

Northern British Columbia

Geological Landscapes Highway Map



Geological Survey of Canada, Popular Geoscience 94E (also British Columbia Geological Survey, Geofile 2007-1)

For more information
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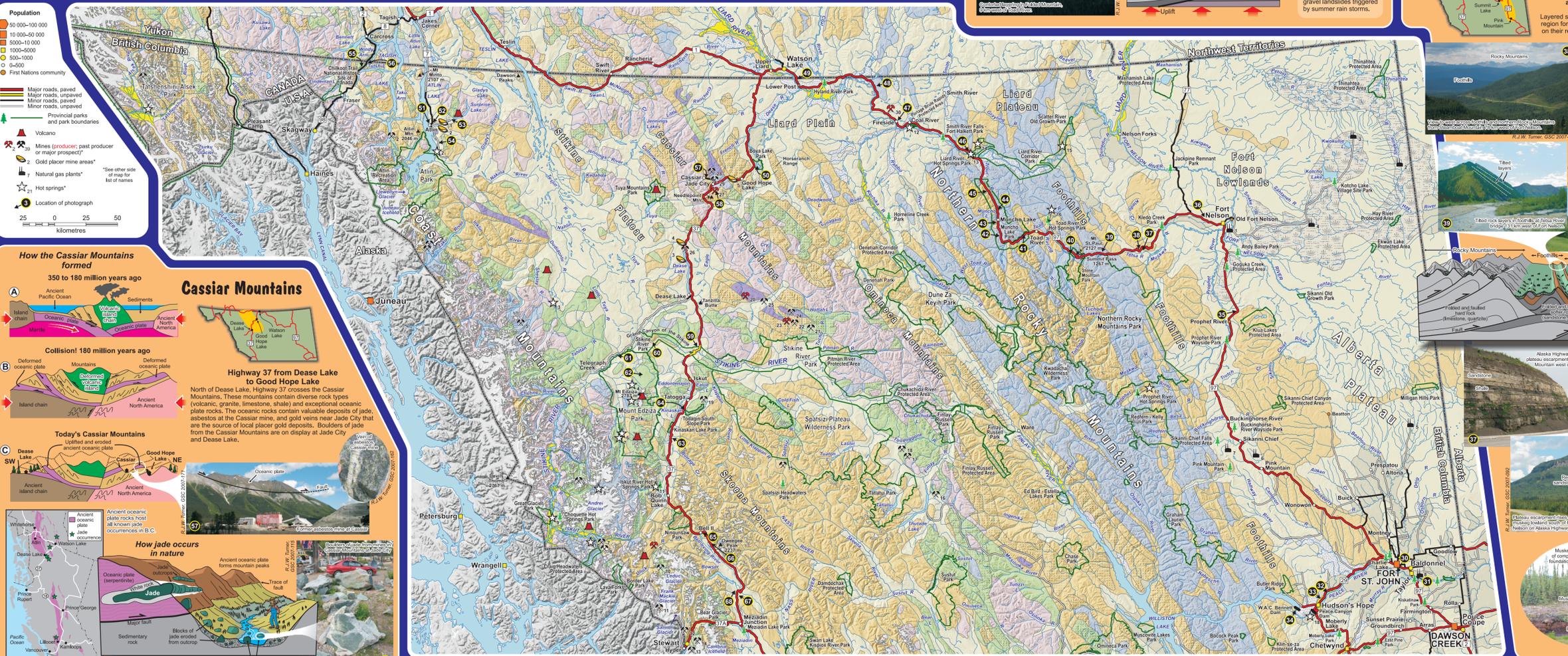
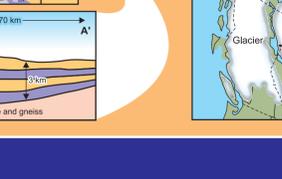
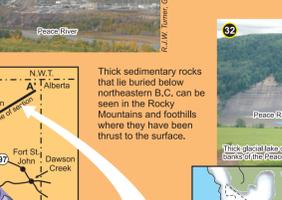
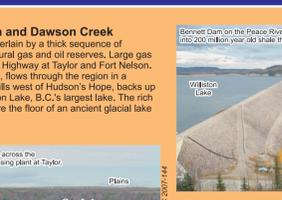
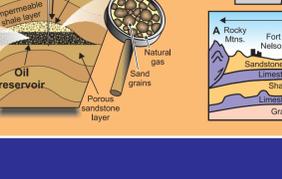
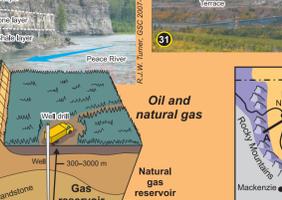
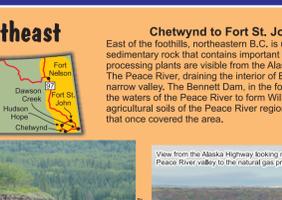
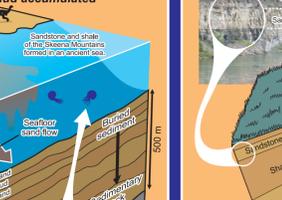
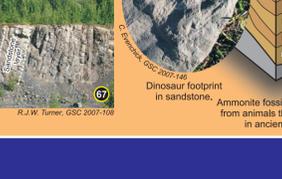
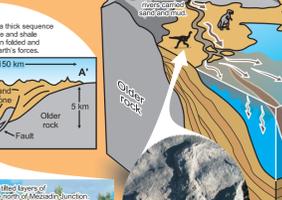
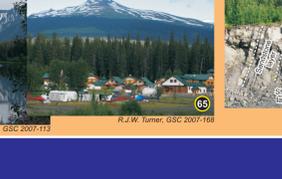
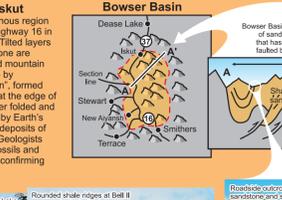
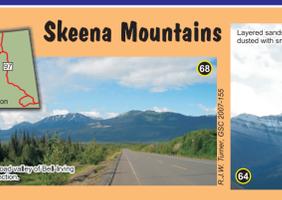
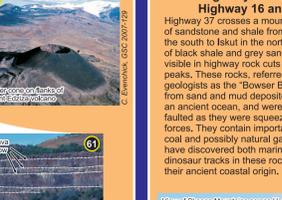
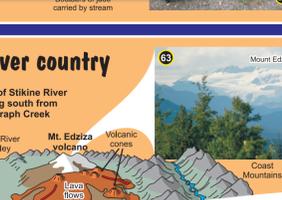
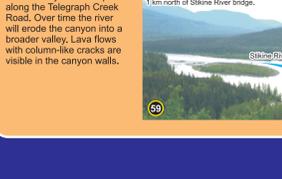
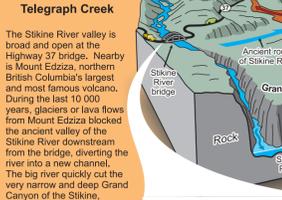
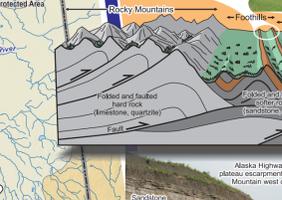
