

# Missouri's ecosystems

Tomorrow's

Today's  
expressions

climate

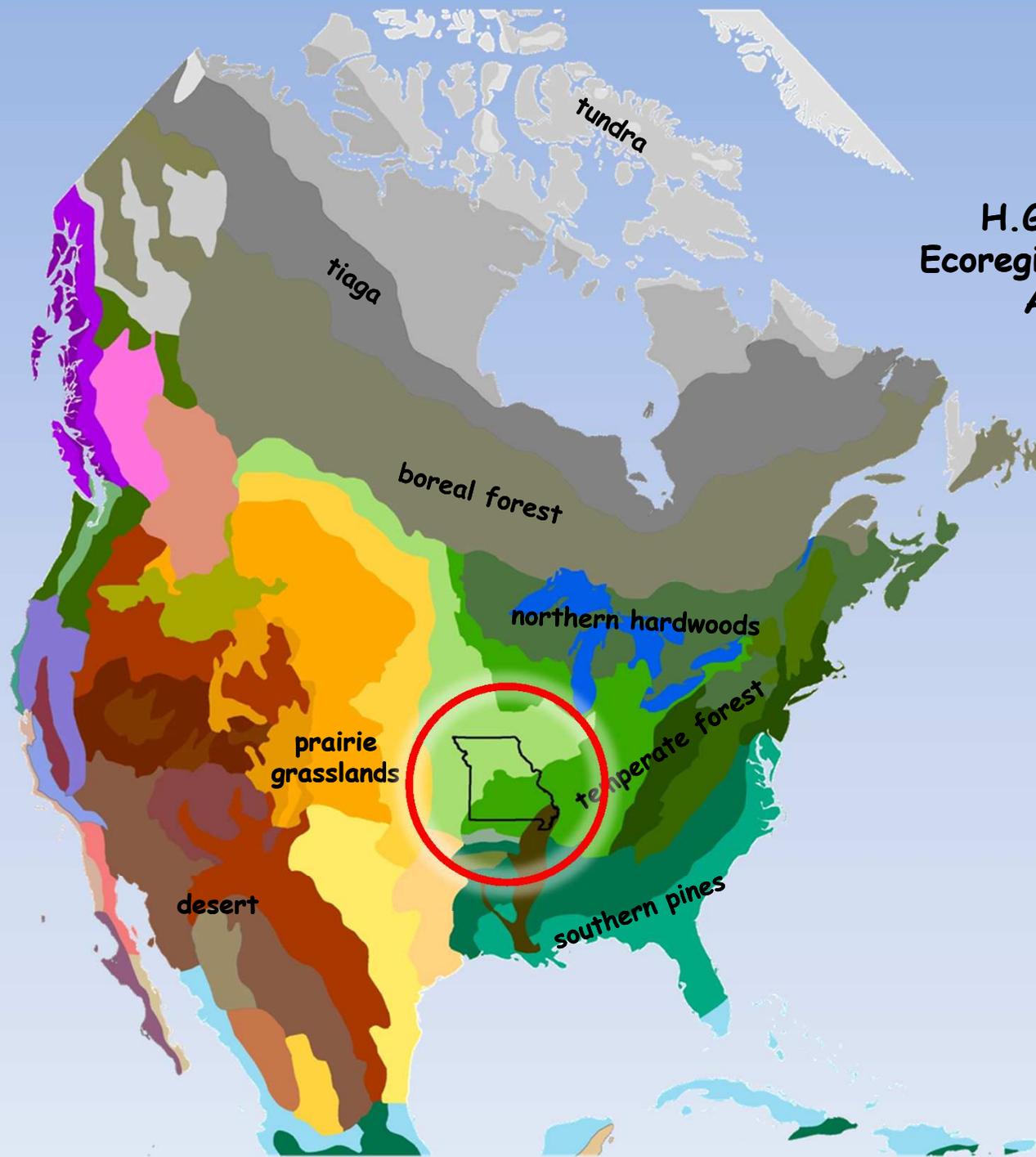


# Ecosystems reflect climate

Missouri's  
oak  
forests



**H.G. Bailey's  
Ecoregions of North  
America  
1996**



# Missouri's humid continental climate

H.G. Bailey's  
Ecoregions of North  
America  
1996



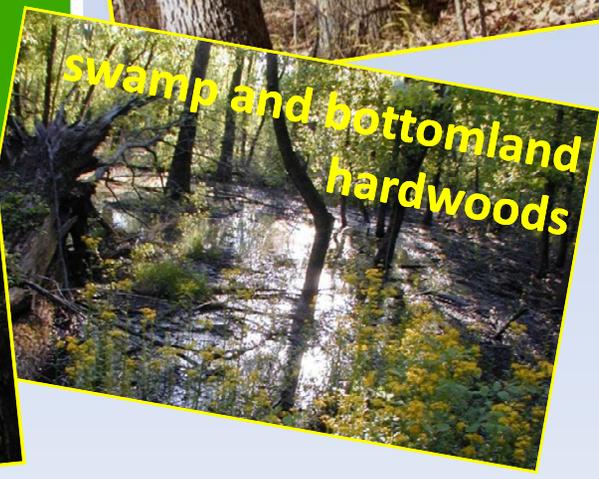
tallgrass prairie



oak savanna



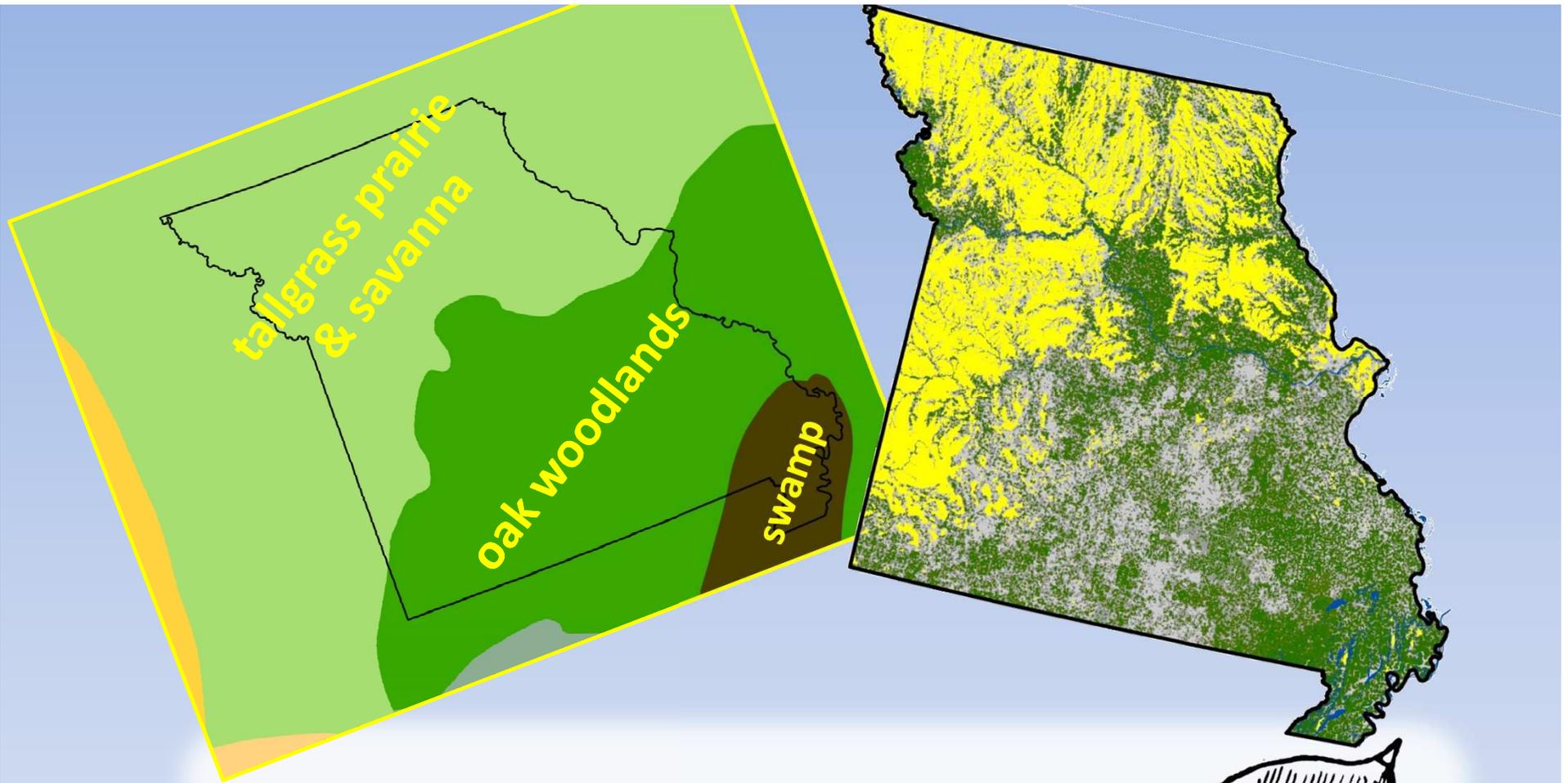
oak  
woodland  
and forest



swamp and bottomland  
hardwoods



southern  
oak & pine



**A matter of  
scale**



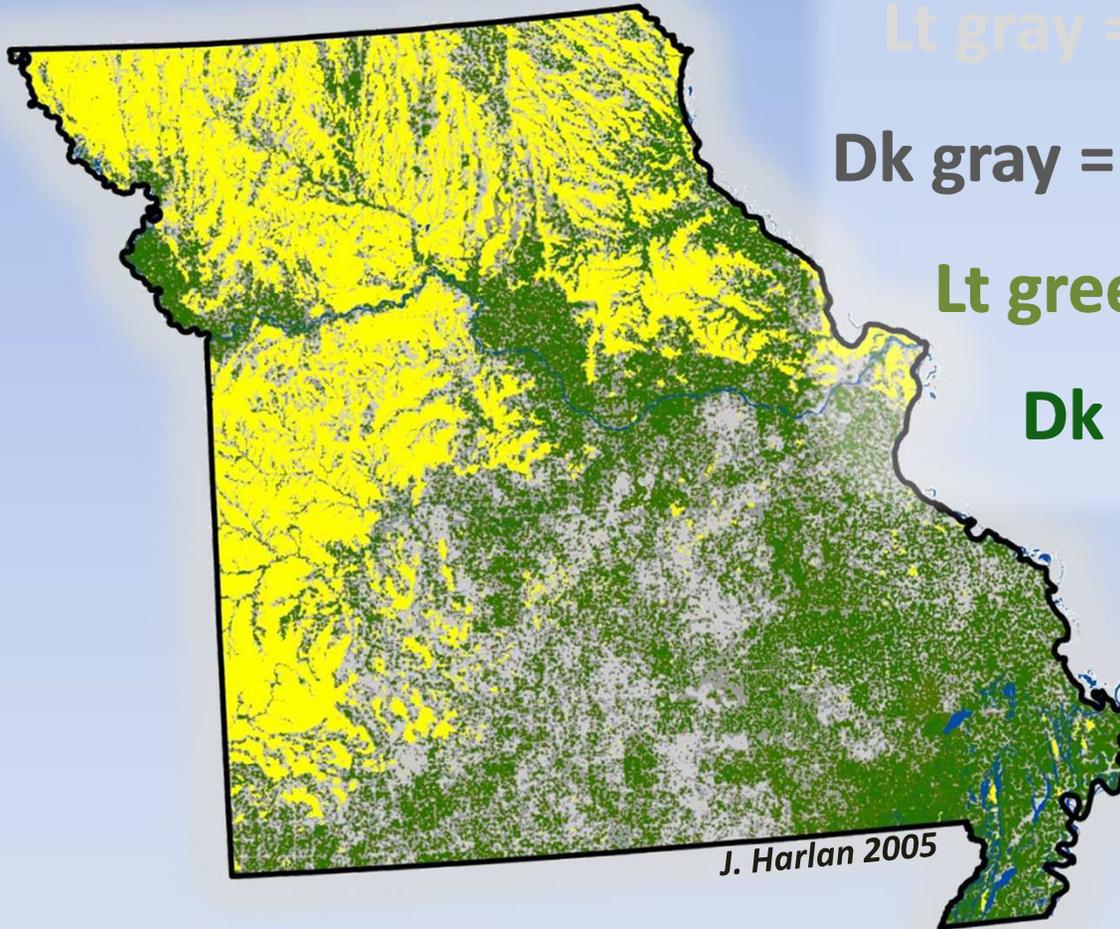
**Yellow = prairie**

Lt gray = savanna

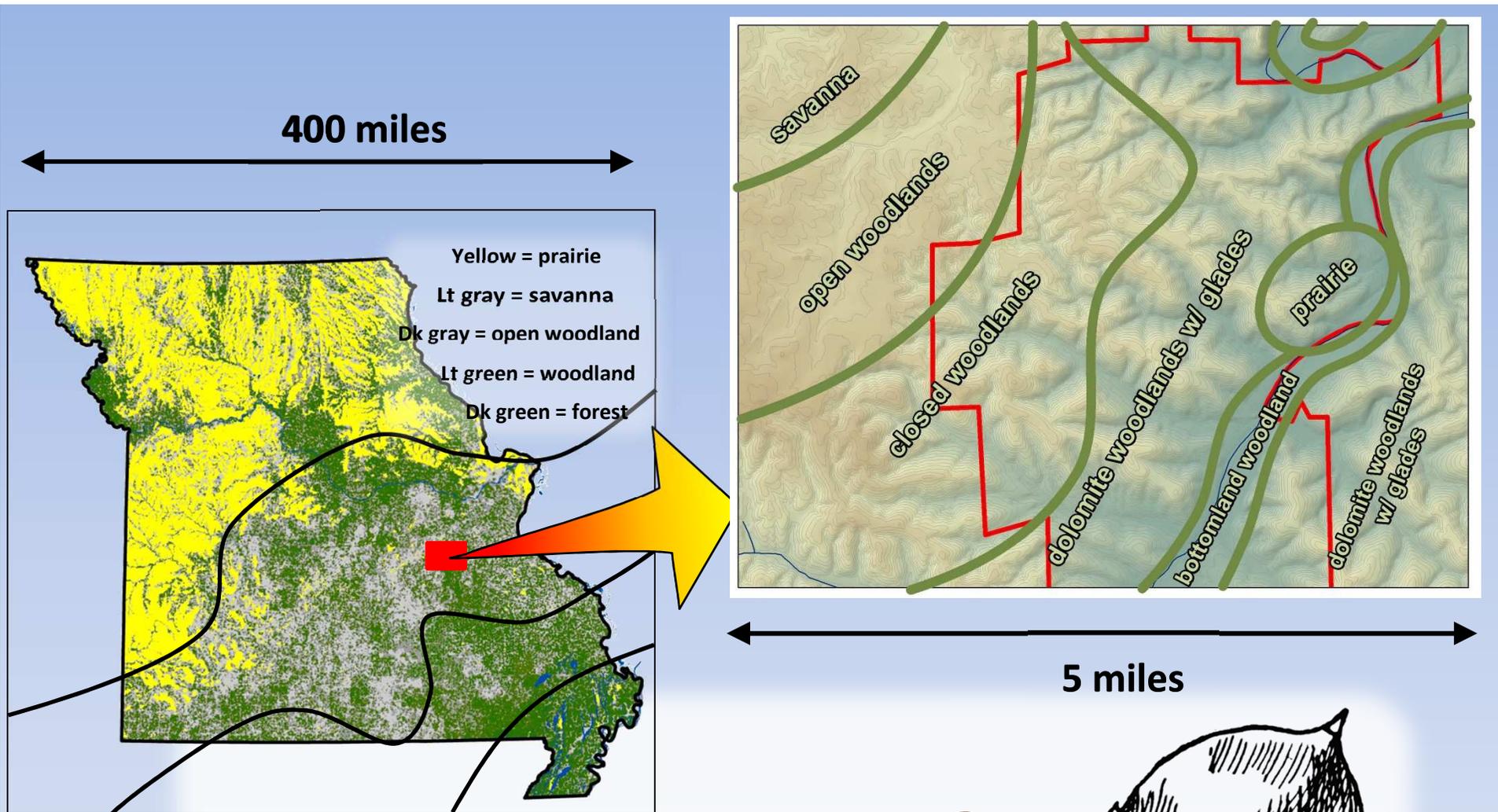
**Dk gray = open woodland**

**Lt green = woodland**

**Dk green = forest**

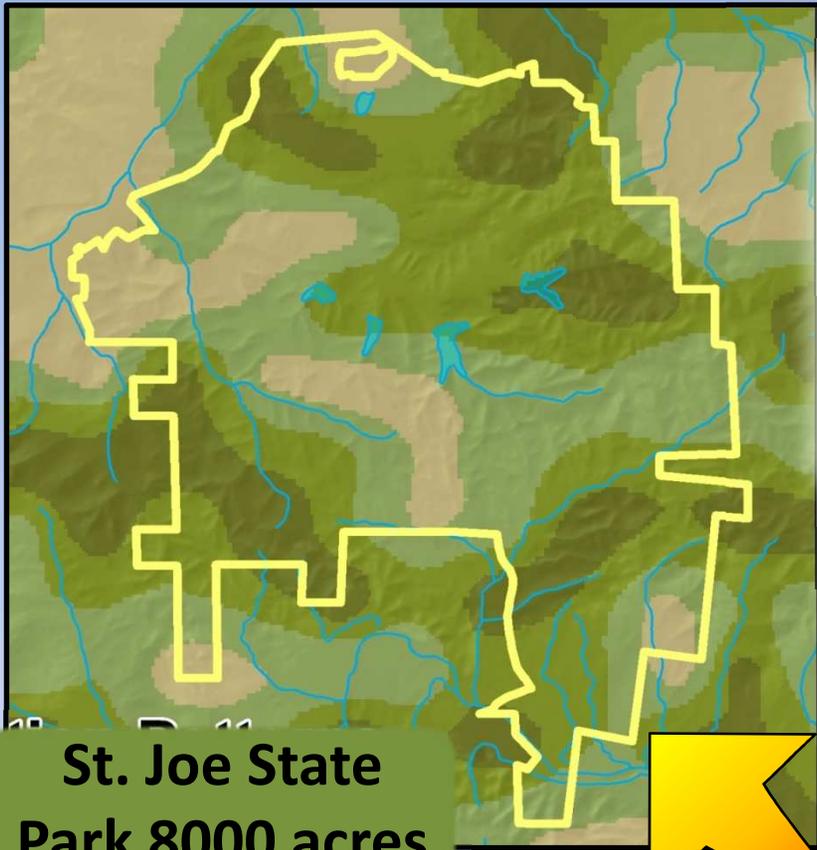


*J. Harlan 2005*



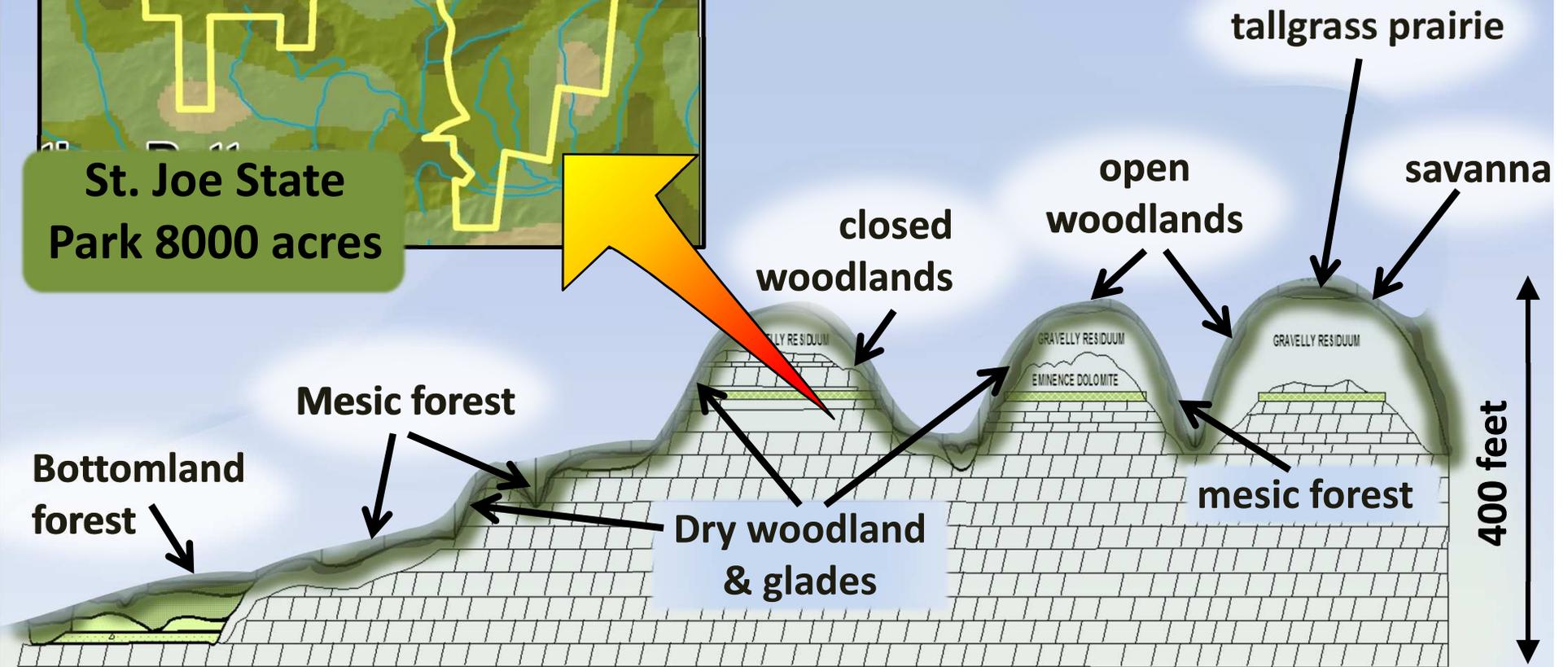
**A matter of  
scale**





**St. Joe State  
Park 8000 acres**

**tan = prairie/savanna**  
**Lt green = open woodland**  
**Med green = closed woodland**  
**Dark green = forest**



**tallgrass prairie**

**open woodlands**

**savanna**

**closed woodlands**

**Mesic forest**

**Bottomland forest**

**Dry woodland & glades**

**mesic forest**

**400 feet**

GRAVELLY RESIDUUM

GRAVELLY RESIDUUM

GRAVELLY RESIDUUM

EMINENCE DOLOMITE

# dry-mesic chert woodland



post oak





***75 distinct natural communities***



***2,222 flowering plant species***

***201 fish***

***17,500+ insects/spiders***

***400 mosses***

***1500+ fungi***

***108 amphibians/reptiles***

***74 mammals***

***390 birds***

***129 snails/mollusks***

***370+ lichens***

## Temperature rises:



Higher average temperatures  
... all seasons by 2-7 degrees



More very hot days & droughts



Longer growing season, fewer  
winter days below freezing

Q: If  
climate  
changes...

