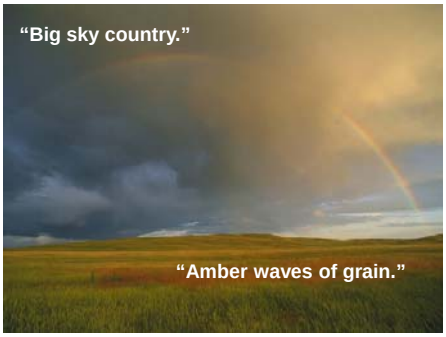
Regional Landscapes of the United States and Canada

The Great Plains and Prairies

Prof. Anthony Grande

Prairie-covered Plains



2

OVERVIEW

- **Minimal topographic variation** (relief).
- **Area of water deficiency.**
- **Experiences violent weather.**
- **Many negative misconceptions.**
- **Good food source:** hunting to grazing to agriculture.
- **Varied farm management decisions:** from sod busting to bread basket.
- **Ogallala Aquifer:** region's water lifeline.
- **Trends** of **farm consolidation** and **depopulation**

➢ See maps in Section 6 of Historical Atlas

3

Plains vs. Prairies: What's the difference?

❖ **Plains** is a **topographic term** signifying expansive and relatively flat land.

❖ **Prairie** is a **vegetation unit** that refers to a variety of grasses.

Most of the Great Plains was originally covered by prairie.

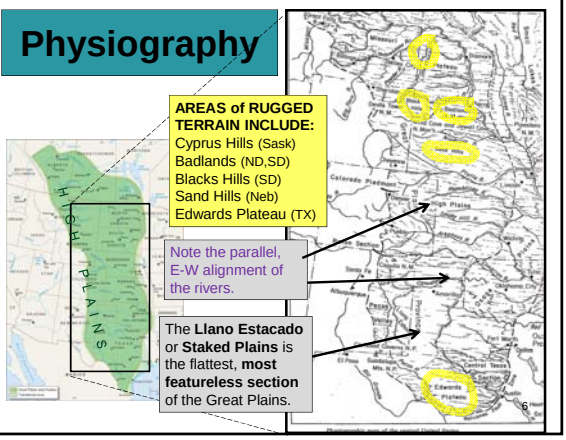
4

The Great Plains and Prairies

- Situated between the Interior Lowlands and the Rocky Mts.
  - From Canada's coniferous forest to the Mexican border.
  - Flat to rolling landscape with some irregularities.
  - Formed by deposited sediment that came from the Rocky Mts.
- Layers of sedimentary rock are **very thick** and slope toward the Mississippi River.
- Some layers are **porous** and contain **great water supplies.**

5

Physiography



AREAS of RUGGED TERRAIN INCLUDE:
Cyprus Hills (Sask)
Badlands (ND,SD)
Blacks Hills (SD)
Sand Hills (Neb)
Edwards Plateau (TX)

Note the parallel, E-W alignment of the rivers.

The **Llano Estacado** or **Staked Plains** is the flattest, **most featureless section** of the Great Plains.

6

Unusual Terrain Features

Badlands in Theodore Roosevelt NP, ND

Braided section of the Platte River, Neb.

Black Hills, SD

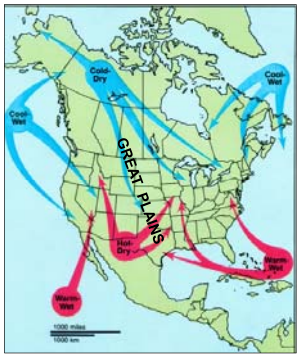
Sand Hills, Neb.

AIR MASSES

The Great Plains are in the zone of conflict between major air masses.

Greatest **difference in the temperature of the air masses** is during spring and autumn.

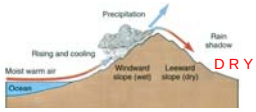
Thunderstorms, blizzards, high winds and tornadoes are common.



8

CLIMATE

In the rain shadow of the Rockies.



It has a **semi-arid climate** with cold winters and snow (BSk) in the north and dry subtropical conditions in the south (BSh).