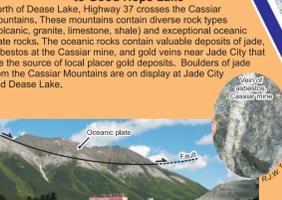
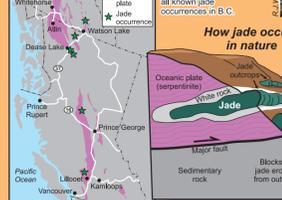
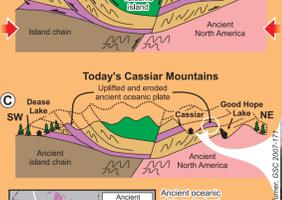
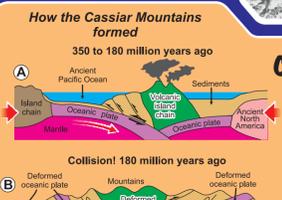
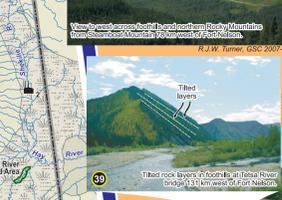
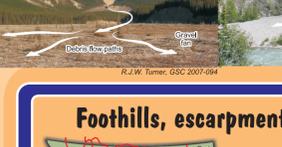
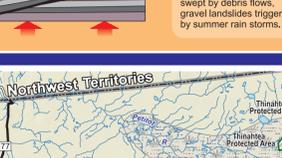
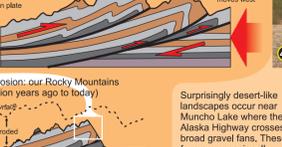
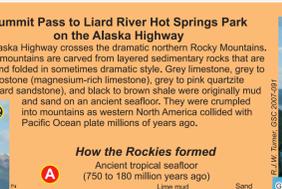
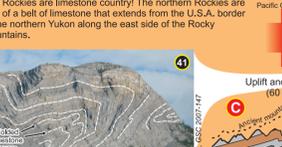
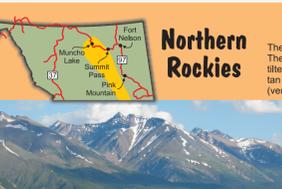
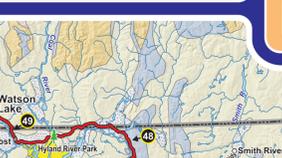
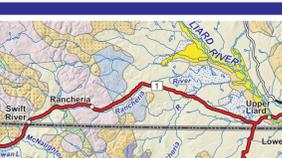
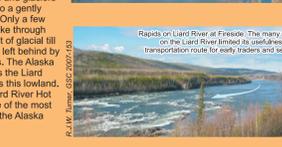
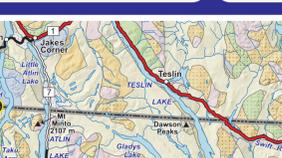
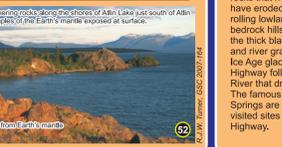
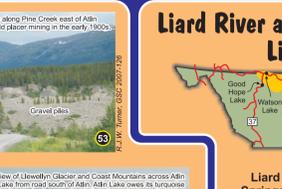
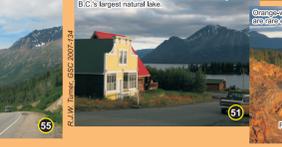
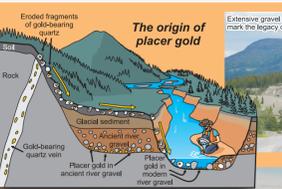
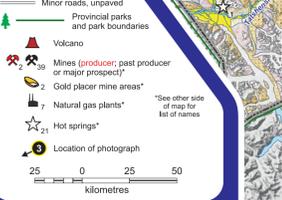
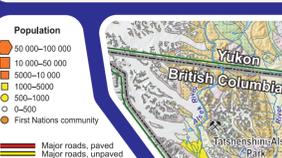
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THE EXPLORATION
The Big Place in Earth