## Precipitation increases:

2-5" increase ... winter and spring

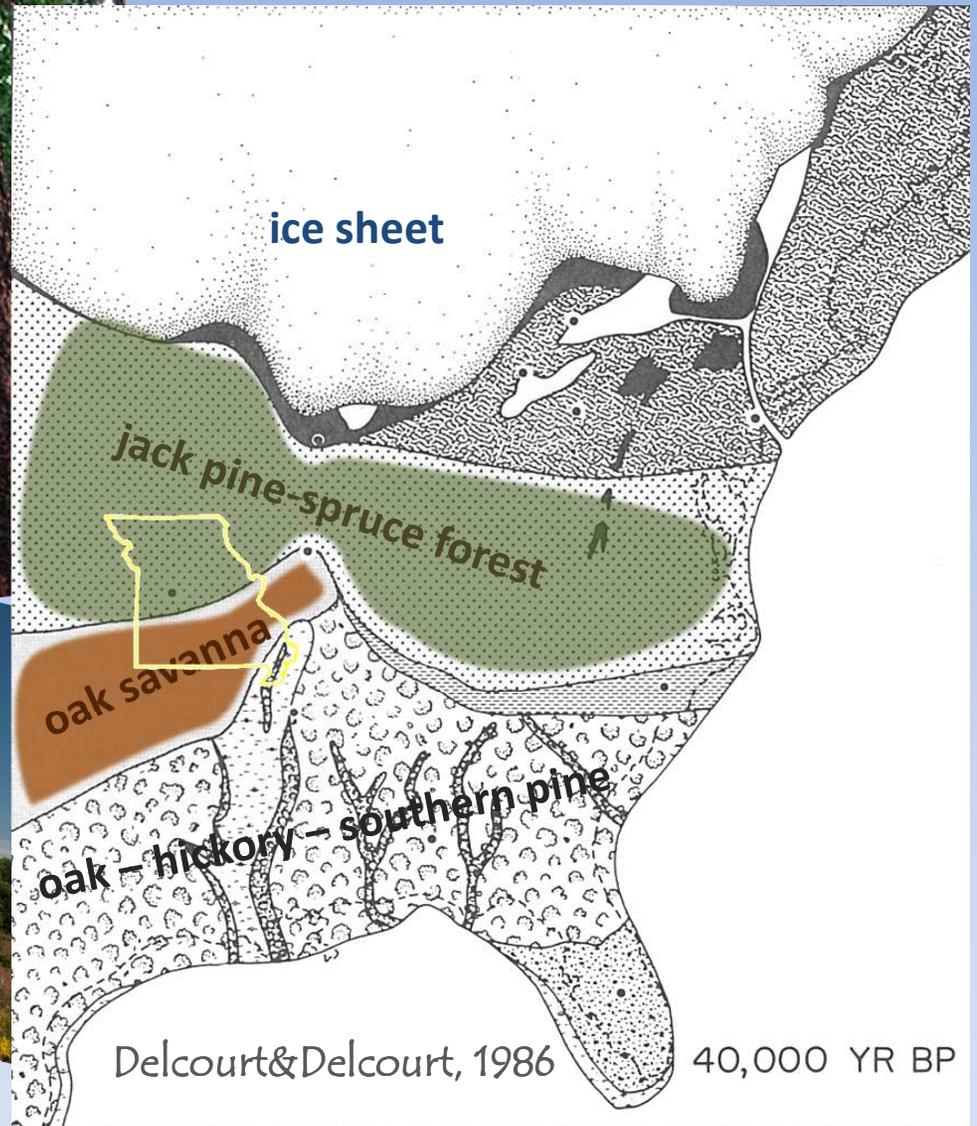


heavier rain events



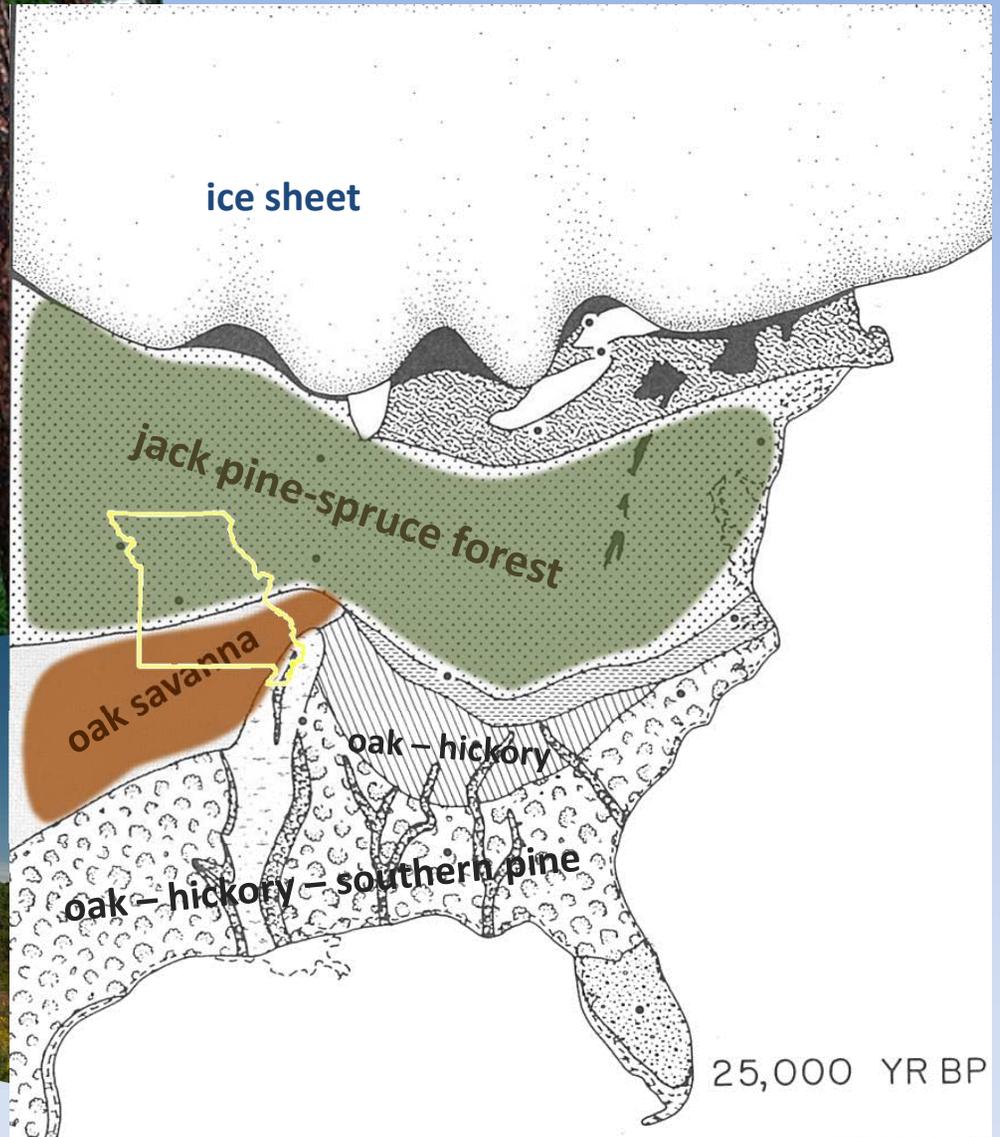
3" increase to 8" decrease ... summer





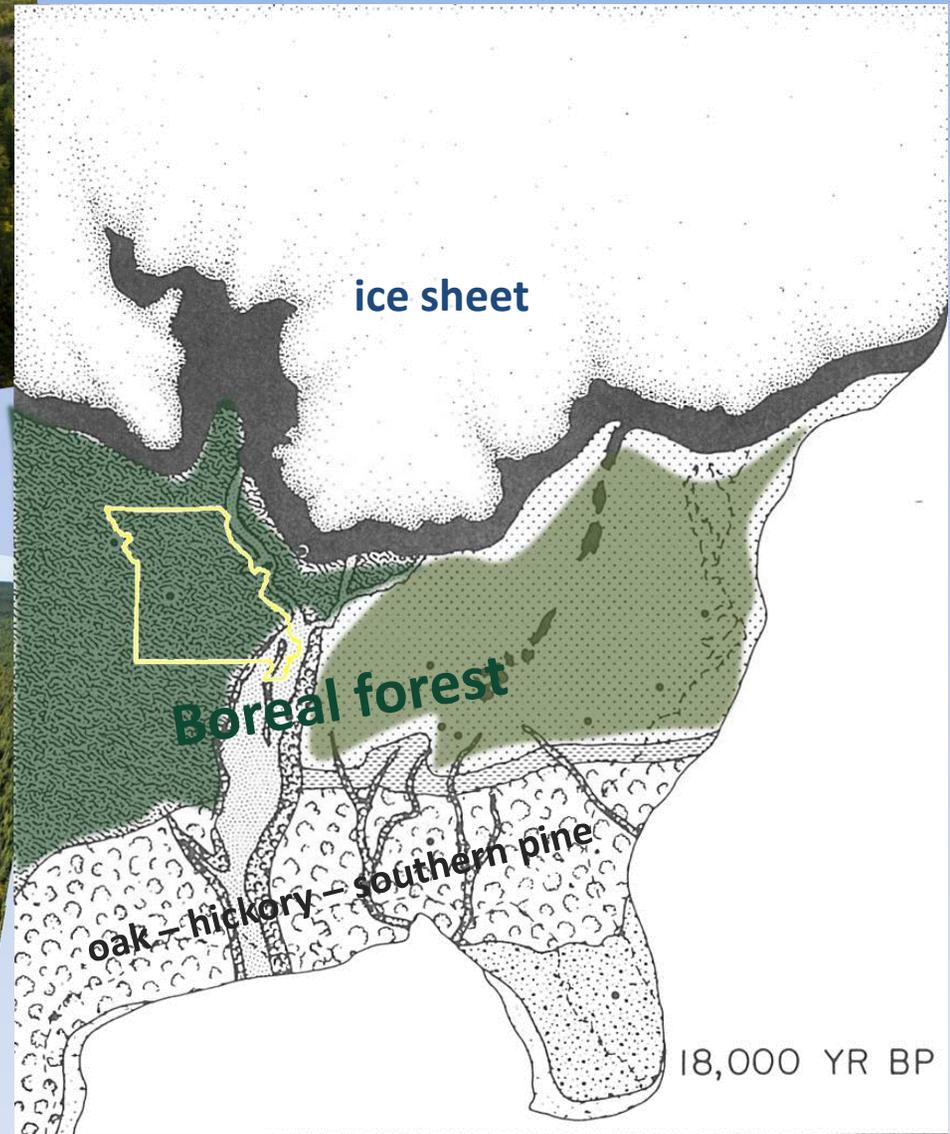
**40,000 years ago**

**mild and dry**



**25,000 years ago**

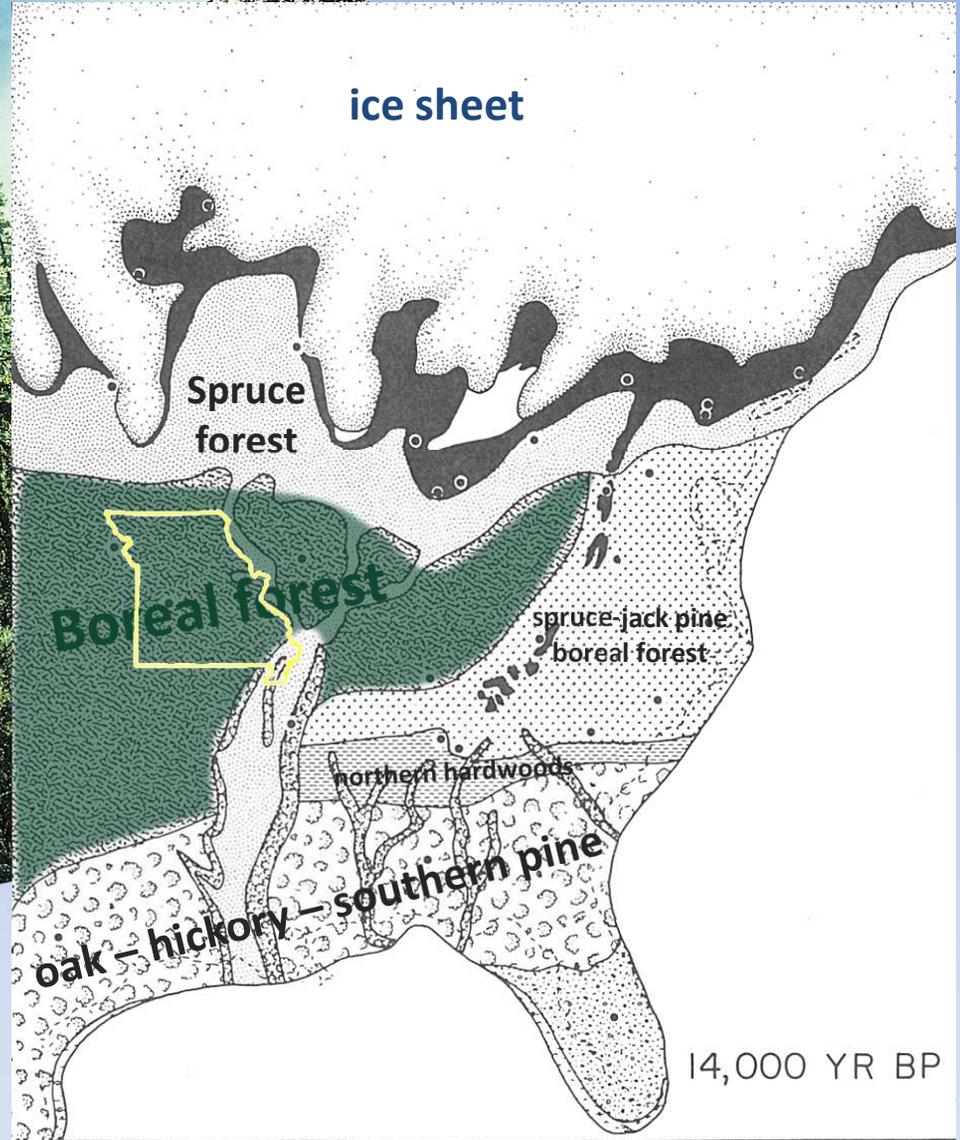