- ✓ Precipitation **decreases** from east to west.
- ✓ Occurs along the frontal zones of air masses.

9

PHYSICAL CONDITIONS

Precipitation

Natural Vegetation

10

VEGETATION

Grasses are the predominant vegetation.

- Taller and more dense in the eastern plains
- Shorter and sparser in the western plains

Intricate root systems

- Add decayed organic matter to soil
- Very difficult to plow
- Can be cut into blocks; it was used as construction material (sod houses)

❖**Trees are found along rivers** and **in areas where water is close to the surface.**

11

SOILS

Mollisols:
Soils that form under grasses not forests.

They have a **thick surface layer** (up to 5 ft) and **high organic content** that comes from the grasses' dense root systems.

Excellent for grain production.

12

Area of Extreme Weather

❖**Great seasonal swings of temperature.**
- Range is from below 0°F to over 100°F

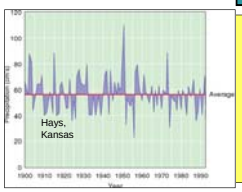
❖**Blizzards**
– Heavy snow + high wind + intense cold
– Can last for several days
– Can cause "whiteouts" that limit visibility

❖**Windy environment**
- Increases rate of evapotranspiration (desiccation)
- Experiences some of the highest wind speeds in North America outside of severe storms.

❖**Drought cycles.**
- Undependable precipitation.

13

Drought Cycles



Precipitation is not dependable:
Wide variation from year to year (80% to 120% of "average") with periods of drought.

✓**Drought occurs in roughly 20 year cycles.**

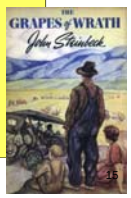
✓Optimism in good years leads to disaster in dry years.

14

DUST BOWL

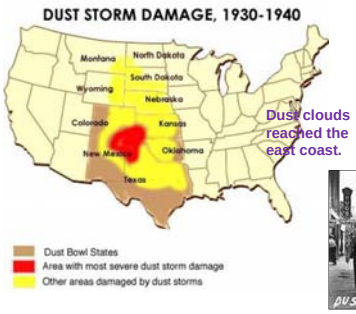
An area on the southern High Plains that experienced the "dust storms" (wind-blown soil particles) **during the severe drought of the 1930's.**

It was immortalized by John Steinbeck's novel, "The Grapes of Wrath," which told the story of poor Oklahoma farmers during the Great Depression.



15

Dust Bowl Area



Dust clouds reached the east coast.

16

Dust Storms

Caused by a combination of natural and human deeds:

1. Inappropriate deep-plowing techniques.

2. The false belief that "*rain follows the plow.*"

3. Several years of drought that contributed to a drying of the exposed topsoil.

4. High winds that picked up the dried soil and carried it away, creating "dust storms."

17

Extreme Weather

❖**Chinook** **(a regional wind called the snow melter)**
– Occurs in winter.
– Warm, dry air descending from Rocky Mts. (pushed over mountains by Pacific air flow).
– Relief from bitter cold and snow.

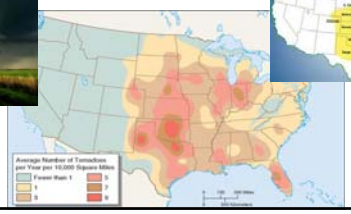
❖**Thunderstorms with hail**
- Collision of contrasting air masses (esp. in spring & fall)
- May produce intense local weather conditions

❖**Tornadoes**
- Result of extreme thunderstorm conditions.
- Extremely destructive within small areas

18

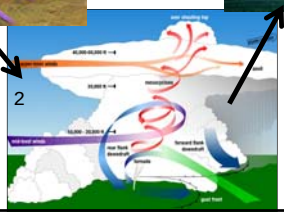
Tornado Alley

"Tornado Alley" A vernacular region that refers to parts of the United States where tornadoes are most frequent.



