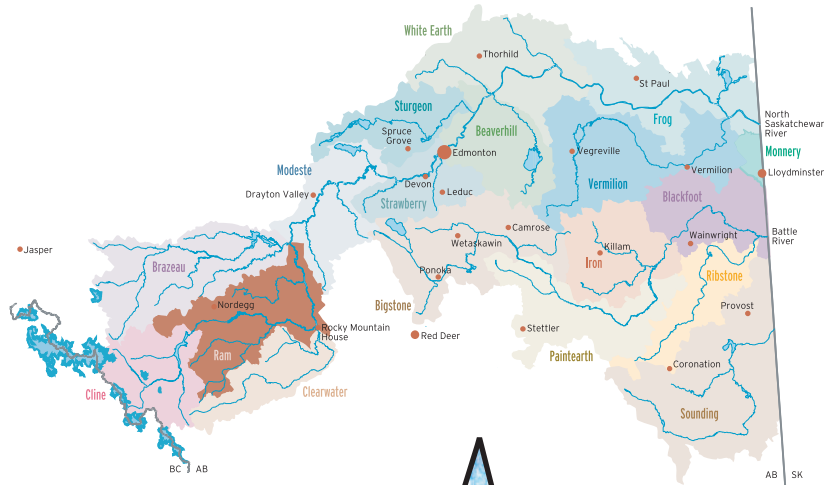


Ram



Zoe Burgess
Age ?
Edmonton



5.3 RAM SUBWATERSHED

The Ram Subwatershed is in the Foothills Natural Region. It encompasses 632,541 hectares including 2,040 hectares of water bodies which is 2% of the Subwatershed area. Less than 1% (4,405 ha) of the Subwatershed is found in Banff National Park (park) or the Siffleur Wilderness Area (provincial protected area). Almost this entire Subwatershed lies in an FMU (99%). The Ram Subwatershed is in the municipal boundaries of Clearwater and Brazeau Counties and includes the settlements of Rocky Mountain House and Nordegg, as well as Crimson Lake Provincial Park and the Bighorn 144A First Nations Reserve. The Ram Subwatershed contains many parks and campgrounds including the 3,217 hectare Crimson Lake Provincial Park located just west of Rocky Mountain House.

The topography is that of strong, rolling ridges of shale and sandstone. The Subwatershed receives about 550 mm in annual precipitation and has a mean annual temperature of 1°C.

The economic base of the region consists of oil and gas, forestry, agriculture, and tourism. This area may be at risk due to the large amount of the Subwatershed which is not protected (i.e. a park or protected area).

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

5.3.1 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.

5.3.1.1 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 Ram 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 Ram Subwatershed.

5.3.1.2 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. Linear development takes up 1.6% (10,229 ha) of the land area in the Ram Subwatershed. The majority of this (51%) is cutlines. Roads of one form or another (24.1%) and pipeline rights of way (17.0%) are the majority of the remainder. About 2% of the linear disturbance is railway line right of way.



5.3.1.3 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.

Thirty-one percent of the watershed has been classified based on the PFRA Land Classification System. Of this 162,838 hectares, 83% (162,838 ha) is classified as trees and 8% (15,731 ha) as forage. The remainder consists of grassland (6%, 11,880 ha) and shrubs, water bodies and other lands. Ninety-nine percent of the watershed is in provincial government forest management units.

In addition to the linear disturbances noted above, 2% (12,364 ha) of the Subwatershed area is classified as municipal or reserve area and 0.3% (2,104 ha) is taken up by well sites. A small percentage (0.03% or 214 ha) is used for various other facilities including an air strip, gas plants, and gravel pits.

5.3.1.4 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 in the actual watershed. Based on the available information, livestock densities in the Ram Subwatershed are low. Manure production in the soil polygons that cover the Ram Subwatershed was estimated at between 0 and 726,300 tonnes.

5.3.1.5 Wetland Inventory

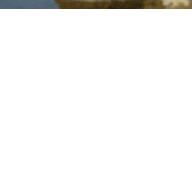
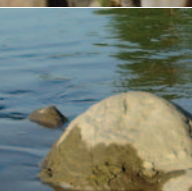
Wetlands serve many functions in the natural landscape. The loss of wetlands to development can have impacts on water quantity and quality to downstream habitats. There was no information available on wetland area in the Ram Subwatershed; however, the Alberta Sustainable Resource Development base features hydrology data indicated that only 0.3% (2,040 ha) of the Subwatershed was made up of water bodies.