**cooler and wetter**



***Ice advances***

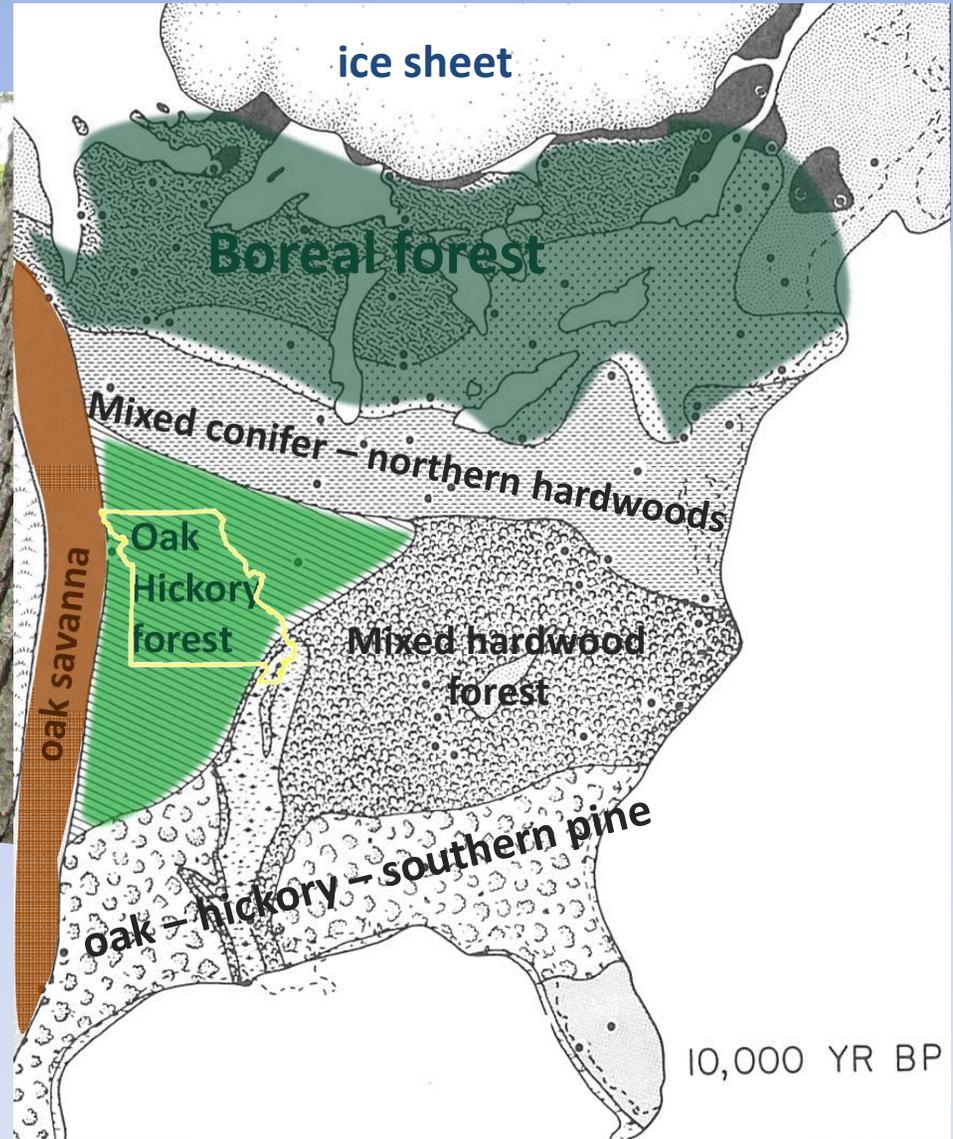
**18,000 years ago**

**cold and wet**



**14,000 years ago**

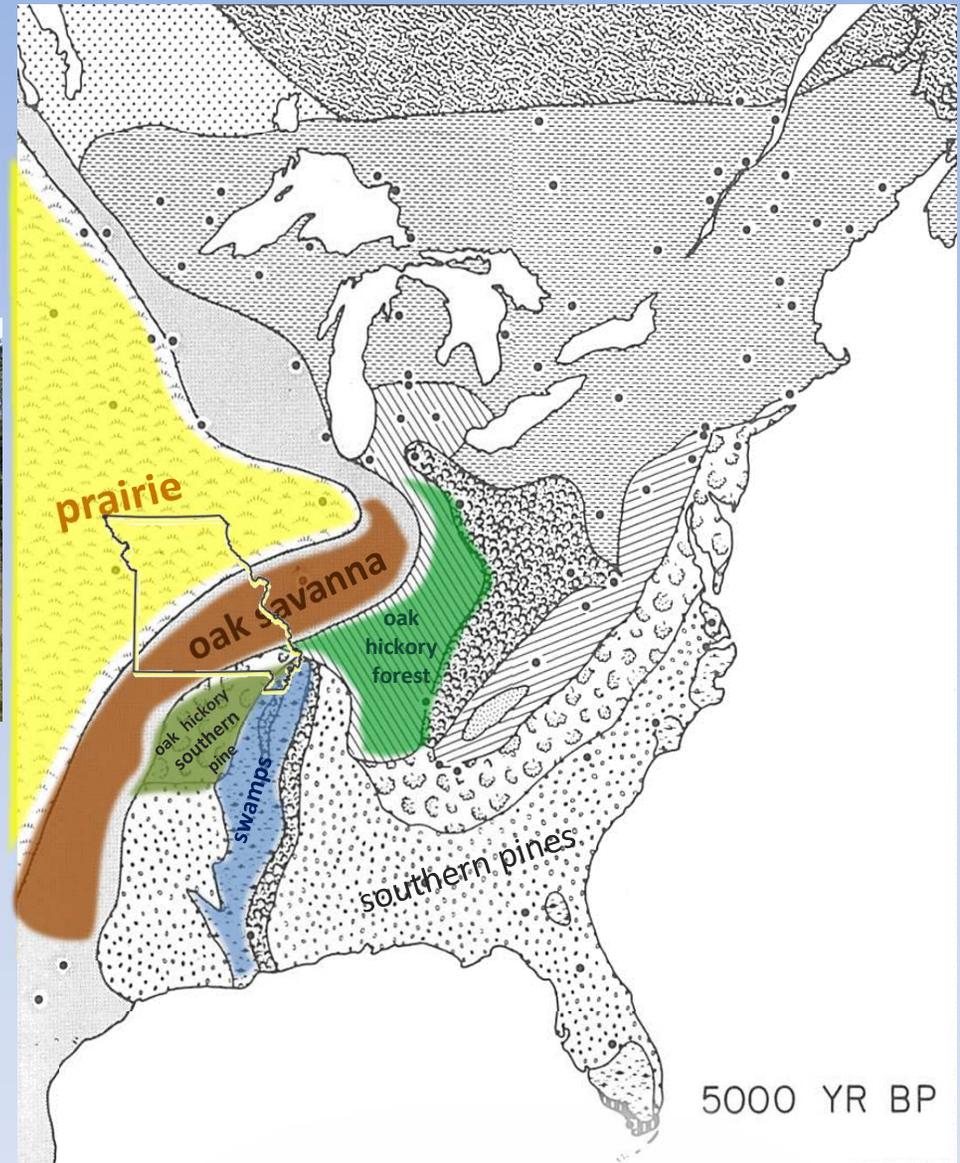
**cold and wet**



## *Ice retreats*

**10,000 years ago**

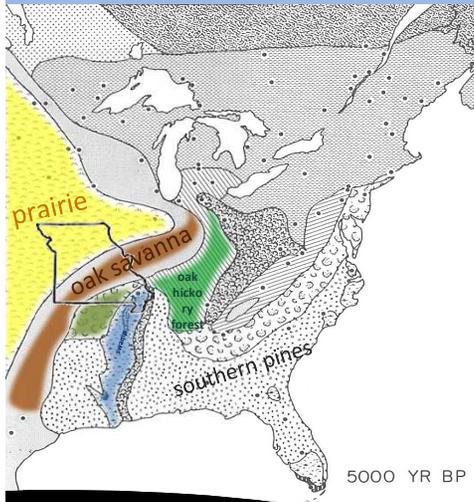
**wet but warming**



*Xerothermic*