19

Tornado Formation



20

Tornadoes on the Ground

21

Aftermath of a Tornado

22

Tornado Video Clips

Tornado Tourism

- http://news.bbc.co.uk/2/hi/science/nature/7533941.stm
- http://efq-bnusfoodreserves.blogspot.com/2011/05/video-actual-footage-from-storm-chasers.html
- http://www.youtube.com/watch?v=dwMVfn7y8V8&feature=related
- http://www.youtube.com/watch?v=EfdK6H9d6J0

23

Perception of the Plains

- ❑**Native Americans were to first to live on the plains.** They followed the animals and the seasons.
- ❑The explorer **Coronado** (raised in dry Spain in the 1500s): "*This region is the best I've seen for producing the crops of Spain. [It is] very flat and black [and] well watered by the rivulets and springs."*
- ❑Early 1800s, **East Coasters** and **Northern European immigrants** saw it as "wholly unfit for cultivation and habitation." ***No trees = Not good for farming.***
- ❑**1850s-1930s:** Area called the ***Great American Desert.***
- ❑**20th century views:** shaped by literature and Hollywood: *a dry waste land inhabited by Indians, buffalo and cattlemen.*

24

Plains Indians

- **Lived a nomadic lifestyle** (hunting and gathering).
- **Buffalo** (bison) **hunting** main livelihood.
- M**obility was limited.**
- **Acquisition of horses in 1500s** (left by Spanish)
  - Allowed diffusion throughout the Great Plains.
  - Were able to follow the buffalo herds.
  - Teepees were traveling homes.
  - Excelled at horse-mounted activities.
- **Pushed out of the Great Plains by American westward expansion**
  - Loss of buffalo (food) to trophy hunting
  - Arrival of European immigrant farmers

Plains Indians in Painting

Bison (American Buffalo)

27

Head-Smashed-In Buffalo Jump

World Heritage Site, Fort MacLeod, Alberta

The buffalo jump was used for 5,500 years by the indigenous peoples to kill buffalo by driving them off the 35 ft high cliffs

28

First American Settlers

- **First arrivals** (**pioneers**):
  - Settlement hindered by a lack of trees for building, fencing, fuel and by a lack of water.
- People moved through the area in convoys called "**wagon trains**."
- Agriculturalists **bypassed** this area.
  - Favored Rocky Mt. foothills and west coast tracts where there were trees.

➢ See maps on p. 36, 46 of atlas

29

Wagon Trains

❖**Provided an organized movement westward through the Great Plains**.

✓Started as supply lines for fur traders, later for settlers.

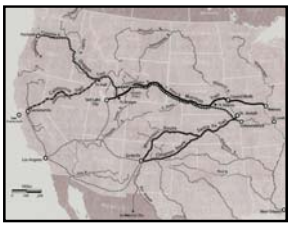
✓Became a route for settlers heading to the Rocky Mts. and to California and Oregon.

➢Wagon wheels created **ruts** in the prairie sod.

- Trail masters followed the ruts on their trips across the Great Plains.
- Geologic landmarks were important guide posts and gauges of distance traveled.

30

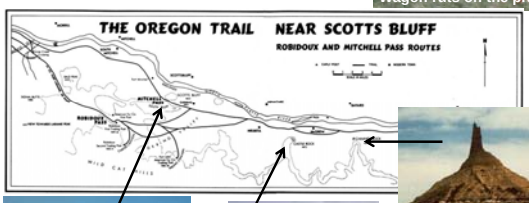
Overland Trails

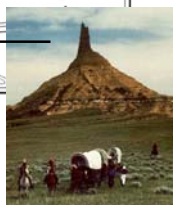


Wagon train parties were outfitted in Missouri and crossed the plains by following rivers, ruts and landmarks.

Landmarks along the Oregon Trail

Wagon ruts on the prairie.





First American Settlers

- **Pioneer settlers**
  - ❖Claimed best land which had surface water
  - ❖***Riparian (Water) Rights***
    - *The rights, which belong to landowners through whose property a natural watercourse runs, to the benefit of such stream for all purposes to which it can be applied.*
    - *Individuals not owning land adjacent to the water course have no rights to use the water.*
      - – Excluded later settlers.
      - – Led to water wars.
- **Cattlemen at odds with land owners.** Need to graze and water the animals along the cattle drives to market.