5.3.2 Water Quality and Quantity

The Town of Rocky Mountain House takes its raw water supply from the North Saskatchewan River and discharges treated wastewater to the river.

Water bodies in the Subwatershed include the North Saskatchewan, Baptiste, Ram, Joyce, and Bighorn Rivers, and Jock, Gap, Dutch, Grace, Chambers, Shunda, Brewster, Deserters, Trout, Kiska, and Tershishner Creeks. Some of the larger lakes in this Subwatershed include Abraham, Cow, Crimson Radial, Shunda, Ernie, McGregor and Jackfish Lakes. Water quality for Crimson Lake can be found in the Atlas of Alberta Lakes (Mitchell and Prepas 1990). The largest glacier in the Subwatershed is the Ram River Glacier in the south of the Subwatershed.

No LTRN water quality stations exist in this Subwatershed, therefore no long term water quality data has been summarized. However, one station on the Ram River was sampled for fecal coliforms and TP from 1985-86. The six fecal coliform samples ranged from 1 to 7 counts/100 mL, and averaged 4 counts/100 mL. All fecal results were below the CCME Surface Water Quality Guidelines for Contact Recreation. The 8 TP samples ranged from 0.008 to 0.061 mg/L, and averaged 0.022 mg/L. No pesticide samples were taken.



Water quantity is measured at twelve HYDEX stations (05DC001-05DC009), two of which have real-time online data (05DC001 and 05DC006). Figure 10 shows the open water season hydrograph for the Ram River. This hydrograph is typical for a glacial meltwater dominated headwater stream, with flows only during the warm summer months, and flows falling to zero in the fall.

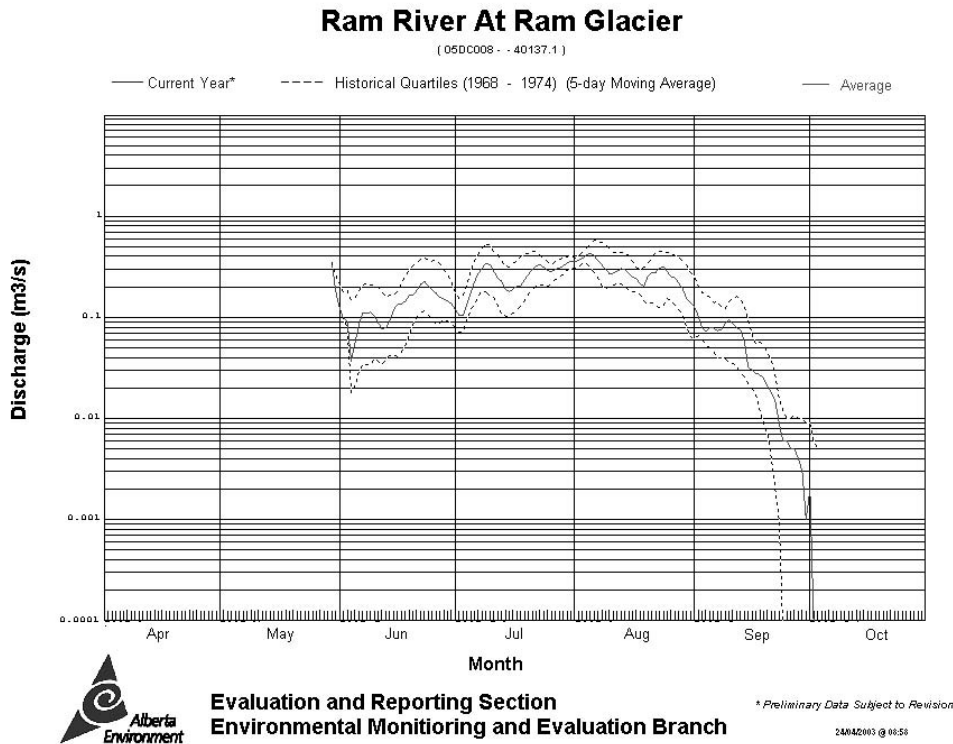


Figure 10: Ram River at Ram Glacier mean monthly discharge for the open water season (Station 05CD008).

5.3.3 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.

5.3.3.1 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 Brazeau 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 Ram Subwatershed.

5.3.3.2 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.