**5,000 years ago**

**warm and dry**



3,400  
years  
ago

2,600

1,200

1,000

500

300

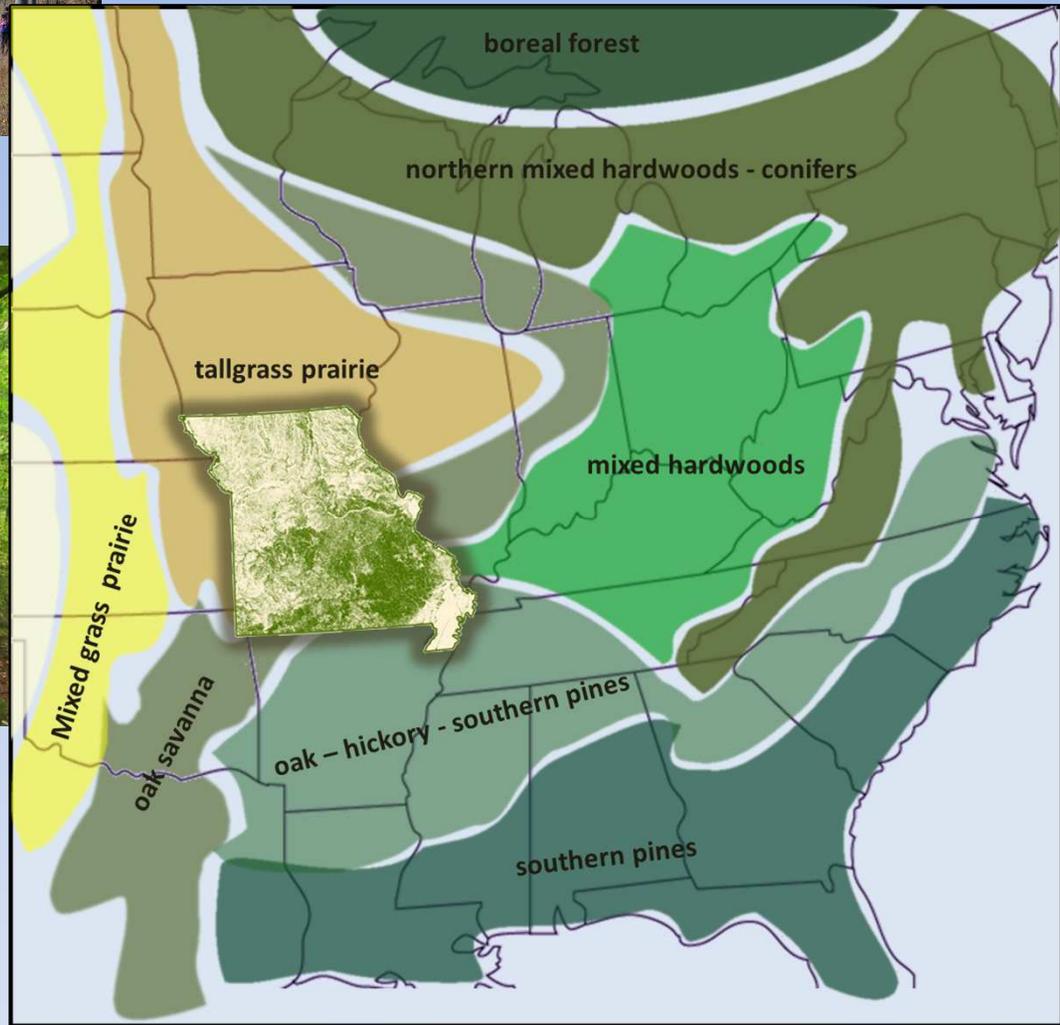
Cooling trend -  
more moisture

Long  
droughts

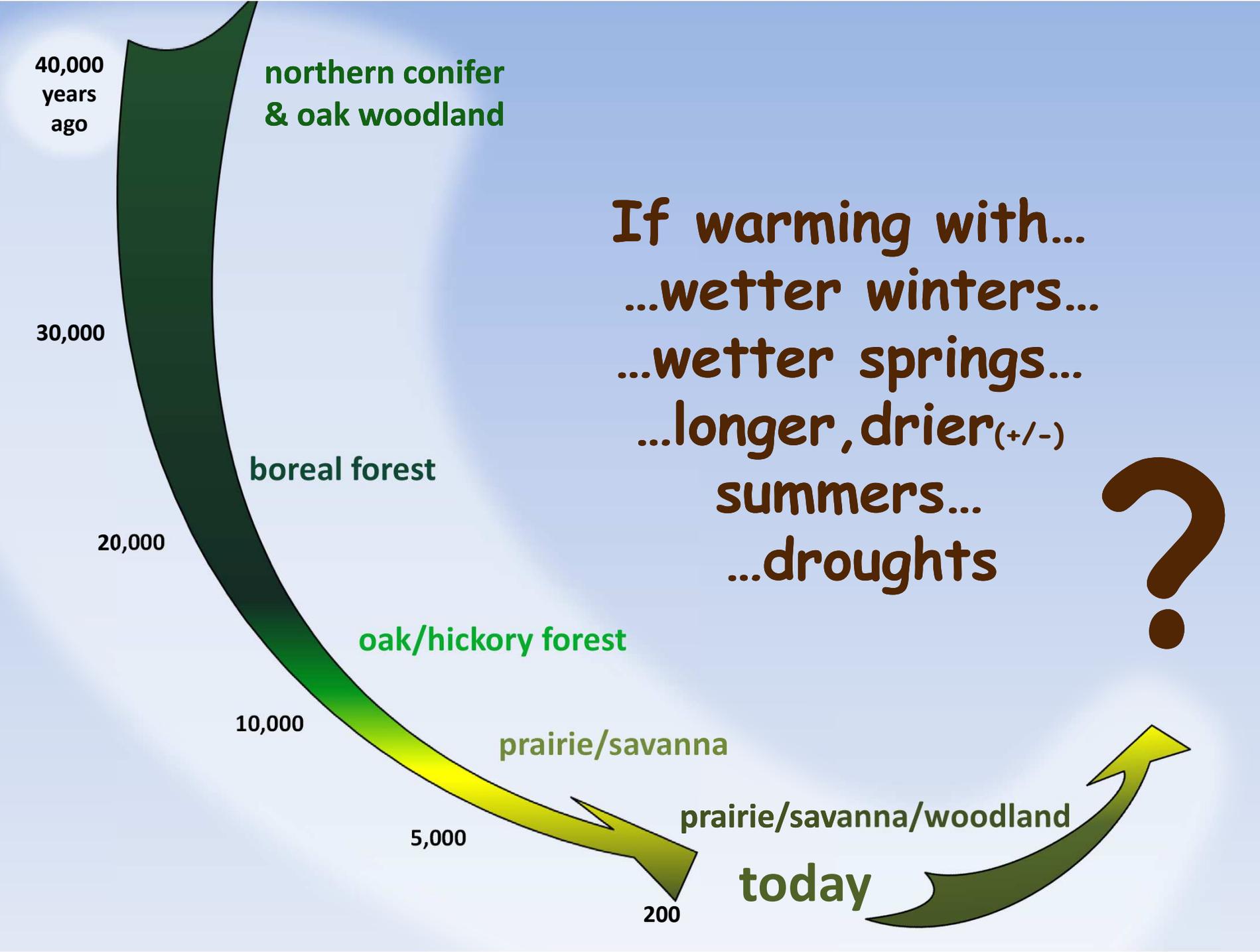


*modern  
climate*

**200 years ago  
through today**

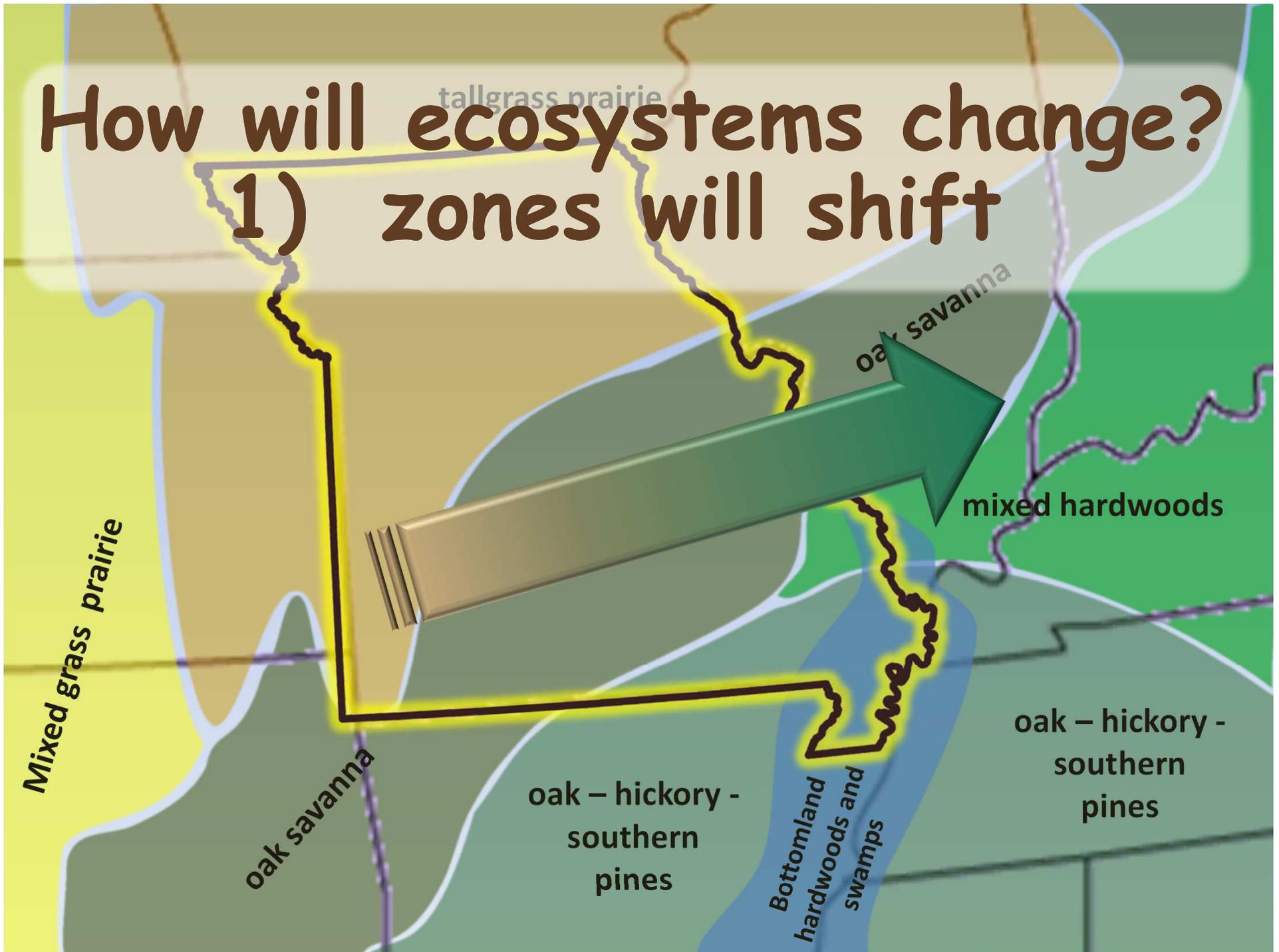


