2.5 Central Vermilion River Subwatershed

General Description

- **Total Area:** 327.7 km^2
- **Drainage:** The headwaters of this subwatershed include the Lower Onaping River, Sandcherry Creek, Rapid River, Nelson River, and the Whitson River. The Whitson River joins the Vermilion River near the outflow of this subwatershed. The river meanders significantly starting outside of Capreol until it is joined by the Onaping River near Dowling.
- **Topography:** The topography is mainly characterized by rugged Precambrian terrain.
- **Geology**
    - **Bedrock Geology:** Mainly Precambrian bedrock of the Southern and Superior Province, this subwatershed is surrounded by the Sudbury Igneous Complex with the formation crossing over into this subwatershed at a few locations along its southern border.
    - **Quaternary Geology:** Bedrock is the main formation, however large intrusions of glaciolacustrine deposits, fluvial deposits and glaciofluvial outwash deposits are found throughout, with smaller pockets of till and glaciofluvial ice-contact deposits.
- **Soils:** Stable bedrock is the main surface substrate. Within the river valley, there are a variety of soil types with coarser textures like sandy loams and fine sandy loams in the northern section and textures changing to silty loams or decreasing in particle size as the river drains southward. There are also large pockets of organic soil throughout.
- **Groundwater:** This area of Sudbury has many 'Highly Vulnerable Aquifers' identified throughout. There are also many Significant Groundwater Recharge Areas, particularly along the river and within much of the township of Balfour.
- **Land Cover**:
    - Forest covers an area of 222.1 km^2, 67.8 % of the subwatershed.
    - Wetlands cover an area of 66.3 km^2, 20.2 % of the subwatershed.
    - Lakes cover an area of 26.7 km^2, 8.1 % of the subwatershed.
- **Land Use Type:**
    - **Zoning:** 300.5 km^2 (91.7%) of this subwatershed is subject to the City of Greater Sudbury's Zoning By-law. Of that area, 250.0 km^2 (83%) is zoned rural, 20.9 km^2 (6.9%) is industrial and 19.7 km^2 (6.6%) is environmental protection. The remainder are small areas designated as agricultural, open space, residential and future development, making up less than 1% each.

Indigenous Communities and Traditional Territories

- This 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.

Development Pressure

Overall: Low. Most of this subwatershed has maintained its natural cover, with some smaller agricultural areas.

- **Settlement Area:** 1.21 km^2 (0.4%) is designated as settlement area under the City of Greater Sudbury's Official Plan. This includes only the settlement of 'Vermilion Lake.'
- **Municipal Wastewater Facilities:** The Chelmsford Lagoon lies within this subwatershed, a secondary wastewater treatment facility in the Chelmsford Wastewater system, occasionally used for storage during wet weather events.
- **Forestry:** Completely within the Sudbury Forest, only a few small areas to the west of Vermilion Lake and northeast of Hanmer are identified for harvest in the 2020-2030 Sudbury Forest Management Plan.
- **Aggregates:** There are currently 22 active aggregate operations, covering an area of 6.1 km^2.
- **Mining :**
    - No active exploration reported within the last year (February 2023-January 2024)
    - There are currently no active Mining Plans and Permits registered to this subwatershed.
    - Historically, there was one producing mine, Vermilion Mine, an underground project which operated until 1955, extracting copper, lead, silver and zinc.

Recreational Use

- Because of its meandering nature, this section of the Vermilion River is an established canoe route, well used by canoers and kayakers and even supports a 'river tubing' business.
- Other recreational activities such as fishing, hunting, crown land camping, hiking and nature appreciation also take place within this subwatershed, especially along the Vermilion River.
- There is an official snowmobile trail to the south of Vermilion Lake.

Water use

- There are currently no active Permits to Take Water.

Notable Waterbodies

- **Vermilion Lake** is located in Fairbank township. Vermilion Lake is 1126.6 ha in size and has a maximum depth of 12 m. This lake has 145 permanent and 89 seasonal residents.
- **Gordon Lake**, also located in Fairbank township, has an area of 180 ha. There are no permanent residents, and 2 seasonal residents on this lake.

Previously Identified Management Issues

Erosion:

- In the NDCAs 1980 watershed inventory, it was identified that as the river moves south it exhibits streambank erosion characteristics due to the underlying sands and gravels typical of glacial outwash materials. Beyond Vermilion Lake, erosion is reduced significantly.