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The far northwest: Atlin and Coast Mountains

The roads to Atlin, Skagway, and Haines
Three short roads cross the northwest corner of B.C. and connect the Alaska Highway to coastal Alaska and Atlin. The spectacular Haines Highway rises above tree line at Chilkat Pass before descending to the ocean at Haines. The Klondike Highway follows narrow lakes and mountain passes and then descends abruptly to the sea at Skagway. The Atlin road skirts glacier-carved Atlin Lake with its backdrop of Coast Range mountains. Atlin has a colourful history of placer gold mining that continues today.



Population

- 50,000-100,000
- 10,000-50,000
- 5,000-10,000
- 1,000-5,000
- 500-1,000
- 50-500
- First Nations community

Roads

- Major roads, paved
- Minor roads, paved
- Minor roads, unpaved
- Provincial parks and park boundaries

Other features

- Mines (producer, past producer or major prospect)
- Gold placer mine areas
- Natural gas plants
- Hot springs
- Location of photograph

Scale: 0 25 50 kilometers

How the Cassiar Mountains formed

350 to 180 million years ago

A Ancient Pacific Ocean. Deformed volcanic island arcs and oceanic crust.

B Collision 180 million years ago. Deformed oceanic plate and island chain.

C Today's Cassiar Mountains. Uplifted and eroded ancient oceanic plate.

Highway 37 from Dease Lake to Good Hope Lake

North of Dease Lake, Highway 37 crosses the Cassiar Mountains. These mountains contain diverse rock types (volcanic, granite, limestone, shale) and exceptional oceanic plate rocks. The oceanic rocks contain valuable deposits of jade, asbestos at the Cassiar mine, and gold veins near Jade City that are the source of local placer gold deposits. Boulders of jade from the Cassiar Mountains are on display at Jade City and Dease Lake.