**Cooler and more moist**

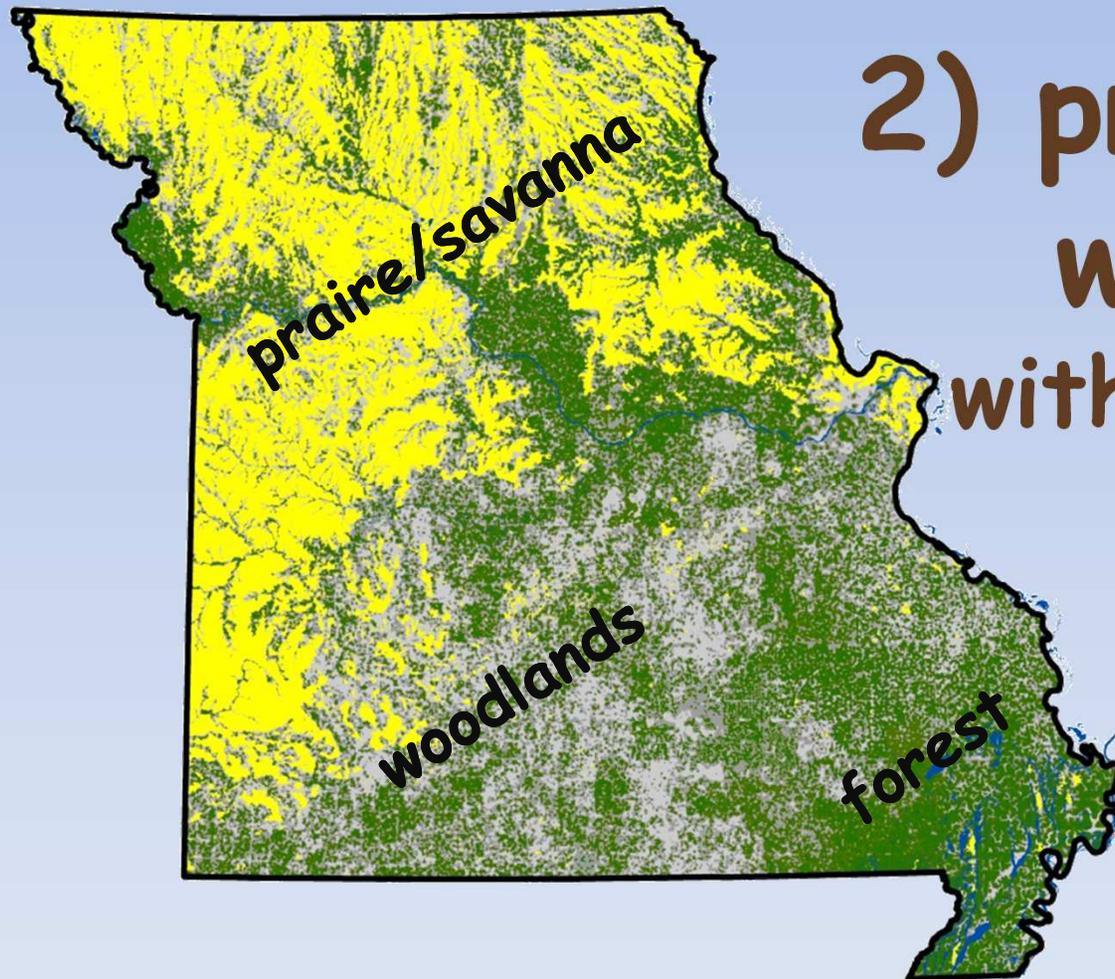


# How will ecosystems change?

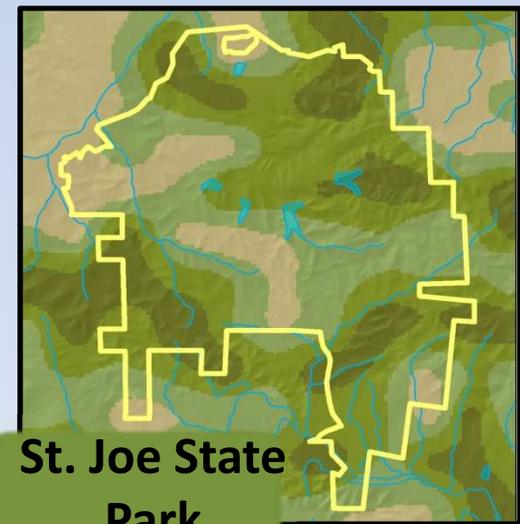
1) zones will shift



# How will ecosystems change?

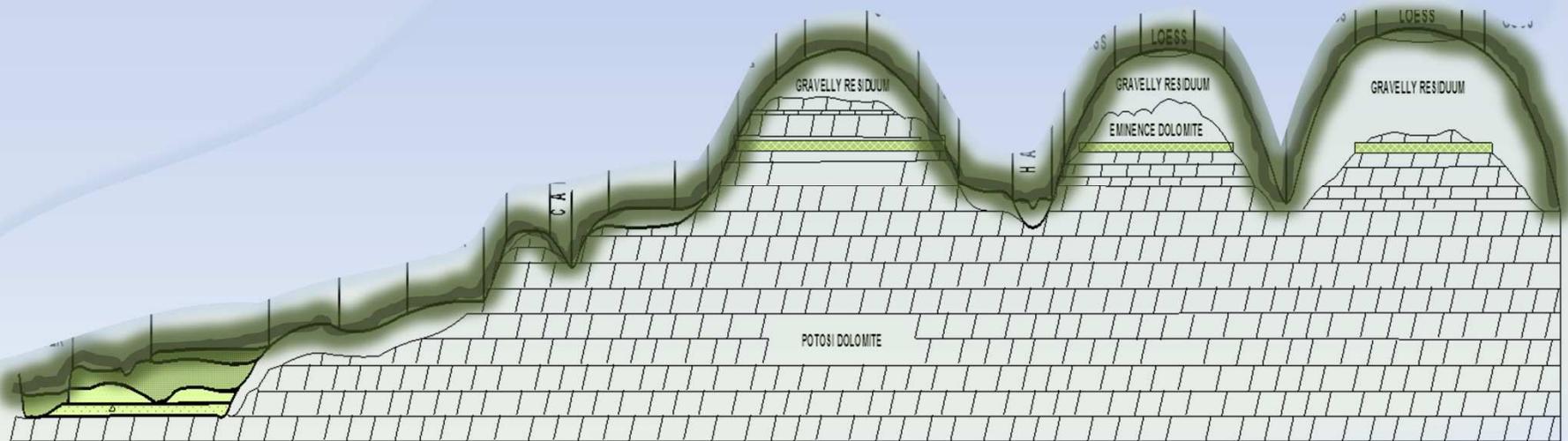


2) proportions will change within each zone



# How will ecosystems change?

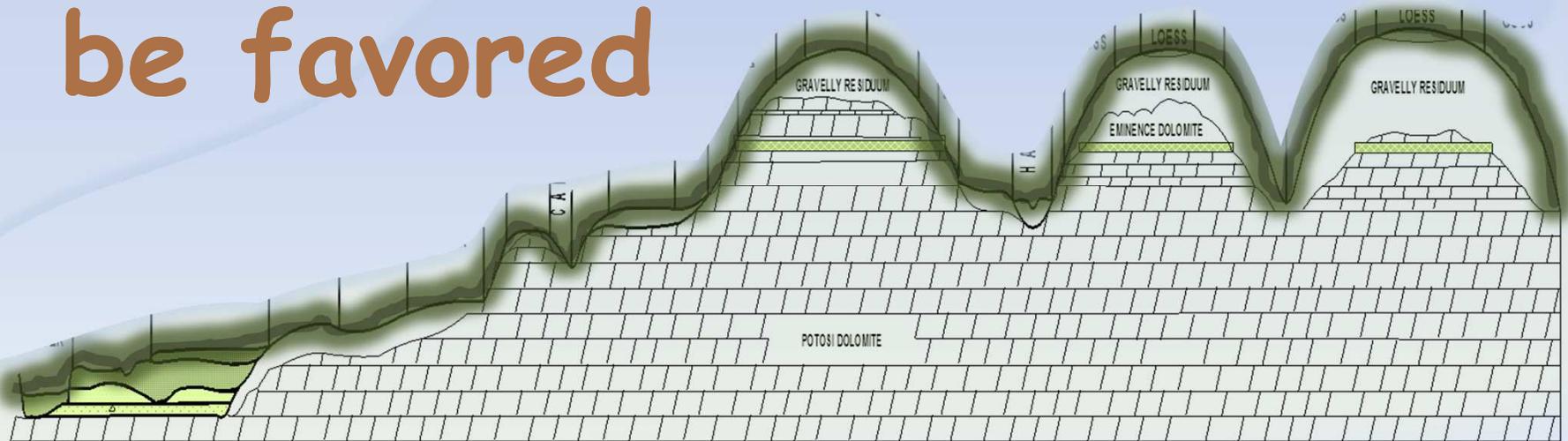