The North Saskatchewan River in this Subwatershed is frequently confined to a stream cut valley with islands, pool and riffle sequences with sand bars and a predominately gravel substrate. Many of the water bodies in the Subwatershed provide a high quality, cold water habitat for fish. Fish species include cutthroat trout, bull trout, mountain whitefish, brown trout, and lake trout. Cutthroat trout and brown trout are introduced species and are abundant in some streams. Bull trout probably are the most widely distributed trout in the Subwatershed, but mountain whitefish are the more abundant, especially in the larger rivers including the North Saskatchewan River. Other fish species include northern pike, walleye, brook trout, rainbow trout and goldeye. Mountain whitefish likely spawn and overwinter in this section of the North Saskatchewan River (Allan 1984).

The Baptiste River system contains about 500 kilometres of streams. Based on surveys in the early 1980's the system contains crucial areas of habitat for spawning, rearing and overwintering of salmonid species in the upper main stem and tributaries (Allan 1984).

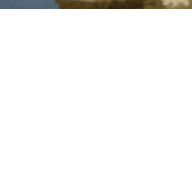
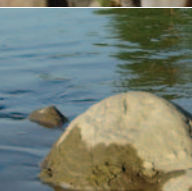
5.3.3.3 Vegetation Types

Inventories of flora populations may show changes in abundance that may be related to environmental factors including changes in land use practices. The Ram Subwatershed is located in the Foothills Region of Alberta. The Foothills Region is split into the upper foothills and the lower foothills. The upper foothills includes species such as white spruce, black spruce, lodgepole pine and subalpine fir. The lower foothills are composed mainly of mixed forests, featuring white spruce, black spruce, lodgepole pine, balsam fir, aspen, balsam poplar and paper birch. Fens are very common in the lower foothills area. Coniferous forests of white spruce and lodgepole pine dominate the vegetation in the higher elevations. At lower elevations, there is a co-dominance of trembling aspen, balsam poplar, lodgepole pine and white spruce.

5.3.3.4 Benthic Invertebrates

Inventories of benthic invertebrate populations may show changes in the presence and abundance of species that may be related to changes in water quality.

Alberta Environment conducted surveys of benthic invertebrates in the North Saskatchewan River between 1973 and 1977. Data from the five-year period were summarized in a report published in 1978 (Reynoldson and Exner 1978). One of the sampling sites was at Rocky Mountain House. The authors concluded that upstream of the City of Edmonton, there was little change in the species diversity or total numbers of macrobenthic fauna from year to year and season to season. The site also showed less variability in both diversity and standing crop compared to sites downstream of Edmonton. The main invertebrate groups in five years of sampling the river upstream of Edmonton were Chironomidae (Midges), which made up 38.4% of the samples, Ephemeroptera (Mayflies), 31.7% and Plecoptera (Stoneflies), 20.0%. The remainder of the sample was Trichoptera (Caddisflies), 4.9% and Oligochaeta (Earthworms), 0.5%.



5.3.4 Ram Summary

Most of the Ram Subwatershed is forested and allocated to forest management and less than 1% lies in parks or protected areas. Because so much of the Subwatershed is allocated to forest management, this watershed is potentially at risk and sustainable practices must be followed to avoid negative impacts in this Subwatershed. The economic base consists of oil and gas, forestry, tourism and some agriculture. A relatively high percentage of the Subwatershed has been affected by liner development (1.6%). This development includes cutlines, roads, and pipelines rights of way. In addition, 2% of the developed area is municipal or reserve area and a small area is affected by well sites and other facilities.

No long-term river water quality information exists for this Subwatershed; however, it should be noted that the Town of Rocky Mountain House discharges treated wastewater to the North Saskatchewan River. The impact of this discharge on river water quality should be assessed.

Water quantity is measured at twelve stations, two of which have real-time online data.

Detailed assessments of fish populations in the Subwatershed have not been done. Studies suggest that the North Saskatchewan River and Baptiste River systems provide critical areas of habitat for spawning, rearing and overwintering of fish species.

A systematic examination of aquatic plants and assessment of riparian health have not been completed in the Ram Subwatershed. Surveys of benthic invertebrates in the North Saskatchewan River at Rocky Mountain House, between 1973 and 1977, concluded that there was little change in the species diversity or total numbers from year to year and season to season.

In summary, there has been little systematic assessment of the impact of development on the Ram Subwatershed and there are significant data gaps, which should be addressed. However, of the eight indicators assessed, six were good, two were fair, and none were poor, yielding an overall subjective rating of good. In particular, future studies should focus on the impacts of linear development and the potential conflicts between industrial activities – forest harvesting and oil and gas development – and recreational uses. These data gaps should be addressed given the importance of this area of recreational use and tourism, and the importance of habitat in the area for fish species.