How jade occurs in nature

Jade is a mineral that occurs in nature. It is formed from sedimentary rock (serpentine) and is carried by stream.

How B.C. was built: an analogy

180 million years ago: As the Atlantic Ocean began to open, North America moved westward and collided with nearby ocean floor and volcanic islands, in a process somewhat like a bulldozer pushing soil and boulders from a field.

Today: B.C.'s landmass is a collision zone of deformed volcanic islands, seafloor, and North American continental margin.

B.C.—North America's leading edge

The Stikine River valley is broad and open at the Highway 37 bridge. Nearby is Mount Edziza, northern British Columbia's largest and most famous volcano. During the last 10,000 years, glaciers or lava flows from Mount Edziza blocked the ancient valley of the Stikine River downstream from the bridge, diverting the river into a new channel. The big river quickly cut the very narrow and deep Grand Canyon of the Stikine along the Telegraph Creek Road. Over time the river will erode the canyon into a broader valley. Lava flows with column-like cracks are visible in the canyon walls.

Stikine River country

Schematic view of Stikine River country looking south from road to Telegraph Creek.

Highway 37 from Iskut to Dease Lake, and the road to Telegraph Creek

The Stikine River valley is broad and open at the Highway 37 bridge. Nearby is Mount Edziza, northern British Columbia's largest and most famous volcano. During the last 10,000 years, glaciers or lava flows from Mount Edziza blocked the ancient valley of the Stikine River downstream from the bridge, diverting the river into a new channel. The big river quickly cut the very narrow and deep Grand Canyon of the Stikine along the Telegraph Creek Road. Over time the river will erode the canyon into a broader valley. Lava flows with column-like cracks are visible in the canyon walls.

Highway 37 between Highway 16 and Iskut

Highway 37 crosses a mountainous region of sandstone and shale from Highway 16 in the south to Iskut in the north. Tilted layers of black shale and grey sandstone are visible in highway rock cuts and mountain peaks. These rocks, referred to by geologists as the "Bowser Basin", formed from sand and mud deposited at the edge of an ancient ocean, and were later folded and faulted as they were squeezed by Earth's forces. They contain important deposits of coal and possibly natural gas. Geologists have discovered both marine fossils and dinosaur tracks in these rocks, confirming their ancient coastal origin.

Bowser Basin—where sand and mud accumulated

Bowser Basin is a thick sequence of sandstone and shale that has been folded and faulted by Earth's forces.

Oil and natural gas

Oil reservoir and natural gas reservoir are shown in the diagram.

Chetwynd to Fort St. John and Dawson Creek

East of the foothills, northeastern B.C. is underlain by a thick sequence of sedimentary rock that contains important natural gas and oil reserves. Large gas processing plants are visible from the Alaska Highway at Taylor and Fort Nelson. The Peace River, draining the interior of B.C., flows through the region in a narrow valley. The Bennett Dam, in the foothills west of Hudson's Hope, backs up the waters of the Peace River to form Williston Lake, B.C.'s largest lake. The rich agricultural soils of the Peace River region are the floor of an ancient glacial lake that once covered the area.

12,000 years ago

Glacial meltwaters formed a large lake that covered the Peace River region at the end of the last Ice Age. The region's rich agricultural soils are formed from silt deposited on the ancient lake floor.

Skeena Mountains

Layered sandstone and shale are exposed on mountain slopes east of Iskut, 12 km south of Iskut.

View of Skeena Mountains across Horder Lake

View of Skeena Mountains across Horder Lake, 3 km south of Iskut on Highway 37.

Rounded shale ridges at Bell I

Rounded shale ridges at Bell I are popular heliski slopes.

Roadside outcrop of tilted layers of sandstone and shale

Roadside outcrop of tilted layers of sandstone and shale (McKenzie formation) near Iskut.

Dinosaur footprint in sandstone

Dinosaur footprint in sandstone. Ammonite fossils formed from animals that swam in ancient oceans.

View from the Alaska Highway, looking north across the Peace River valley

View from the Alaska Highway, looking north across the Peace River valley to the natural gas processing plant at Taylor.

Thick sedimentary rocks that lie buried below northeastern B.C.