- Several erosion and bank stability problems were identified along the north shore of Vermilion Lake, in a 1982 study. Recommendations included prioritizing the area of the Vermilion Lake Marina, slope flattening and stabilization, slope revetement and retaining walls.

Data gaps: A stream gauge at Stobie Dam was identified as a data gap in the 2014 Source Protection Program Assessment Report.

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:** Has taken place, as part of a 1982 Floodline project in the following areas:
  - Vermilion Lake
  - Central Vermillion River – Balfour, Dowling, Fairbank, Creighton-Davies Townships
  - 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 bank full 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.
  - NDCA has completed an erosion and bank stabilization study on the north shore of Vermilion Lake in 1982.

Water Control Structures

- **Stobie Dam**, owned and operated by Domtar, is located approximately 3 km downstream of the eastern outlet of Vermilion Lake. Though Vermilion Lake was historically used as a reservoir, it currently only maintains water levels for local lake users. The dam requires infrequent operational changes except during exceptionally heavy spring runoff events.

Drinking Water Source Protection

- There are no municipal drinking water sources within this subwatershed.
- They are located within the headwaters of the Vermilion River Drinking Water System, a municipal drinking water source. As such, all watercourses within this subwatershed 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:

- Historically, water samples of the Vermilion River near the inflow of the Onaping River had concentrations of total coliform, organic nitrogen, manganese, and some heavy metals in concentrations greater than MOE objectives (NDCA Watershed Inventory, 1980).
- Vermilion Lake has been classified as mesotrophic, with concentrations of nutrients, algae, and other chemical parameters within a moderate range. Bacterial water quality was generally good, but some sources of fecal bacteria were identified along the more populated north shore.
- Gordon Lake was classified as mesotrophic to oligotrophic based on annual spring total phosphorus samples.
- Lake Partner Program samples from Simmons Lake, Vermilion Lake and Gordon Lake were classified as mesotrophic.

Significant Features

- Most of the Vermilion River and adjacent lands are classified as a Provincially Significant Wetland. The City of Greater Sudbury Official Plan noted that the Vermilion River and Delta is the only Provincially Significant ANSI within the municipality, though it is not identified as an ANSI in the most recent data (2022) from the province.
- Wildlife Values:
  - There are 68 moose related wildlife value areas, covering a total area of 3.3 km^2.
  - There are 3 Great Blue Heron nesting sites/colonies.
  - There are 6 wildlife value points for raptor nesting locations.
- Candidate Provincial ANSIs identified in the CGS OP include:
  - Larchwood-Chelmsford Formation (Earth Science ANSI)
- Candidate Regional or Local ANSIs identified in the CGS OP are:
  - Vermilion River – Chelmsford Formation (Earth Science ANSI)
- Other sites of Geological Interest, identified in the CGS OP are:
  - Anthraxolite Vein, near Vermilion Lake Rd. (Earth Science ANSI)

Management and Stewardship

- **Wahnapitae First Nation** and **Atikameksheng Anishnawbek First Nation:** Their traditional territories include the area within this subwatershed. They are land holders of the area and, as such, are stewards of the land.
- **Vermilion River Stewardship**

Data available

- **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 Stobie dam, since 1983.
- **Conservation Sudbury** – Active Stream Gauging Stations:
    - Vermilion River at Simmons Rd. has water level data, sporadically, since 2017.
- **Vermilion River Stewardship** group funded the collection of water quality samples from 27 sites within the Vermilion River watershed between 2013 and 2015, 2 of which are located within the Central Vermilion River subwatershed.
- **City of Greater Sudbury:** Lake Water Quality Program collects spring total phosphorus data on Vermilion Lake and Gordon Lake.
- **Lake Partner Program:** Vermilion Lake, Gordon Lake, and Simmons Lake have been sampled for total phosphorus and secchi depth as part of this provincially run, volunteer-based program.

