Regional Landscapes of the United States and Canada

The Northlands

Prof. Anthony Grande

The Northlands

Largest region of North America. Lowest pop. density region of N. America.

- From the Arctic O. to the Great Plains, Great Lakes and St. Lawrence River.
- From Rocky Mts. to the Labrador Sea.
  - Includes **Alaska's North Slope** and **Canada's Arctic Archipelago** as well as northern MN, WI and MI in the south.

2

OVERVIEW: Physical

- **Inhospitable area:**
  - Extremely cold, long winters/very short summers,
  - Low precipitation
  - Poor soils
  - Stagnant water
  - Swarms of black flies and mosquitoes
- **Covered mostly by boreal forest** (taiga).
  - **Tundra** north of the tree line.
- **Ice fields/glaciers** on Baffin and Ellesmere islands.
- **Difficult to move around:** terrain plus distance.
  - Fabled *Northwest Passage* is frozen most of the year. Sea ice is a danger to shipping.

3

OVERVIEW: Human

- **Extremely low population density** except for the southern margins.
- **Limited economic development:** harsh environment, few people and distances to market.
- **Mining is very important:** metal ores on the Canadian Shield and the tar sands/oil shale areas of Rocky Mt. foothills.
- **Hudson Bay:** gateway for trade into area.
- **St. Lawrence Seaway:** allows ocean-going ships into the middle of the continent.
- **Center of Inuit culture:** Nunavut Territory.

4

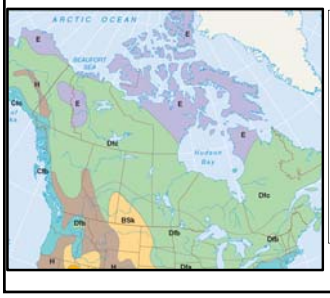
GEOLOGIC SETTING

- Centered on the **Canadian Shield.**
  - Exposed Pre-Cambrian granitic crustal rocks called the "*basement of the continent*."
  - These are the oldest rocks of North America.
- **Hudson Bay** is a depression in the center of the shield
  - Caused by the weight of glaciers from the last ice age
  - Flooded by the ocean as sea level rose.
- **"Glacial rebound"**
  - Getting more shallow and shrinking in width
  - Marshes around the bay are getting wider.

5

CLIMATE

Coldest area of North America.



Humid Continental climates: **Dfb** cool summer and **Dfc** short summer

Polar climates: **ET** tundra and **EF** icecap

ET is found in the northernmost parts of the region.

EF is found over the glaciers of Ellesmere and Baffin islands.

6

Temperature

- **Dominant feature: COLD**
  - Ave. January temperatures range from 27˚F along the southern Great Lakes to -39˚F along the Arctic Fringe.
  - Temperatures as low as -76°F have been recorded.
  - **Long winters**
  - **Short frost-free period**
    - Less than 90 days (3 months) over most of region
    - **Range:** 135 days at southern margins to 14 days on the Arctic coastal plain
    - Too short for agriculture

7

Solar Heating

- **Sun's rays are weak** because of their low angle; provide minimum heating even with long hours of daylight.
- Areas north of Arctic Circle (66½°N) begin to experience **at least 24 hrs of darkness and 24 hrs of daylight**
  - Revolution + Inclination + Parallelism
  - Closer to the North Pole, the longer the periods of darkness and daylight.
- **Snow cover reflects solar heat.**
- **Low temperatures = low evaporation rates = low precipitation.**

8

Precipitation

- Area is **equivalent to a semi-arid/desert region**.
  Why?
  - Cold temperatures and a frozen Arctic Ocean
- Highest amounts are received in the southeast.
  - **40 in.** in Labrador (mostly from Atlantic Ocean storms)
  - **10 in.** over Nunavut.
  - **6 in.** in Arctic Islands

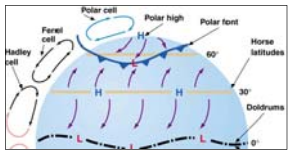
9

Air Flow

The **Polar High** (cell of cold, heavy air) centered over the North Pole pushes southward.

Its boundary is called the **Polar Front.**

Storms form along it when it interacts with subtropical air.



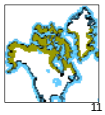
Predominant air flow, called the **Polar Easterlies**, is from NE to SW.

Polar Jet Stream usually prevents mid-latitude storms from moving northward blocking moisture.

10

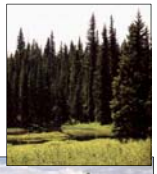
Natural Vegetation

- **TAIGA** (Boreal forest)
  - **Northern coniferous forest** extending across the entire southern part of the region.
  - Closely spaced spruces, firs, and pines.
  - Slow-growing and short.
  - Decrease in size/number from S to N.
- **TREE LINE**
  - **A zone of smaller and sparser trees.**
  - Transition between taiga and tundra.
- **TUNDRA**
  - Northern most land areas.
  - Conditions **too harsh for trees**.
  - Lichens, grasses, mosses, and shrubs.