33

Agricultural Settlement

Intense agricultural settlement was delayed until the development of technologies to deal with the environment:

- – **Barbed wire** (for fencing)
- – **Sod houses** (occupied until replaced by frame houses made from wood transported in by railroads)
- – **Deep-well drilling to get water** and **windmills to pump up the water.**
- – **Mechanization** of grain farming.

34

Pioneer Sod House

35

Northern Plains
(Canadian Prairies)

- **Hudson's Bay Company**
  - – **Rupert's Land** was charted (1670) and owned land south of Hudson Bay
  - – Sole agent of British authority until 1870
  - – Discouraged settlement as interfering with fur trade
- **Canadian Government**
  - – Acquired Rupert's Land in 1870
  - – Pushed settlement but conditions limited its use for farming.
  - – Railroad was extended into the area (1885) but many settlers were from the U.S.
  - – Leases, rather than land grants, controlled the land.
- **Today**
  - – **Prairie provinces** (Manitoba, Saskatchewan and Alberta) **are Canada's main wheat producers.**
  - – Most is exported to Europe.

36

Southern Plains

- **Spanish introduced ranching to Texas.**
- **Cattle ranchers** used the land extensively **(vs. intensively);** plentiful grasslands for cattle.
- **Rapid expansion after Civil War** (1866-1886)
  - Unbranded cattle running loose during Civil War
  - Railroads pushing to West Coast
  - Cattle drives north to rail heads in Kansas
- **Collapse** (late 1880s)
  - Overgrazing
  - New cattle-raising operations in Midwest
  - Slipping national economy
  - Disastrous blizzards of 1887-1888
  - Influx of farmers

37

Ranching

- **Range Wars**
  - Cattlemen clashed with land owners and farmers.
  - Needed to move cattle north to the transcontinental railroad depots in Kansas.
  - Needed water and grass for the herds.
  - Conflict of land ownership precepts, water rights and open range concepts.
- **Sheep Wars:** Battles between cattle and sheep ranchers in Southern Plains.
  - Revolved around disputes over land and water rights.
  - Cattlemen's disdain of sheep's overgrazing the range and polluting watering places used by cattle.

38

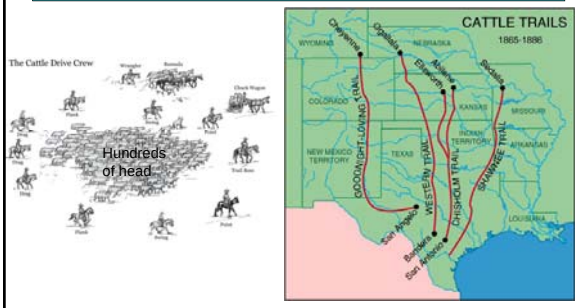
Cattle Drive

The movement of cattle on hoof (overland) **by cowboys on horseback.**

- ✓ A major economic activity in the West between 1866-1886, when cattle were "driven" from Texas north to rail head "cow towns."
- ✓ Established the cowboy as an iconic American figure.

39

Cattle Drive Trails



Cattle drives moved herds to terminals along the east-west Trans-continental Railroads. Conflicts with land and water right owners ensued.

Modern Cattle Feed Lots

Ranchers now ship cattle by truck and train to feed lots where they await being sold.

Agriculture Today

- **Extensive** (large area), **large scale operation and machinery intensive.**
- Wheat is the main crop.
  - Winter wheat
    - Planted in fall, established before winter.
    - Grows in spring, harvested May and June.
    - Mainly from northern Texas to southern Nebraska, but as far north as Montana.
  - Spring wheat
    - Central South Dakota to south-central Prairie Provinces of Canada.
    - Planted in early spring, harvested late summer-fall.

