2.3 Upper Vermilion River and Roberts River Subwatersheds

General Description

- **Total area:** 684.9 km^2; Upper Vermilion (497.6 km^2) and Roberts River (187.4 km^2).
- **Drainage**: The Vermilion River rises from a group of small lakes located in Frechette Township and runs north into Thor Lake. From there, through Edna, Danae and Post Lakes it flows southwest where it is joined by the Roberts River (in Hutton Twp) and continues its flow through the town of Capreol toward Green's and Onwatin lakes. The length of the Vermilion River from beginning to its southern extent, just past Onwatin Lake, is approximately 103 km. Along this stretch stretch, the river drops from 456.0 m.a.s.l. to 281.9 m.a.s.l., with a channel slope of 1.69 m/km. The Roberts River subwatershed is 28km long, with a drainage area of 187.67 km^2, a drop of 108m and an average gradient of 3.86m/km.
- **Topography:** The valley of the Vermilion River (Thor and Edna Lakes) is deeply incised and forms a broad sandy plain bound on both sides by steep cliffs or high hills. East of Edna Lake, a gently undulating plain of sand and silt river deposits extends for over 1200 m easterly.
    - The mean elevation of these two subwatersheds is 399.7 m.a.s.l, with a maximum elevation of 541.8 m.a.s.l.
- **Geology:**
    - **Bedrock Geology**: Precambrian bedrock of the Huronian Province and the Superior Province are intermixed throughout the Upper Vermilion subwatersheds. The Roberts River subwatershed is composed primarily of bedrock from the Superior Province. The Sudbury Igneous Complex is present in the southern portion of the Upper Vermilion subwatershed.
    - **Quaternary Geology:** Mainly undifferentiated igneous and metamorphic rock, exposed at surface or covered by a discontinuous, thin layer of drift. Smaller pockets of glaciofluvial outwash deposits occur throughout.
- **Soil:** The main surface substrate is stable bedrock, particularly along the outside edges of the subwatershed. Large areas of sand and sandy loam occur along the valleys of the Vermilion River. Around the Sudbury Structure, there are large expanses of gravely sandy loam. Soil data is absent for the Roberts River subwatershed and a larger central portion of the Upper Vermilion subwatershed.
- **Groundwater:**
    - At the southern reaches of the subwatersheds, as the landscape transitions into the area known as 'The Valley' there are large areas identified as Significant Groundwater Recharge Areas.
    - Almost the entire southern section of these subwatershed is identified as Highly Vulnerable Aquifer with smaller areas also throughout the watersheds and another large area identified to the north, in the townships of Frechette and Beaumont.

- **Land cover:**
  - Forest covers an area of 568.3 km^2, 83.0 % of the subwatersheds.
  - Lakes cover an area of 58.6 km^2, 8.5 % of the subwatersheds.
  - Wetlands cover an area of 50.4 km^2, 7.4 % of the subwatersheds.
- **Land Use Type:**
  - **Zoning**: 210.6 km^2 (30.7%) of these subwatersheds falls within the City of Greater Sudbury's zoned areas and are subject to the Zoning By-law. Of this area, 163.9 km^2 is rural (77.8 %) and 60.7 km^2 is industrial (38.6%). The remainder are small areas designated as open space, park, environmental protection, commercial, residential, future development, institutional and seasonal lands.

Indigenous Communities and Traditional Territories

- These subwatersheds falls within the Robinson-Huron Treaty Area #61, of 1850. It also lies within the traditional territory of both the Wahnapitae First Nation and the Atikameksheng Anishnawbek First Nation.
- It also falls within the Mattawa/Lake Nipissing Métis traditional territory, Region 5.

Development Pressure

Overall: Low. Mostly undeveloped in the northern and central areas of these subwatersheds, but development increases in the southern extent of the Upper Vermilion, near the towns of Capreol and Valley East. Forestry is the main disturbance within these subwatersheds.

- **Settlement Area:** The town of Capreol (2.78km^2) is designated as settlement area under the City of Greater Sudbury Official Plan.
- **Municipal Wastewater Facilities:** Wastewater originating within the Capreol Wastewater System is treated at the municipally owned and operated Capreol Lagoon.
- **Forestry:** The majority of the Upper Vermilion subwatershed falls within the Sudbury Forest. A smaller area to the northwest falls within the Spanish Forest. The Roberts River subwatershed is split between both Forest Management Areas. There are extensive areas identified for harvest in both the 2020-2030 Sudbury and Spanish Forest Management Plans, from the northern extent south until Hutton Township, near the town of Milnet.
- **Aggregate:** There are currently 43 active and 1 inactive aggregate operation, covering an area of 8.6 km^2.
- **Mining:**
  - No active exploration reported within the last year (February 2023-January 2024)
  - There are currently 55 active Mining Plans and Permits registered to these subwatersheds, 54 of which fall within the Upper Vermilion River subwatershed.
  - Historically, there was one producing mine, Moose Mountain, an open pit iron mine which operated from 1957 to 1975.