11

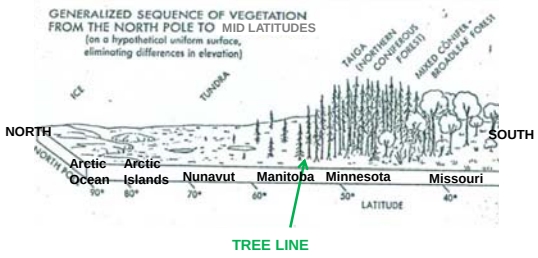
Northland Biomes



Taiga/Tundra Interface: transition zone is called the **tree line.**

12

Vegetation Sequence



13

Permafrost

❖ **Subsurface layer of permanently frozen ground.**

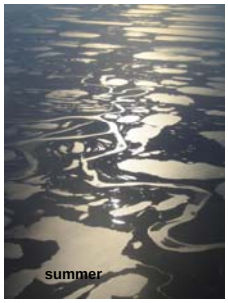
- From a few inches to over 1000 ft. thick
- Discontinuous in warmer areas.

- In summer, **frozen layer holds melt water on the surface,** creating pools of standing water .

- **Effects:**
  - Building construction needs **piles** driven deep into permafrost for stability.
  - Constant road repair; off road travel difficult.
  - Need to protect ground from the heat of buildings.
  - Area becomes a breeding ground for insects.

14

Extent of Permafrost



15

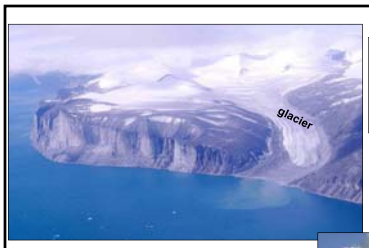
Arctic Sea Ice
and Polar Ice Cap

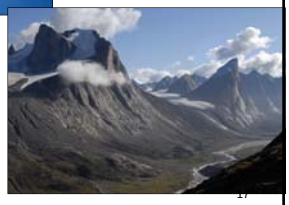
❖ **Characteristics**
- Covers 1.8 million sq. mi.
- 10-20 ft thick and **very irregular** with pressure ridges and crevasses
- Expands in winter to cover the entire Arctic coast of Canada and northern Alaska.

- **Effects**
  - Minimizes moderating effect of Arctic Ocean on climate.
  - Limits coastal and ocean transport
- **Changes**
  - Slowly melting, apparently in response to global warming
  - Summer coverage shrinking with coastal areas of islands now ice-free.
  - Possibility of a future, year-round **REAL** "Northwest Passage."

16

Baffin Island



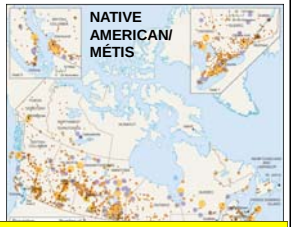


Glaciers are getting smaller.

Areas are ice and snow free for longer periods of the year.

17

Canada's Native Population



Inuit (formerly called Eskimo) **are the predominant group of the Arctic.**
Arrived in North America about 4,500 yrs ago. Culture extends from Siberia to Greenland.
Traditionally nomadic, now live in small towns

American Indians are concentrated in the taiga.
Traditional economy based on hunting and fishing.
Métis: **Descendants** of the **intermarriage** of **Indian women** and **Eur. fur-traders.**
They outnumber Amer. Indians in the taiga.

Early European Settlement

- **First the French**
  - Voyageurs, fur trappers, fur traders, missionaries.
  - Controlled Hudson Bay drainage basin in early days.
  - Trading posts and forts at strategic sites now the location of today's cities.
- **Then the British**
  - Hudson's Bay Company: British fur-trading company
  - Settlements on the margins of Hudson Bay
  - Granted trade monopoly by British government
  - Control extended west to Rocky Mountains as Rupert's Land

19

Settlement Pattern

- **Low population density.**
- **Created** and **dominated by one major economic activity:** Mining, transportation, shipping
- **Small agricultural settlements**: in fertile, warmer areas
- **Far North**
  - Villages located where food and supplies were plentiful.
  - Few permanent settlements.
  - Most settlers are employees of government or mining companies and are non-Native males.

Economic Activities

Major employers are:

- **Primary sector activities:** mining, petroleum, lumbering and associated activities
- **Transportation/transshipment**
- **Government:** local, state, provincial
- **Power generation**
- **Military/defense**
- **Land management/park service**
- **Tourism:** guides, services

21

Lumbering

- **The taiga is the largest area of uncut forest in North America.**
- **Canada is the world's leading exporter of forest products.**
  - Lumber, pulp and paper operations are found from Quebec to Manitoba.
  - Spruce forests south of Hudson Bay are the prime source of pulp for most paper mills.
  - Mills are located on water supply and power sites on southern edge of Canadian Shield

22

Pulp and Paper Mill
Espanola, ON

Access to trees, water and cheap power.

