

bedrock geology

This large trilobite fossil can be found on a rock shelf near the Snake River. [JP]



The Peel River watershed is part of the far western edge of ancestral North America, two billion year old bedrock overlain by up to 15 kilometres of sediments washed down from the heart of the continent. The time span of these deposits is among the longest in the world, with sedimentary rocks from the early Proterozoic (1850 million years ago) to the middle Jurassic (160 million years ago), a 1.6 billion year long record exposed in only a few other places in Canada (Ecosystem Stratification Working Group, 1998).

Geologically, the Peel watershed is considered to be part of the Foreland Belt, the original western edge of North America before other pieces of continent collided with it from the west 160 million years ago (Gabrielse et al., 1991).

A sloping shelf under shallow seas, the area of the modern Peel Watershed was buried under four kilometers of sediments eroded from the granite core of the continent and layered with thick mats of algae, developing carbonate deposits over a time span of nearly half a billion years (1,200 to 780 million years ago) (CPAWS, 2000)

Beginning about 780 million years ago another wedge of sediments was deposited along the western edge of the continent, parts of which may have come from Precambrian glaciers as they advanced onto the continental shelves. The layers built up at this time commonly contain thick deposits of iron oxide, deposits which by some estimates exceed 47 million tonnes in the

Mackenzie Mountains (Yorath, 1990). Also contained in these deposits is evidence of ancient under-ocean landslides in the Wernecke Mountains, where massive blocks of rock broke off from submarine cliffs and fell into deep ocean basins along the ancient continental edge (CPAWS, 2000).

During the Paleozoic Era, 590 to 245 million years ago, the edge of the continent sloped gently westward, covered by warm, clear shallow seas. Large layers of limestone were deposited in the form of coral reefs and banks of carbonate rock. Then, 160 million years ago, an immense piece of continent collided with ancestral North America, folding and thrusting the ancient rock and sliding over the continental margin, creating the Ogilvie, Mackenzie and Wernecke Mountains (Yorath, 1990).

As thousands of kilometres of ocean crust were forced underneath the western edge of North America, pressure built and melted some of the deeper layers of the crust, forming magma that forced its way towards the surface, intruding the sedimentary rocks above (Locke, 2000). The plutonic rocks that resulted can be found south and west of the Peel River watershed on the map.

The lower Bonnet Plume and Wind watersheds are covered by younger (50-100 million year old), non-marine sedimentary rocks that occur in a structural basin called the Bonnet Plume Basin. Here, poorly consolidated (loose material that hasn't become firm and coherent rock) to