3) Landscape positions will change



# How will ecosystems change?

- Drier systems & southern species will be favored

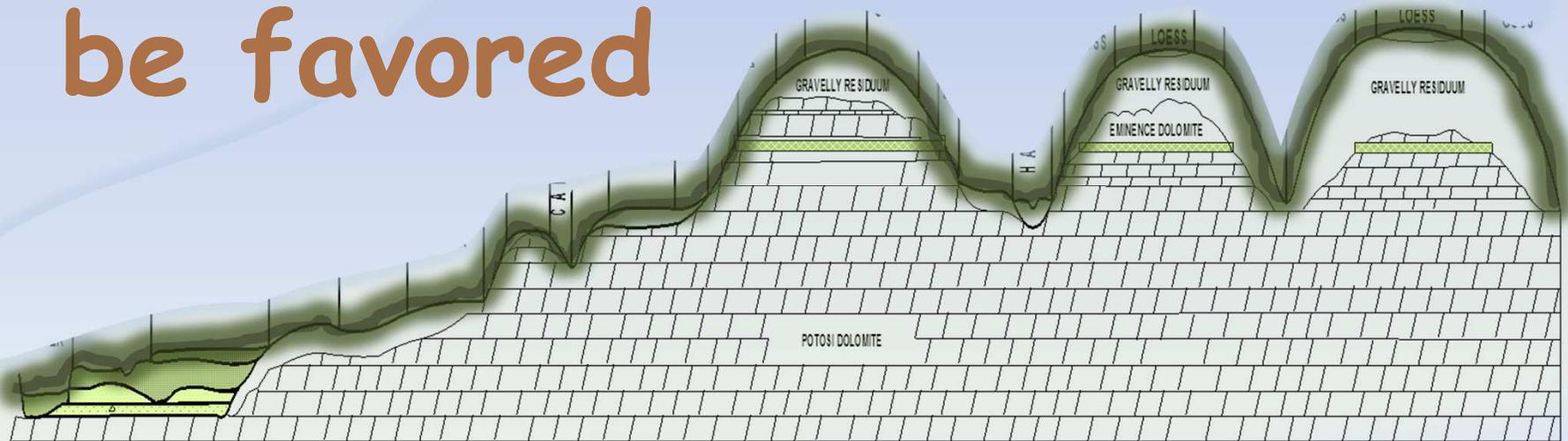
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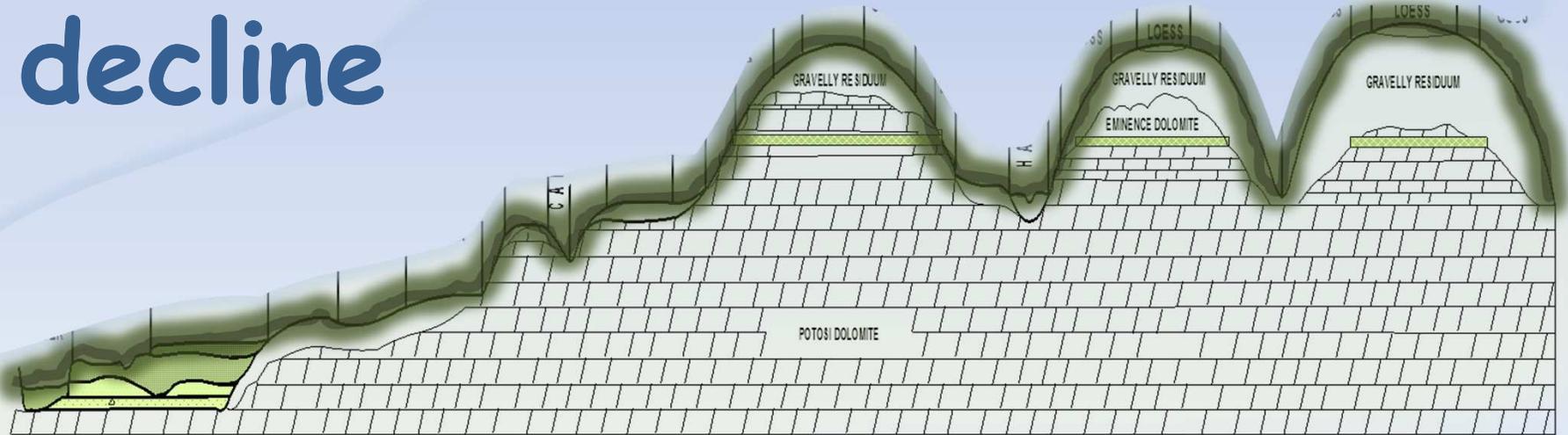
Eg: communities linked to shortleaf pine, post oak, blackjack oak, cedar