Thick sedimentary rocks that lie buried below northeastern B.C. can be seen in the Rocky Mountains and foothills where they have been thrust to the surface.

View of plains from Alaska Highway

View of plains from Alaska Highway (roughly 30 km west of Fort Nelson).

Northern Rockies

The Alaska Highway crosses the dramatic northern Rocky Mountains. These mountains are carved from layered sedimentary rocks that are tilted and folded in sometimes dramatic style. Grey limestone, grey to tan dolomite (magnesium-rich limestone), grey to pink quartzite (very hard sandstone), and black to brown shale were originally mud and sand on an ancient seafloor. They were crumpled into mountains as western North America collided with Pacific Ocean plate millions of years ago.

How the Rockies formed

A Ancient tectonic seafloor (750 to 180 million years ago). Mud, sand, and limestone.

B Collision builds mountains (180 to 60 million years ago). Collision with Pacific Ocean plate.

C Uplift and erosion: our Rocky Mountains (60 million years ago to today). Erosion.

Foothills, escarpments, and plains

Pink Mountain to Summit Pass along the Alaska Highway. Layered sedimentary rocks that underlie this region form different landscapes depending on their resistance to erosion and orientation. Soft, flat-lying shale creates lowlands; hard, horizontal sandstone forms high plateaus bound by escarpments. Tilted sandstone and soft shale create ridge-like foothills, whereas tilted hard limestone and quartzite create mountains. North of Pink Mountain, the Alaska Highway route to Fort Nelson follows lowlands, with views of plateau escarpments to the east, and foothills to the west. West of Fort Nelson, the highway climbs a plateau at Steamboat Mountain, and then enters the foothills before rising into the mountains.

View of plains from Alaska Highway

View of plains from Alaska Highway (roughly 30 km west of Fort Nelson).

Alaska Highway cuts through different landscapes

Alaska Highway cuts through different landscapes depending on their resistance to erosion and orientation.

Plateau escarpment near Dease Lake

Plateau escarpment near Dease Lake.

Mudstone contains thick layers of compressed peat

Mudstone contains thick layers of compressed peat that provide a poor foundation for parts of the Alaska Highway.

Bennett Dam on the Peace River

Bennett Dam on the Peace River was built in a canyon carved into 200 million year old shale that contains extensive fossiliferous limestone.

Thick glacial lake deposits are exposed in banks of the Peace River near Hudson's Hope

Thick glacial lake deposits are exposed in banks of the Peace River near Hudson's Hope.

View of Skeena Mountains across Horder Lake

View of Skeena Mountains across Horder Lake, 3 km south of Iskut on Highway 37.

Coast Mountains

Terrace to Prince Rupert

Tidal marshes at Takapah Point (65 km west of Terrace) grow on silt deposited by the Skeena. These wet ecosystems include salmon, waterfowl, and eagles.

Sleep, and volcanic slopes of granite and gneiss near Takapah Point. The forested, coniferous forest on sand and gravel terraces of the lower Skeena River.

The Coast Mountains are granite country
A great range of granite forms the Coast Range from Alaska to Vancouver. The granite and related gneiss are best seen at Terrace, Hazelton, and Prince Rupert, in the basin valley near Hazelton, and on the Highway to Kitimat.

Highway 16 between Terrace and Prince Rupert, Nisga'a Highway, and Highway 37A to Stewart

Three highways cut through the central Coast Range. Highway 16 follows the Skeena River valley from Terrace to Prince Rupert. As the Skeena flows to the sea, it dumps its load of gravel and sand as numerous islands and bars. The highway route passes below steep cliffs of granite and gneiss prone to avalanches during the winter. Farther north, the western end of the Nisga'a Highway follows a similar route along the Nass River valley and estuary. Upriver, near the town of Hazelton, the Nisga'a Highway crosses the barren rock expanses of a lava flow. Farther north again, Highway 37A crosses high Bear River Pass before descending to an ocean inlet at Stewart. The road through nearby Hyder in Alaska leads to stunning views of the Salmon Glacier.

Nass valley

The best roadside view of a Salmon Glacier near Stewart. The panorama includes its high ice fall, crevassed surface, terminal moraine and glacial meltwater river, and evidence for recent shrinkage.

Mountain slopes show evidence for shrinkage of Bear Glacier at Bear River Pass on Highway 37A due to climate change. Less than 150 years ago, the Bear Glacier covered the area of the lake and advanced the highway was more than 50 m of ice.