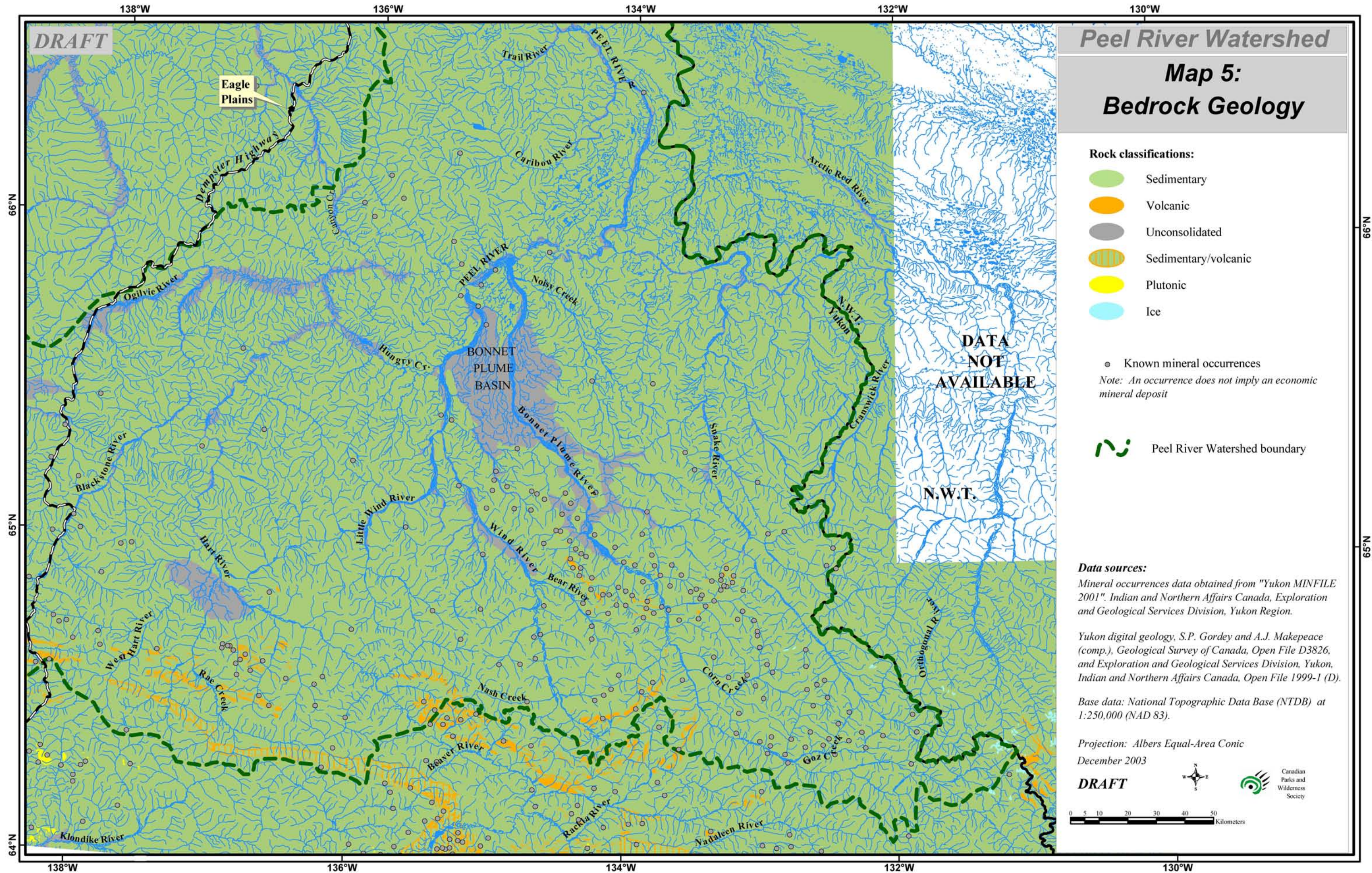
consolidated clastic sediments overlie the ancient sediments (Hulstein and Emond, 1994). Unconsolidated rocks are also found in the upper main stem of the Peel and along the Ogilvie River, as well as a section of the Hart River (see map).

Bedrock geology is an important factor in land use planning because it affects both the distinctive landforms of the ecoregions and their associated biological diversity, and is the source of potentially economic deposits of minerals and fossil fuels. Mineral presence varies greatly over the Peel Watershed. Entire ranges lack any sort of known mineralizations, while others host many mineral occurrences. The Bonnet Plume Range, for instance, contains uranium-bearing brannerite, iron-bearing hematite, and traces of copper, barium, cobalt and gold (Ecosystem Stratification Working Group, 1998). Potentially significant deposits include the large hematite iron deposit near the Snake River, lead-rich and zinc-rich veins in the south end of the Bonnet Plume Range, and abundant coal seams in the Bonnet Plume Basin (CPAWS, 2000)

The region is seismically very active, with frequent and large earthquakes. On the seismic map of Canada, the upper Peel watershed is the most active part of the Yukon, comparable to Victoria, B.C. in earthquake activity (Yorath, 1990).

The sedimentary rock canyons through which the Peel River flows display impressive folds and striking colours. [JP]





Peel River Watershed

**Map 5:
Bedrock Geology**

Rock classifications:

- Sedimentary
- Volcanic
- Unconsolidated
- Sedimentary/volcanic
- Plutonic
- Ice

○ Known mineral occurrences
Note: An occurrence does not imply an economic mineral deposit

- - - Peel River Watershed boundary

DATA NOT AVAILABLE

N.W.T.

Data sources:

Mineral occurrences data obtained from "Yukon MINFILE 2001". Indian and Northern Affairs Canada, Exploration and Geological Services Division, Yukon Region.

Yukon digital geology, S.P. Gordey and A.J. Makepeace (comp.), Geological Survey of Canada, Open File D3826, and Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1999-1 (D).

Base data: National Topographic Data Base (NTDB) at 1:250,000 (NAD 83).

Projection: Albers Equal-Area Conic
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