Recreational Use

- The rivers and lakes in these subwatersheds have a wide variety of uses including canoeing, kayaking, boating, swimming, and recreational fishing.
- The area is also commonly used for Crown-land camping, hiking, hunting, berry picking and general nature appreciation. Trails are plentiful for snowmobiling and off-road vehicle use.
- Capreol Public Beach is a municipal beach located along the Vermilion River.
- In developed areas, there are several municipal parks and groomed trails, including the Capreol Trail, managed by Rainbow Routes, and the Capreol Cross Country Ski Club, with 32km of ski and snowshoeing trails.

Water use

- There are currently 3 active Permits to Take Water within this subwatershed, all held by Vale.

Notable Waterbodies

- Thor Lake, Edna Lake and Post Lake are all widenings of the Vermillion River in the more remote northern reaches of the subwatershed. Helen Lake is one of the larger lakes in this area.
- Green's Lake and Onwatin Lake are also widenings of the Vermilion River, located within the more developed areas of the subwatershed, to the souch.
    - **Onwatin Lake** has an area of 34.2 ha and a maximum depth of 4 m. Onwatin Lake has 159 permanent residents and 13 seasonal residents.
    - **Green's Lake** has an area of 34.0 ha and a maximum depth of 32m. The lake has 1 permanent residence and no seasonal residents.
- Frenchman Lake and Hanmer Lake are well known lakes in the north of Hanmer accessible by road and inhabited by both permanent and seasonal residents.
    - **Frenchman Lake** has an area of 43.8 ha and a depth of 18 m. There are 37 permanent residents and 28 seasonal residents on this lake.
    - **Hanmer Lake** has an area of 54.4 ha and a maximum depth of 10 m. Hanmer Lake has 32 permanent residents and 56 seasonal residents.
- Bigwood Lake and Ironside Lake are both larger lakes located within the Roberts River subwatershed.
    - **Ironside Lake** is located in Hutton township and has an area of 80.4 ha. It has no permanent residents and 38 seasonal residents.

Previously Identified Management Issues

- In a Reconnaissance Watershed Survey (A.A. Lupton, 1974), 5 sites were identified in the Upper Vermilion River as hazard lands when subject to human use, mainly because of the instability of the fine sand it is based on.
- The Vermilion River is also known to exhibit streambank erosion characteristics as the underlying material is glacial outwash composed of sands and gravels. As it follows the edge of

the Sudbury Basin, extensive meandering occurs through deposits of glaciofluvial sandy gravel (NDCA Watershed Inventory, 1980)

- Roberts River is the first major tributary of the Vermilion River and historically received sanitary sewage and mine waste from Moose Mountain Mine, however, in the spring of 1979 the complex was closed. (NDCA Watershed Inventory, 1980, Biological Survey of the Streams and Lakes of the Sudbury Area, 1968).

Natural Hazard Identification and Regulation

Hazards and features regulated by Conservation Sudbury include flood and erosion hazards, wetlands, unstable soils, rivers, streams, creeks, and small inland lakes. More on these regulations can be found in the Conservation Authorities Act, O. Reg. 686/21 that addresses the risks of natural hazards.

- **Floodplain mapping:** Flood Line Mapping has taken place in the following areas:
  - The Vermilion River at Capreol (1982)
  - In the absence of floodplain mapping, flood hazards are estimated based on site conditions. Typically, the extent of the flood hazard is estimated at 1.2 m above the bankfull elevation or high-water elevation.
- **Erosion hazard mapping:** Currently, erosion hazards are evaluated based on the general guidance from the MNRF for confined and unconfined systems.

Water Control Structure

- There are no water control structures identified within these subwatersheds.

Drinking Water Source Protection

- The Upper Vermilion River subwatershed encompasses the municipal wells of the Capreol well supply (Wells I, J, M) and their surrounding Wellhead Protection Areas (WHPA). It also includes the Linden Well (Well F) as part of the Blezard Valley Well Supply and its WHPA, which it shares with the Whitson River subwatershed immediately to the south. groundwater aquifers do not necessarily follow the same boundaries as subwatersheds.
  - Wells J and M (Capreol Wells) draw water from a common unconfined aquifer comprised mostly of sands and gravels and classified as Groundwater Under Direct Influence of a surface water (GUDI).
- The entirety of both subwatersheds fall within the headwaters of the Vermilion River Water intake, a municipal drinking water source. As such, all watercourses within these subwatersheds and the lands immediately around them are classified as Intake Protection Zone 3 as the water ultimately drains towards the Vermilion River drinking water intake.

