

## 3.3 River Morphology

The Ottawa River environment changes constantly. Rivers can be divided into three zones: the headwater stream zone, middle-order zone and lowland zone. The Ottawa River displays characteristics of each of these zones. Along its path, the river alternates between rapids, lakes, shallow bays, and quiet stretches. More than 80 tributaries contribute their water to the river's force. As a tributary itself, the Ottawa River meets the St. Lawrence River at its southern end. The numerous dams along the Ottawa River affect the duration, frequency, timing and rate of the natural water flow.

### 3.3.1 Channel Pattern

Because water will always travel in the path of least resistance, a river's channel pattern, or map view, is a response to the physiographic features of the area. The channel pattern of a river can take many forms. Kellerhals et al (1976) suggest classifying channel patterns into six categories: straight, sinuous, irregular (wandering), irregular meanders, regular meanders, and tortuous meanders.

Overall, the Ottawa River is a constrained, straight river that has been highly altered. The river is said to be constrained because it exists within a valley, although a flood plain exists on the Ontario shore of the river and on parts of the Quebec shore. For the most part there is a main river channel lacking the sinuosity generally observed in unconstrained rivers.

**Figure 3.25 Main River Channel of the Ottawa**



Source : Christian Veillemont

Figure 3.26 Ottawa River Watershed



Source: Jan Aylisworth

### 3.3.2 Landforms and Depositional Forms

Material that is transported down a river can be deposited temporarily and then reactivated as the channel shifts, creating transient landforms. The landscape surrounding the Ottawa River includes features such as river terraces and glacial landforms that are relict depositional landforms that have been preserved since they were deposited. The fact that these features have been preserved attests to the change in environmental conditions since they were formed. One of the conditions for the survival of depositional landforms is that they form under conditions of waning erosive power, such as the retreat of the ice sheets or the diversion in the course of the river (*Fundamentals* 355).

The sediment load in the Ottawa River is probably reduced due to impoundments, although some bank erosion is related to water level changes for hydroelectricity. There may be artificial deltas forming, such as at the mouth of the Petawawa River, due to reduced natural peak flows.

The Ottawa-Gatineau region is underlain by three different geological materials that create very different landscapes adjacent to the river. The resistant rocks of the Canadian Shield form highland areas that are characterized by rough terrain, numerous small lakes, and abundant rock outcrops. In contrast, the flat-lying Paleozoic rocks underlie lowland plains and low hills, and outcrops are confined largely to low scarps and riverbanks. Much of the region is covered by a blanket of Quaternary sediments which form

landscapes that range from gently undulating plains and low hills of glacial deposits to the flat plains of the Champlain Sea (Geoscape Canada: “Different Rocks”).

In the Outaouais region, the banks of the Ottawa River are made up of a flat terrain with associated terraces (CREDDO 6). Natural and artificial beaches are present in places along the wider, slower flowing reaches of the Ottawa, such as Norway beach and Britannia beach. Downstream from the Gatineau River, the landscape differs as the Ottawa’s course takes it over Quaternary sediments. Here, vegetated sandbars form low islands (such as Petrie Island and Kettle Island) and marshes are common along the shore.

### Petrie Islands of the Ottawa River

The Petrie Islands are a series of alluvial deposits forming a wetland complex of elongate sedimentary ridges and backwaters characteristic of the Ottawa River below the confluence with the Gatineau River. Along with Kettle Island and the Duck Islands, Petrie Islands form a unique landform in the region. They bear testament to the powerful geological forces that shaped the landscape. The sand and clay sediments that make up these islands were created by the massive icesheet that moved over the continent 10,000 years ago. Crushed by the continental glaciers from the rocks further north, the sediments were carried down the Ottawa and Gatineau Rivers (Hanrahan and Darbyshire).

### 3.3.3 Waterfalls and Rapids

Falls and rapids occur where the Ottawa River drops over resistant bedrock outcrops. At these locations, the river is relatively shallow and swift, and bedrock islands often divide the channel. Hydroelectric dams exploit many of these natural drops, including the generating centres at Portage-du-Fort, Fitzroy Harbour, Chaudiere Falls and Carillon, as well as along many of the tributary rivers such as the Gatineau. Major rapids or drops that still exist today on the Lower Ottawa River are located at Chaudiere Falls and Rocher Fendu, where there are five major drops separated by pools. The rapids themselves are created by the Lafontaine Islands that create a narrowing in the river. Along the Upper Ottawa River, the main rapids occur downstream of Lake Forks.

### 3.3.4 Lakes

Lakes and reservoirs along the Ottawa River include:

- Lake of Two Mountains
- Lac Dollard des Ormeaux
- Lac Deschênes
- Lac des Chats
- Lac du Rocher Fendu
- Allumette Lake
- Lac Coulonge
- Holden Lake
- Lac la Cave
- Lake Temiskaming
- Petit réservoir des Quinze
- Des Quinze Reservoir

- Simard Reservoir
- Descelles Reservoir
- Dozois Reservoir
- Lake Grand Victoria
- Baskatong Reservoir
- Lac des Quinze
- Lake Capimitchigama