Coast Range faults and glaciers are visible from Highway 37A near Bear River Pass.

Stewart area

Mountain slopes show evidence for shrinkage of Bear Glacier at Bear River Pass on Highway 37A due to climate change. Less than 150 years ago, the Bear Glacier covered the area of the lake and advanced the highway was more than 50 m of ice.

Coast Range faults and glaciers are visible from Highway 37A near Bear River Pass.

Modern sediment

Modern sediment types include sand and gravel, silt, and clay.

Ice Age sediment

Ice Age sediments form a widespread blanket overlying rock throughout much of northern British Columbia. They were deposited during the Ice Age when continental glaciers, similar to those in Antarctica today, covered most of Canada.

How do I use this map?

This map sees the land through "geological eyes". The map's many colours represent the different geological materials that underlie this diverse landscape. You can use the map to answer such questions as: Are the Rocky Mountains made of sandstone or limestone or granite? (Go to the Coast Mountains to find granite!) Why is the farmland near Vanderhoof so flat? (You are driving across an old glacial lake floor!) Why are there so few exposures of rock outcrop between Prince George and Smithers? (A thick blanket of Ice Age sediment covers the rocks!) The diagram below uses the example of the Chetwynd area to show how the map's three major types of geological materials (rock, Ice Age sediment, modern sediment) typically underlie the landscape. Rock underlies all parts of northern B.C., but is commonly buried by thick layers of Ice Age sediment in valleys. Today's rivers have cut through this Ice Age sediment and deposited their own modern sand and gravel sediments.

Since the end of the Ice Age 10 000 years ago, rivers have eroded valleys and deposited modern sediments in valleys and estuaries. Peat bogs, sand dunes, and beaches are other modern sediments.

Rock

Rock of the Earth's crust underlies all of British Columbia. It is widely exposed at surface in mountainous areas, but is commonly buried beneath thick layers of sediments in valleys and on plateaus.

Peace River country

Chetwynd to Hudson's Hope, Dawson Creek, and Tumbler Ridge

Forested foothills and plateaus in Peace River country are replaced eastward by rich agricultural plains. Across the landscape, the Peace River has carved a fertile valley. Foothills between Chetwynd and Tumbler Ridge are underlain by folded layers of sandstone and shale that contain important reserves of coal, as well as the foothills and fossils of dinosaurs and other life. The town of Tumbler Ridge was built to support local coal mines.

Dinosaurs and coal
Broad coastal swamps inhabited by dinosaurs developed in places as in what is now Peace River country. Swamps transformed into coal. The layer of coal was formed during mountain building has exposed during erosion. The layer is called the Peace River coal seam.

Increasing pressure and temperature
The former Bullmoose coal mine in the foothills west of Tumbler Ridge gained three times of coal from a surface pit.

Several short walks in the Tumbler Ridge area lead to rich agricultural plains. For example, such as this example at Ribbles Creek.

Legend

Population
50 000 or more
10 000-50 000
5000-10 000
1000-5000
500-1000
D-500
O-500

Major roads, paved
Minor roads, unpaved

Provincial parks and park boundaries

Volcano

Mines (producer, past producer or major prospect)
1=Windy Craggy (copper), 2=Enginer (gold), 3=Palms Taku (gold), 4=Fairbank Creek (gold), 5=Galore Creek (gold), 6=Salmon Creek (gold), 7=Ship (gold), 8=Johnny Mountain (gold), 9=Edsby Creek (gold), 10=Spruce Creek (gold), 11=Granduc (copper), 12=Premier (gold), 13=Porter-Isho (gold), 14=Glacier Creek (gold), 15=Mount Klappan (copper), 16=Kenesa South (gold), 17=Kenesa (copper), 18=Lavers (gold), 19=Red Chris (copper), 20=Polars Jade (gold), 21=Kathu Creek (copper), 22=Kathu Creek (copper), 23=Provence Lake (copper), 24=Leelan Creek (copper), 25=Wharton Creek (copper), 26=Stewart (copper), 27=Table Mountain (copper), 28=Cassiar (copper), 29=Taurus (copper), 30=Fraser (copper), 31=Anyox (copper), 32=Anyox (copper), 33=Kispiox (copper), 34=Red Rose (copper), 35=Silver Standard (copper), 36=Oden Mountain (copper), 37=Glacier Gulch (polythorium), 38=Oubie (gold), 39=Takwa (copper), 40=Kob (copper), 41=Granite (copper), 42=Huskberry (copper), 43=Equity Silver (silver), 44=Erskine (polythorium), 45=Finch (copper), 46=Mount Milligan (copper), 47=Dani Lake (limestone), 48=Cariboo Gold (gold), 49=Giosome (limestone), 50=Dona Creek (sulfur), 51=Willow Creek (coal), 52=Brule (coal), 53=Wolverine (coal), 54=Bullmoose (coal), 55=Quinnette (coal).