Water Quality Indicators

Surface water:

- Past data suggest a lack of excessive pollutants and almost no organic loadings, despite historic mining within the Roberts River subwatershed (NDCA Watershed Inventory, 1980).
- Frenchman Lake, Hanmer Lake and Onwatin Lake were all found to be oligotrophic under the City of Greater Sudbury's Lake Water Quality Monitoring program.
- Lake Partner Program samples from Ironside Lake, Kumska Lake, Frenchman Lake, Green's Lake, Onwatin Lake and Dixon Lake were also found to be oligotrophic, while Bass Lake, was mesotrophic verging on eutrophic.

Groundwater: There are currently no known sources of groundwater data within this subwatershed.

Significant Features

- The Kitchener Township (Morton Lake) Conservation Reserve is mostly located within the Roberts River subwatershed, covering an area of 4.9 km^2.
- Wildlife Values:
  - There are 697 moose related wildlife value areas, covering a total area of 157.3 km^2.
  - There are 3 Great Blue Heron areas identified.
  - There are also 3 wildlife value points for raptor nesting locations.
- There are no ANSI ecological or geological areas of interest.

Management and Stewardship

- **Wahnapitae First Nation** and **Atikameksheng Anishnawbek First Nation:** Their traditional territories include the area within these subwatersheds. They are land holders of the area and, as such, are stewards of the land.
- **Ministry of Environment, Conservation and Parks:** Conservation Reserves are managed by MECP.
- **Vermilion River Stewardship Group**
- **Ironside Lake Stewardship Group**
- **Four Lakes Community Association** (Frenchman, Hanmer, Joe, Dixon Lake).

Data available

- **Water Survey of Canada** – Active Stream Gauging Stations:
  - Vermilion River near Milnet (Station 02CF014) 1970-1977, 2004-present
  - Vermilion River at Val Caron (Station 02CF011) - 1970-1994, 2005-present
  - Inactive: Vermilion River at Capreol (Station 02CF100) – continuous data from 1970-1979
- **Snow - Surface Water Monitoring Centre:** Conservation Sudbury, in partnership with Ministry of Natural Resources and Forestry, has collected bi-monthly snow depth and snow water equivalent data near the town of Capreol since 1982.
- **Climate Change Monitoring Station:** Future location of a climate change monitoring station near Milnet, which will include snow depth and snow water equivalent, soil moisture, precipitation, temperature, and other climate data. This station will be monitored by Conservation Sudbury, in partnership with the Ministry of Natural Resources and Forestry.
- **Vermilion River Stewardship Group** funded the collection of water quality samples from 27 sites within the Vermilion River watershed between 2013 and 2015, 1 of which was located within the Upper Vermilion River subwatershed.
- **City of Greater Sudbury – Water and Wastewater**: Raw water and treated water from the Capreol Drinking Water system are sampled and tested regularly, as required by O. Reg. 170/03.
- **City of Greater Sudbury:** Lake Water Quality Program collects spring total phosphorus data on Ironside Lake, Hanmer Lake, Green's Lake and Onwatin Lake.
- **Co-operative Freshwater Ecology Unit:** Hutton Lake was sampled as a Reference Lake in the CFEUs long term monitoring of lakes recovering from Sudbury's mining legacy.
- **Lake Partner Program:** Ironside Lake, Kumska Lake, Bass Lake, Frenchman Lake, Hanmer Lake, Green's Lake, Onwatin Lake and Dixon Lake have been sampled for total phosphorus and secchi depth as part of this provincially run, volunteer-based program.
- **Public Health Sudbury and District:** Collects water samples from public beaches in the Sudbury area to identify any health hazards.

Supporting Documents

City of Greater Sudbury, **Water and Wastewater Master Plan – Existing Water Systems,** 2017.

Conservation Sudbury, **Greater Sudbury Source Protection Area - Assessment Report**, September 2, 2014.