# How will ecosystems change?

wetter  
systems &  
northern  
species will  
decline

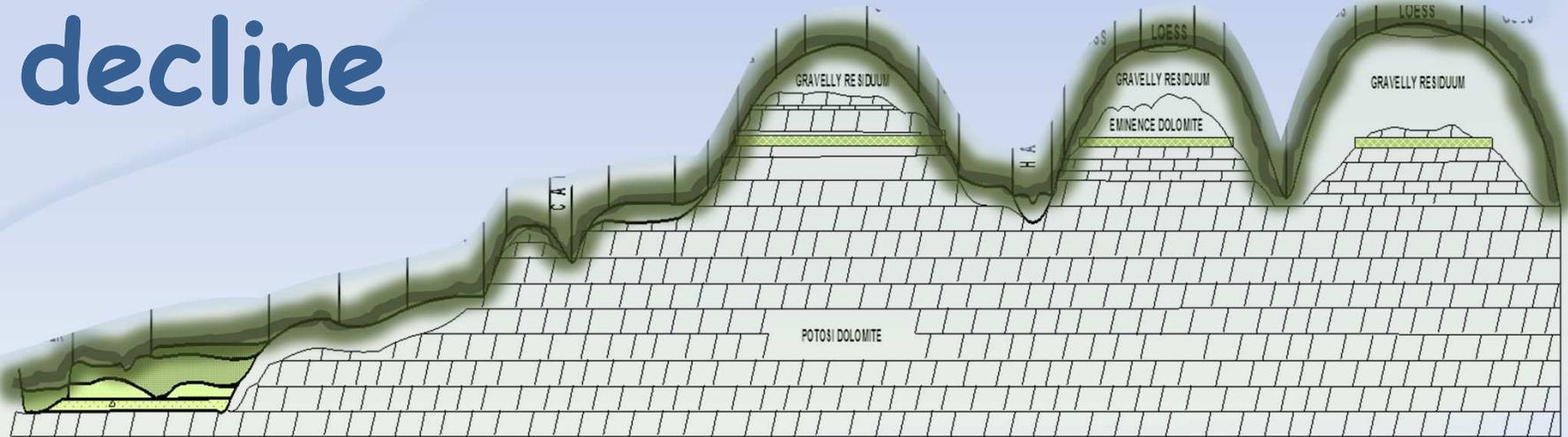
3) Landscape  
positions will  
change



# How will ecosystems change?

wetter  
systems &  
northern  
species will  
decline

Eg: communities linked  
to sugar maple,  
basswood and beech



# What will block ecosystem change?

## 1) Vegetation barriers

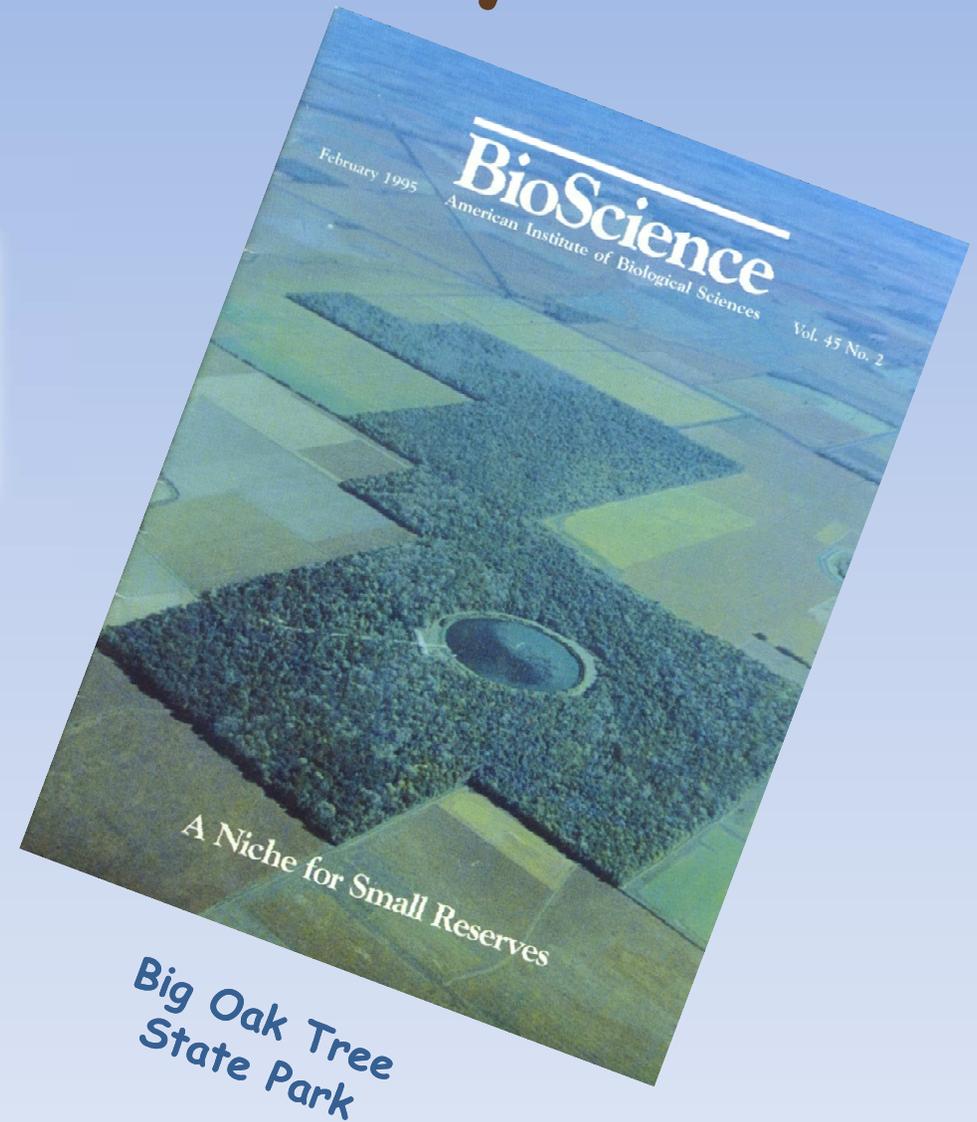


**brown depicts land converted from the native ecosystem**

# What will block ecosystem change?

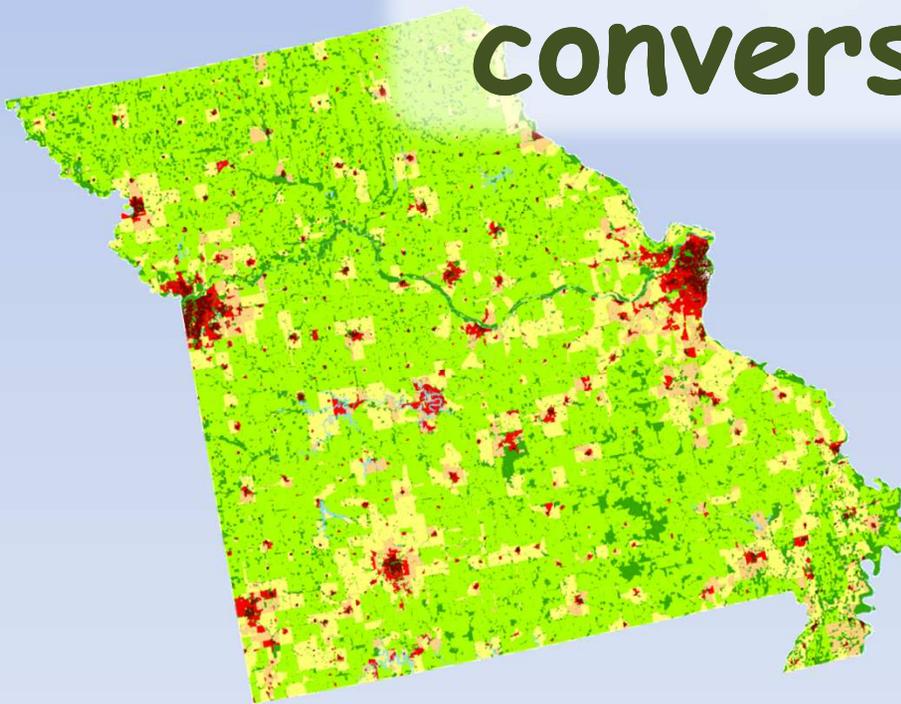
## 1) Vegetation barriers

land-locked systems are at risk

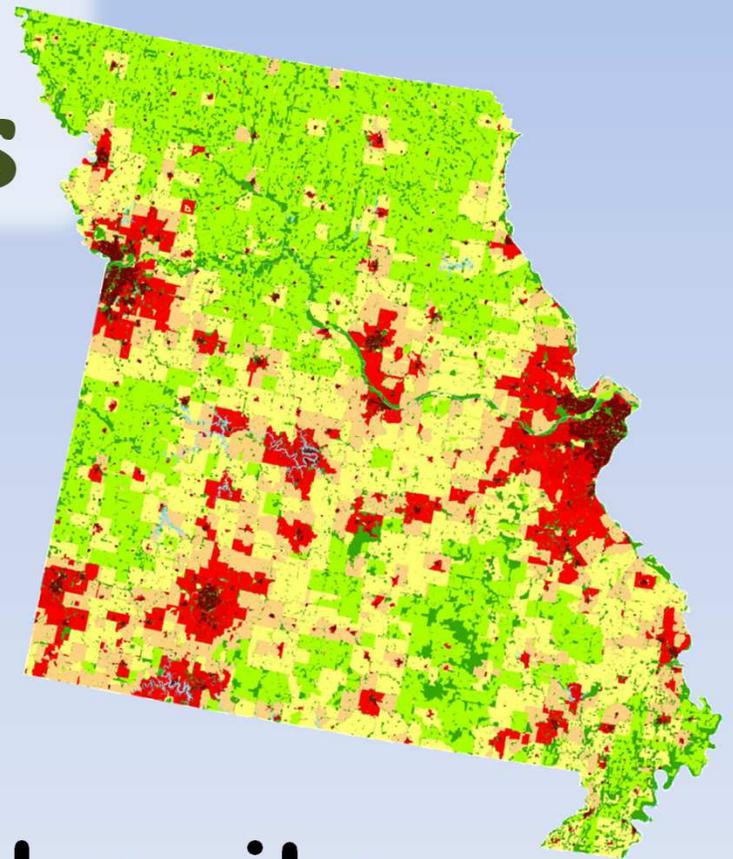


# What will block ecosystem change?

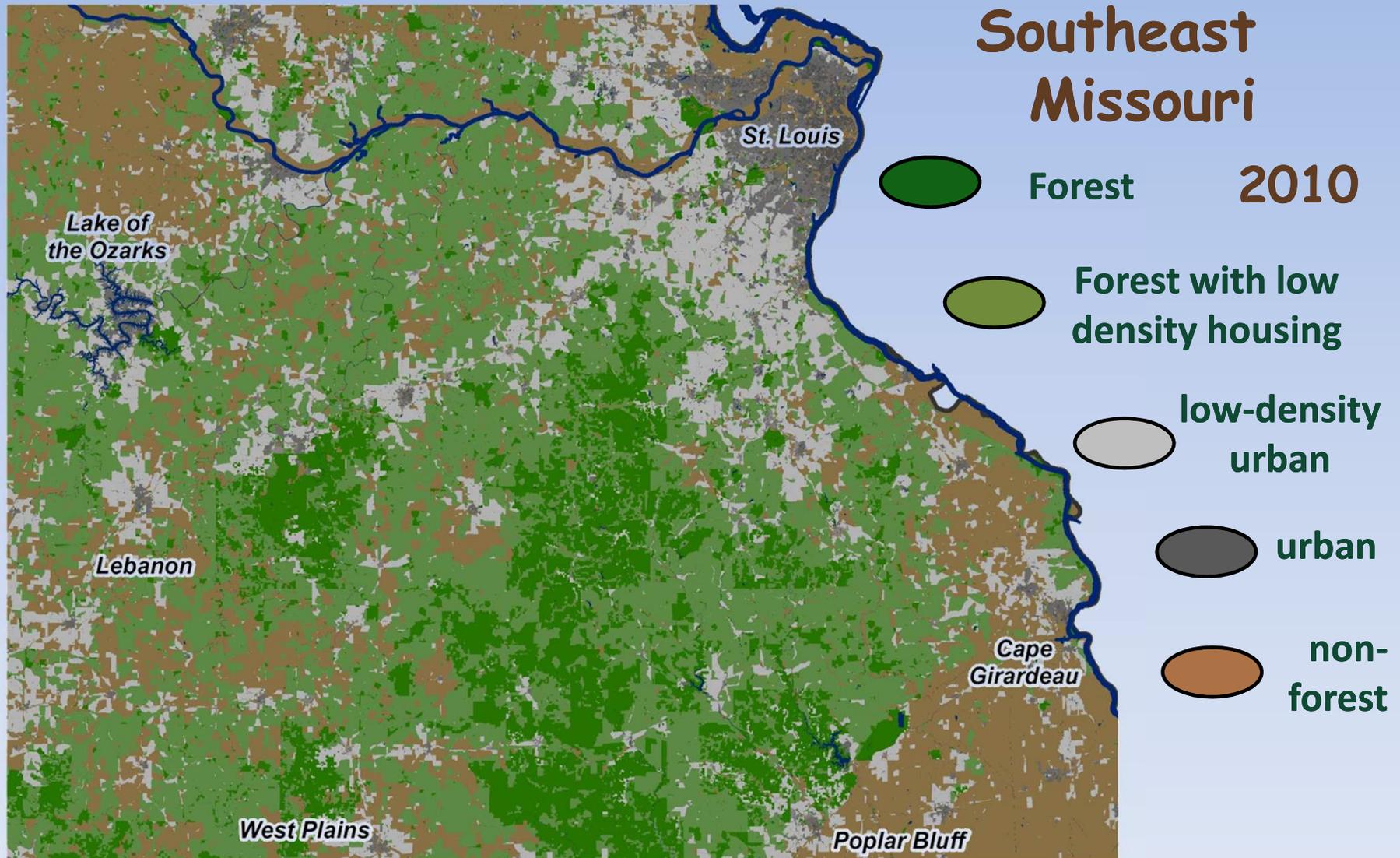
## 2) Land conversions



1960 **Housing density** 2010



# Urban-wildland interface



# What will block ecosystem change?

## 3) Reduced content and quality

fewer  
species =  
less  
resilient



# What will block ecosystem change?

## 3) Reduced content and quality



Eg: historic land use

# What will block ecosystem change?

## 3) Reduced content and quality



Eg: altered modern form

# What will block ecosystem change?

## 3) Reduced content and quality



Eg: lost natural processes

# What will block ecosystem change?

## 3) Reduced content and quality



Eg: exotic species

# Recommendations

1) Protect species richness and abundance

2) Manage natural communities

3) Prevent homogenization

4) Counter invasive plants and animals

5) Value size and quantity

6) Seek quality and continuity