Gold placer mine areas
1=Fine Creek, 2=Spruce Creek, 3=Dease Creek, 4=Thibert Creek, 5=McDermie Creek, 6=McDermie Creek, 7=Manson Creek, 8=Barikawa.

Natural gas plants
1=Fort Nelson, 2=Wildby, 3=Midwinter, 4=Ekwan, 5=Ladyfern, 6=Alvick Creek, 7=Skam, 8=Taylor, 9=Hine River, 10=Kwam, 11=Noel.

Hot springs
1=Tahshini, 2=Alin, 3=Sheslay, 4=Elwyn Creek, 5=Taweh Creek, 6=Mess Lake, 7=Mesa Creek, 8=Sphaler Creek, 9=Chocoma, 10=Hoodoo Mountain, 11=Kaski River, 12=Portage Brule, 13=Lard, 14=Deer River, 15=Lepine Creek, 16=Toad River, 17=Phog River, 18=Hazelton, 19=Tcheno Lake, 20=Alvick, 21=Burton Creek, 22=Frizzell, 23=Lakelse, 24=Weewane, 25=Bishop Bay, 26=McKane Inlet, 27=Kuznetsov Inlet, 28=Shawarater, 29=Burns River, 30=Hospitals Island.

Location of photograph

Population
50 000 or more
10 000-50 000
5000-10 000
1000-5000
500-1000
D-500
O-500

Major roads, paved
Minor roads, unpaved

Provincial parks and park boundaries

Volcano

Mines (producer, past producer or major prospect)
1=Windy Craggy (copper), 2=Enginer (gold), 3=Palms Taku (gold), 4=Fairbank Creek (gold), 5=Galore Creek (gold), 6=Salmon Creek (gold), 7=Ship (gold), 8=Johnny Mountain (gold), 9=Edsby Creek (gold), 10=Spruce Creek (gold), 11=Granduc (copper), 12=Premier (gold), 13=Porter-Isho (gold), 14=Glacier Creek (gold), 15=Mount Klappan (copper), 16=Kenesa South (gold), 17=Kenesa (copper), 18=Lavers (gold), 19=Red Chris (copper), 20=Polars Jade (gold), 21=Kathu Creek (copper), 22=Kathu Creek (copper), 23=Provence Lake (copper), 24=Leelan Creek (copper), 25=Wharton Creek (copper), 26=Stewart (copper), 27=Table Mountain (copper), 28=Cassiar (copper), 29=Taurus (copper), 30=Fraser (copper), 31=Anyox (copper), 32=Anyox (copper), 33=Kispiox (copper), 34=Red Rose (copper), 35=Silver Standard (copper), 36=Oden Mountain (copper), 37=Glacier Gulch (polythorium), 38=Oubie (gold), 39=Takwa (copper), 40=Kob (copper), 41=Granite (copper), 42=Huskberry (copper), 43=Equity Silver (silver), 44=Erskine (polythorium), 45=Finch (copper), 46=Mount Milligan (copper), 47=Dani Lake (limestone), 48=Cariboo Gold (gold), 49=Giosome (limestone), 50=Dona Creek (sulfur), 51=Willow Creek (coal), 52=Brule (coal), 53=Wolverine (coal), 54=Bullmoose (coal), 55=Quinnette (coal).

Gold placer mine areas
1=Fine Creek, 2=Spruce Creek, 3=Dease Creek, 4=Thibert Creek, 5=McDermie Creek, 6=McDermie Creek, 7=Manson Creek, 8=Barikawa.

Natural gas plants
1=Fort Nelson, 2=Wildby, 3=Midwinter, 4=Ekwan, 5=Ladyfern, 6=Alvick Creek, 7=Skam, 8=Taylor, 9=Hine River, 10=Kwam, 11=Noel.