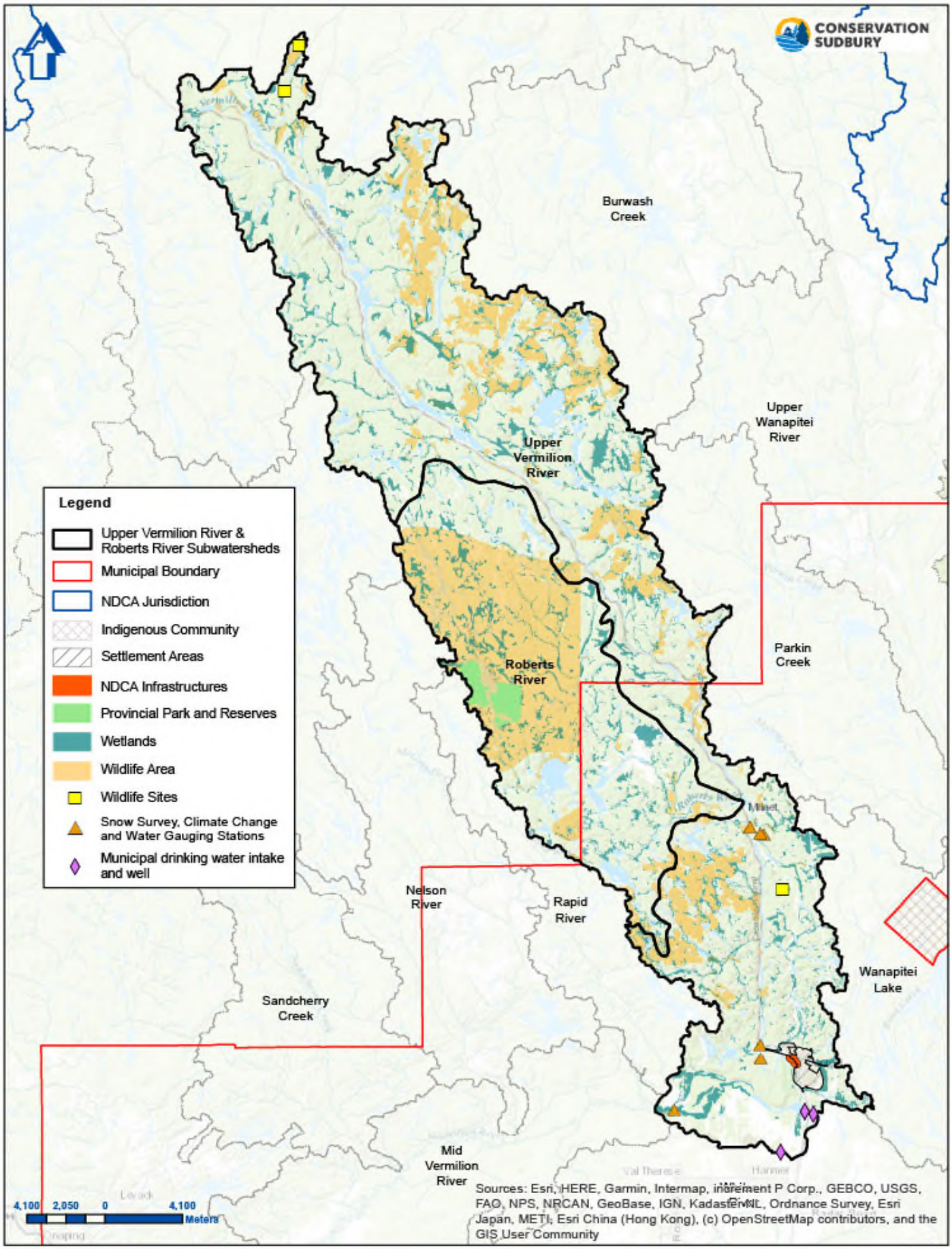
Kilborn Ltd, **Flood Damage Reduction Study - Vermilion River at Capreol,** 1982.

Nickel District Conservation Authority, **NDCA Watershed Inventory**, September 1980.

Meyn, H.D. (MOE), **Geology of Frechette, McNamara and Cotton Townships**, 1976.

Lupton, A.A., **Reconnaissance Watershed Survey**, **1974 (?)**

J.V. Svanks., **Report on Study of Onaping-Vermilion River Watershed**, 1970.


CONSERVATION SUDBURY
Burwash Creek
Upper Wanapitei River
Upper Vermilion River
Roberts River
Parkin Creek
Nelson River
Rapid River
Wanapitei Lake
Sandcherry Creek
Mid Vermilion River
Legend
Upper Vermilion River & Roberts River Subwatersheds
Municipal Boundary
NDCA Jurisdiction
Indigenous Community
Settlement Areas
NDCA Infrastructures
Provincial Park and Reserves
Wetlands
Wildlife Area
Wildlife Sites
Snow Survey, Climate Change and Water Gauging Stations
Municipal drinking water intake and well
4,100 2,050 0 4,100
Meters
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community