23

Mining: United States

- **Mesabi Range,** Minnesota, plus northern Wisconsin and Michigan, **produces iron ore.**
- **Situational advantage** with **accessibility network** of the Great Lakes.
- Locks at **Sault-Ste Marie** (Soo Locks betw. Lakes Superior and Huron) are the world's busiest because of ore boats.
- **Taconite**
  - **Contains c.30% iron**, replacing exhausted high-quality ores
  - **Benefit**: Taconite is ground into powder before shipment removing the rock and making the load lighter ands concentrated.

24

Mesabi Range

Iron ore mine in Minnesota

25

Mining on the Canadian Shield

- **The Canadian Shield is a vast area of hard igneous rock at the surface.**
  - **The rocks contain deposits of many important minerals**: iron, copper, lead, zinc, nickel, uranium, gold and asbestos.
  - Centers of mining and processing have grown in the area.
  - Metals are smelted on site to concentrate the ore.

26

Mining Centers

Sudbury, ON:
Center of copper mining and smelting

Timmins, ON:
Open-pit copper mine

27

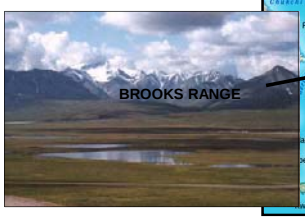
Mining Centers

Sudbury, Ontario: World's largest nickel mine

28

"North Slope" Alaska

Alaska's Arctic Coastal Plain, centered on Barrow, is called the *North Slope* because it lies **north** of the Brooks Range and **slopes** to the Arctic Ocean.



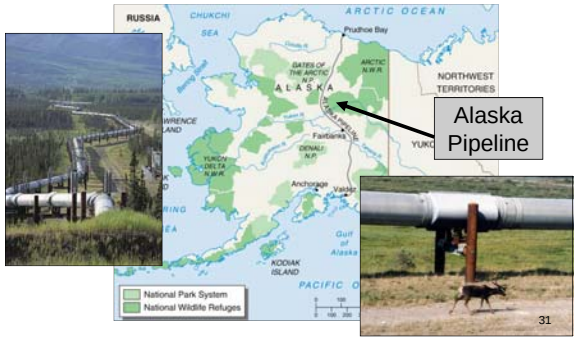
30

Petroleum

- **Alberta**
  - Major proven resources
  - Athabasca tar sands
- **Alaska's North Slope**
  - Tapped out of fear of inadequate supplies in U.S.
  - Extraction a technological feat
  - Problem of transportation: distance to the sea; use of pipelines in a cold climate
- **Best prospects for additional discoveries**
  - Mackenzie River delta
  - Arctic Islands across from Alaska's North Slope

29

Alaska Pipeline



31

Athabasca Oil/Tar Sands

- **The world's largest known near-surface repository of bitumen** (heavy crude oil) mixed in with sandy soils of N Alberta.
- Accessible by strip mining.
- Oil produced from steam injection and refining.
- Estimated economically recoverable oil to be about 170 billion barrels.

32

Alberta Tar Sands Strip Mining

Raw tar sand

To get **one barrel** of oil, **four tons** of tar sands have to be processed.

33

Tar Sands Refining Facility

34

Hydroelectricity

❖**Quebec** and **Labrador have the greatest untapped production potential.**

- Sites located at the southern edge of Canadian Shield

➢ **Basis of the aluminum smelting industry.**

➢ **Surplus energy sold** to New York, Ontario, New England (to replace polluting coal-fired plants) as part of an international grid system.

35

Transportation

❖**Pervasive isolation due to lack of transportation:** sparse population makes it difficult to network + the permafrost problem.

- **Northwest Passage is frozen most of the year**
- **Mackenzie River** only useful river in Far North
- **St. Lawrence Seaway** allows ocean-going vessels to reach Lake Superior from the Atlantic Ocean
- **Railroads** link grain and mining areas with ports; greatest concentrations of track is in the southern portion
- **Roads** – few exist and fewer are paved.
- **Light airplanes with bush pilots** - local
- **Snowmobiles and snow tractors** - local

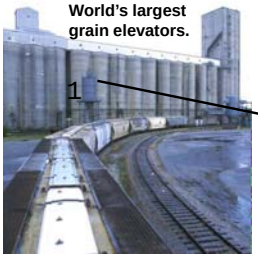
36

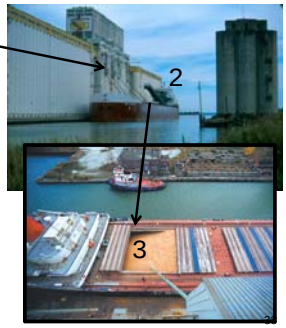
Local Transportation



37

Grain Handling
Thunder Bay, ON





1. **Grain from the Great Plains is delivered by rail to storage elevators.**
2. **When a grain carrier arrives,**
3. **it is filled using chutes.**

Tourism

- **Rising incomes and leisure time allow for more recreation.**
  - **Southern margins** (Minnesota, Wisconsin, Michigan; Quebec; Ontario) draw outdoor-oriented tourists.
    - Easily accessible.
    - Heavy usage.
  - **Central and northern portions** are visited less because of harsh environment.
- **Environmental Concerns:** Fragile environment that needs to be protected.

39