Hot springs
1=Tahshini, 2=Alin, 3=Sheslay, 4=Elwyn Creek, 5=Taweh Creek, 6=Mess Lake, 7=Mesa Creek, 8=Sphaler Creek, 9=Chocoma, 10=Hoodoo Mountain, 11=Kaski River, 12=Portage Brule, 13=Lard, 14=Deer River, 15=Lepine Creek, 16=Toad River, 17=Phog River, 18=Hazelton, 19=Tcheno Lake, 20=Alvick, 21=Burton Creek, 22=Frizzell, 23=Lakelse, 24=Weewane, 25=Bishop Bay, 26=McKane Inlet, 27=Kuznetsov Inlet, 28=Shawarater, 29=Burns River, 30=Hospitals Island.

Location of photograph

Queen Charlotte Islands

Queen Charlotte to Masset

The Queen Charlotte Islands has spectacular beaches and coastlines. Highway 16 follows rocky shores near Queen Charlotte and Skidegate and sweeping lowland beaches north to Tiel. The highway then crosses boggy forest lowlands and tea-coloured rivers to the inland sea at Port Clement. Near Masset are magnificent north coast beaches and striking Tow Hill in Naikoon Park. The low coastal plain of northern Graham Island reflects soft underlying sandstone and shale that is eroded flat and buried beneath glacial sediment.

Kitimat area

Mountain slopes show evidence for shrinkage of Bear Glacier at Bear River Pass on Highway 37A due to climate change. Less than 150 years ago, the Bear Glacier covered the area of the lake and advanced the highway was more than 50 m of ice.

Coast Range faults and glaciers are visible from Highway 37A near Bear River Pass.

Terrace area

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Smithers area

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Hazelton area

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Lake Country

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Prince George and Plateau Country

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Jasper to Prince George, and Mackenzie to Chetwynd

From Jasper, Highway 16 follows the headwaters of the Fraser River past Mt. Robson and other high limestone and quartzite peaks of the Rocky Mountains. It then enters the strikingly long and straight Rocky Mountain Trench and continues northwest along the broad Fraser River toward Prince George. Highway 97 also crosses the trench near Mackenzie and Williston Lake, and crosses the Rockies at Pine Pass. Here the Rockies are a narrow mountain range composed of limestone, slate, and sandstone.

Rocky Mountain peaks of grey limestone rise above Highway 97 at Pine Pass.

Case study across Williston Lake near Mackenzie
Continuation of the Berrett Dam on the Peace River flooded 200 km² of Rocky Mountain Trench with the waters of Williston Lake reservoir. It's a target lake.

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Queen Charlotte to Masset

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Skeena and Bulkley river valleys

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How the river cuts a staircase of terraces

After the Ice Age
Downward river erosion
River plain
Bank erosion
Terrace (abandoned river plain)
Terraces (abandoned river plains)
Today
Staircase of terraces

Highway 16 from Houston to Terrace, and Highway 37 to Kitimat

The Bulkley River valley near Houston and Smithers is a surprising juxtaposition of pastoral valley and glaciated mountains. Downstream, the communities of Hazelton and Kispiox surround important salmon-fishing sites at the junction of the Bulkley and Skeena rivers. Between Hazelton to Terrace, the Skeena River has carved a deep valley through high mountains. At Terrace, the Skeena River emerges into a broad valley, formed by movement of the Earth on faults.

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Eutsuk, Ootsa, Francois, Fraser, Babine, Stuart, and Takla lakes

West of Prince George is Lake Country, a plateau graced with a remarkable fan of finger lakes. These long, thin, and sometimes branching lakes converge eastwards towards Prince George and fill valleys carved by an ancient river system that drained to the Arctic Ocean. Ice Age glaciers left behind glacial debris that dammed rivers to form lakes. Man-made dams have expanded this lake system. The plateau contains widespread volcanic bedrock with granitic intrusions that host molybdenum and copper deposits.

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How the Endako mine formed

Granite intrusion formed one deep in Earth (145 million years ago)
Rising molten rock
Molybdenum ore
Today's Endako mine
Erosion exposed orebody at surface. Prospectors discovered ore and a mine was developed.

Highway 16 from Vanderhoof to Purden Lake, and Highway 97 from Quesnel to McLeod Lake

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