Supporting Documents

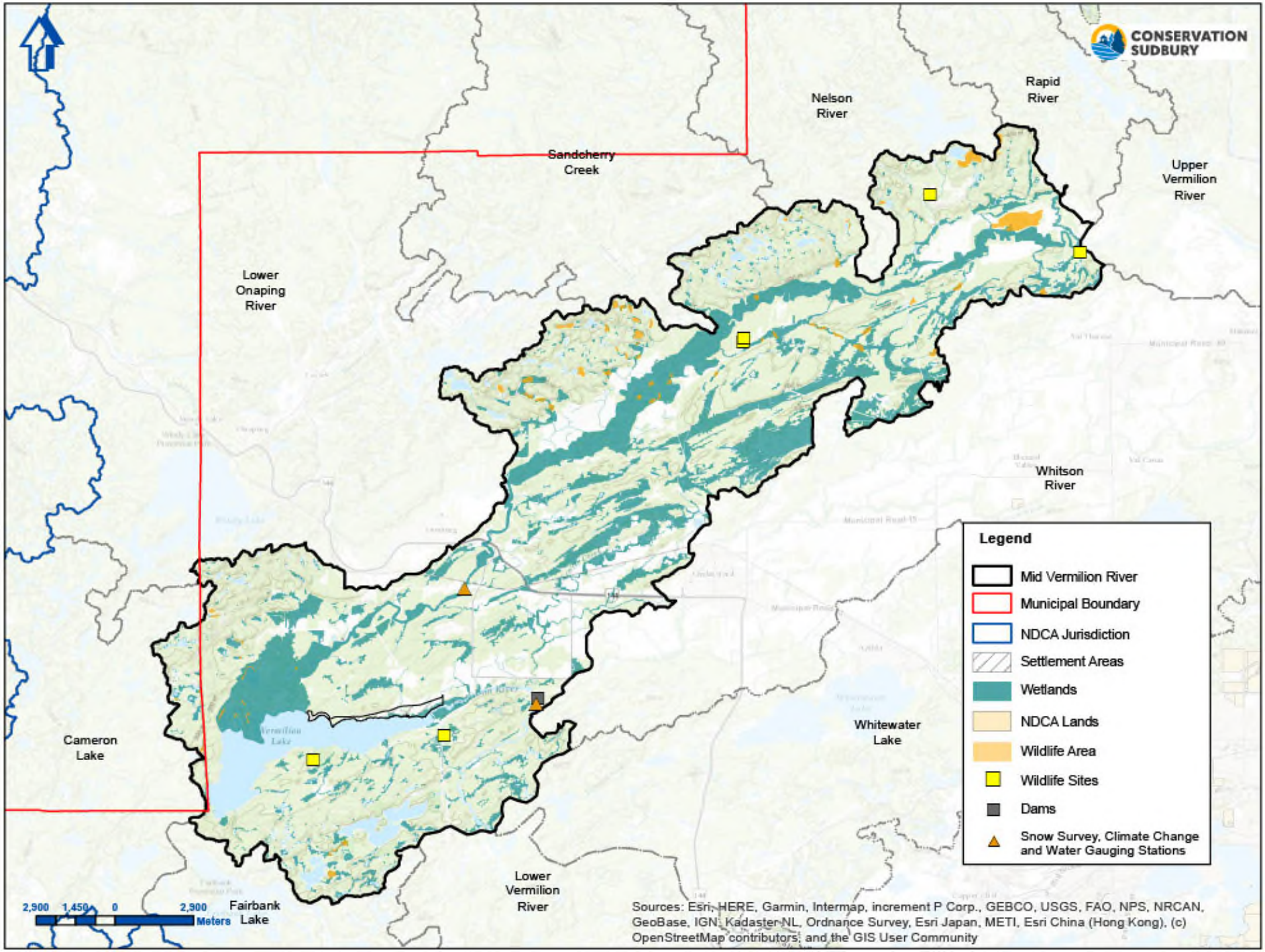
Conservation Sudbury, **Greater Sudbury Source Protection Area - Assessment Report**, September 2, 2014.

Northland Engineering Ltd, **Vermilion Lake North Shore Erosion Control and Bank Stabilization Study**, Sept. 1982

Albery, Pullerits, Dickson and Associates, **Floodline Mapping and Flood Damage Reduction Program - Vermilion Lake, River and Larchmont Dr**.,1981.

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

Ministry of the Environment, **The Recreational Water Quality of Vermilion Lake, Sudbury District**, 1976.


CONSERVATION SUDBURY
Nelson River
Rapid River
Sandcherry Creek
Upper Vermilion River
Lower Onaping River
Whitson River
Cameron Lake
Whitewater Lake
Lower Vermilion River
Fairbank Lake
2,900 1,450 0 2,900 Meters
Legend
Mid Vermilion River
Municipal Boundary
NDCA Jurisdiction
Settlement Areas
Wetlands
NDCA Lands
Wildlife Area
Wildlife Sites
Dams
Snow Survey, Climate Change and Water Gauging Stations
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