42

Wheat Harvesting on the High Plains

43

Harvest, Storage, Distribution

- **Harvesting**
  - Independent crews with large combines.
  - Start with winter wheat in Texas in June and work north.
  - Gradually being replaced by farm-owned equipment.
- **Storage** in small grain elevators or open-air bins.
- **Distribution**
  - Canada
    - To Winnipeg, then to Thunder Bay for shipment on Great Lakes
    - North to Churchill on Hudson Bay and on to Europe
  - United States
    - To ports on the Great Lakes or Mississippi River

44

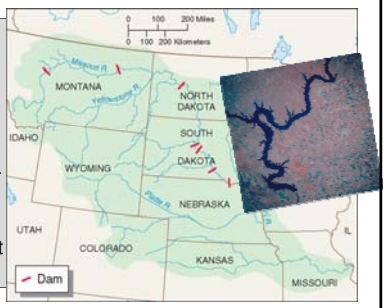
Water

Most important resource of the Great Plains second to land.

45

Missouri River Watershed

The **Missouri River** and its tributaries have been dammed to **create an extensive reservoir system** which provides farmers with water for irrigation.
Problem: flat terrain creates long, wide but shallow reservoirs.



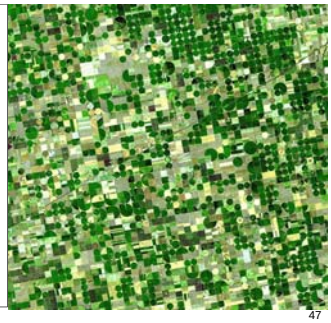
46

Plains Landscape Pattern

Pivot irrigation circles superimposed on the Township and Range grid.

<u>There is a water well in the center of every circle.</u>

(Can you see the looming problem?)



47

Pivot Irrigation System

48

Pivot Irrigation Equipment

49

Ogallala Aquifer

The **Ogallala Aquifer** is an area of Dakota Sandstone, 100-400 ft deep, extending from South Dakota to Texas, containing water that originated in the eastern Rocky Mts.

Contains "fossil" water over a million years old.

Water is used for irrigation, livestock watering and domestic uses.

Aquifer: a water-bearing rock formation through which water slowly moves. 50

Aquifer Depletion

In some areas, the water table has dropped more than 100 feet as a result of pumping.

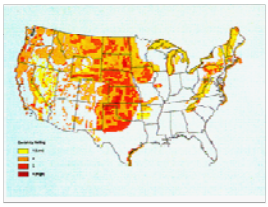
Shallow wells and natural springs are dry. Other wells have to be drilled deeper.

Stronger pumps are needed to bring the water to the surface

51

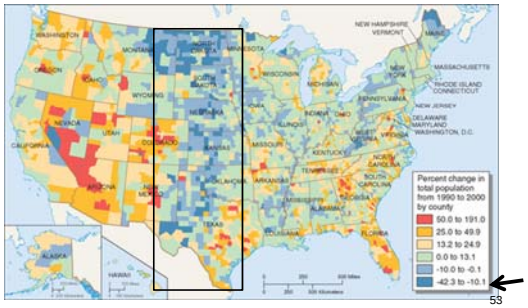
Energy Resources

- **Natural gas**
  - Panhandle Field is (W Texas, Oklahoma, Kansas) world's largest field
- **Petroleum**
  - Panhandle Field
  - Wyoming, North Dakota (deep formations)
  - Alberta (Athabasca Tar Sands)
- **Coal**
  - Thick seams, easily mined
  - Low-sulfur (less polluting)
  - Expensive to ship
  - Wyoming now leading coal-producing state
- **Wind**
  - Inexpensive production
  - Excellent potential
  - Far from areas of need



Wind Power: Certainty Rating of the Wind Resources in the US. 52

Population Change



53

Population Trends

- N and S portions have a high percent of people with immigrant heritage. (Atlas p. 49)
- Out-migration to cities
  - To larger cities within region
  - To cities beyond Great Plains periphery
- Mechanized farms need less labor.
- Younger people leaving; older folks staying.
- Energy boom in Northern Plains luring workers.
- Transportation routes
  - Do little to integrate the region
  - Perceptual orientation toward other places
  - Interstate highways speed people through the region.
- Historic/scenic sites draw tourists.

54