks Unlimited Canada information show wetlands on 8.5% of the land area. This variance needs to be resolved.

Water quantity is measured at seven stations: three have real-time online data. There is no long-term river water quality information for the Subwatershed or information on water plants, benthic invertebrates, fish populations or riparian health.

In summary, there has been little systematic assessment of the Sounding Subwatershed and there are significant data gaps for the area. However, of the five indicators assessed, two were good, two were fair, and one was 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 water quality, water plants, and fish populations.