

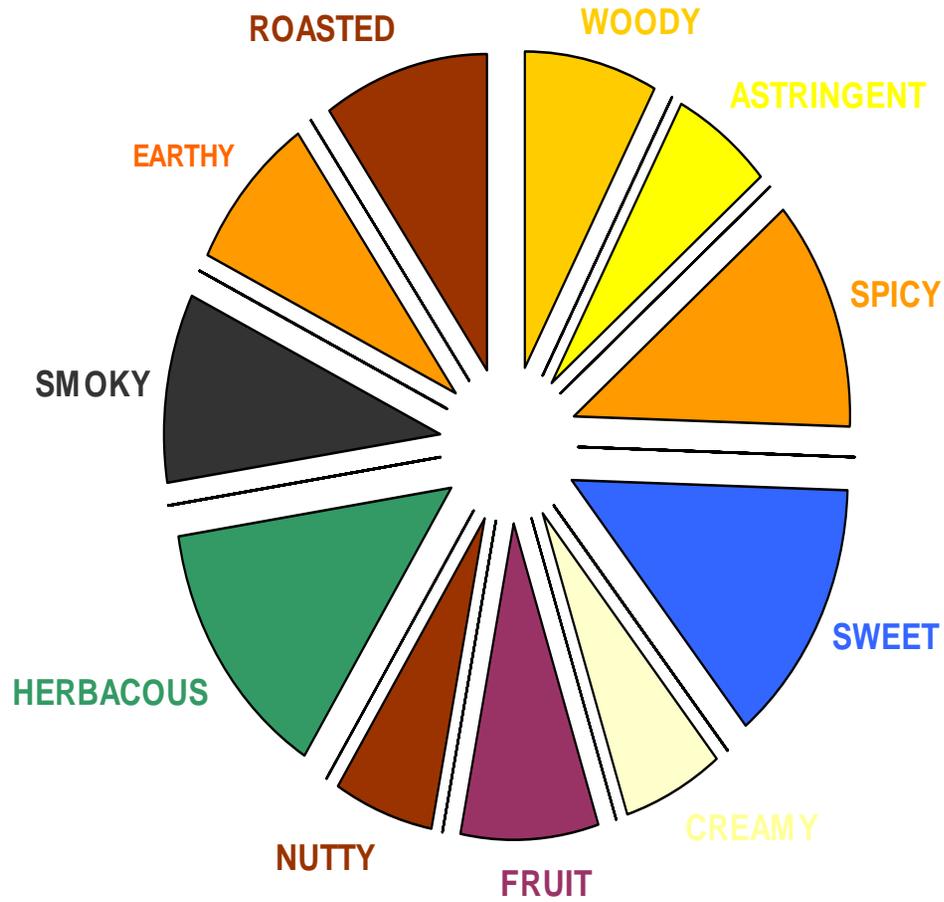
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# MY CHARGE & BASIC QUESTIONS

- So, What's in a Barrel?
  - Why are there so many oak species in Missouri?
  - How do oaks establish?
  - Which oaks are found in Missouri?
  - Describe the growth of Missouri oaks.
  - Describe aspects of the Missouri Wood Products Industry.
-

# FLAVORS DERIVED FROM THE OAK & FLAVORS FROM THE TOAST

From World cooperage Flavor Wheel



# FLAVORS FROM THE OAK & TOAST

WOODY	FRUIT	ROASTED	EARTHY	SMOKY	SPICY	HERBACEOUS	SWEET
Cedar	Berries	Cedar	Shoe box	Cigar	Vanilla	Bell pepper	Carmel
Resin	Citrus	Graham cracker	Leather	Barbecue	Clove	Fresh cut hay	Chocolate
Sawdust	Cherry	Coffee	Mushroom	Grilled meat	Cinnamon	Mint	Molasses
Pencil shavings	Rasin	Toasted bread	Fresh soil	Smoke	Anise	Tobacco	Toffee
		Cereal			Nutmeg	Tea	Bourbon
ASTRINGENT	NUTTY	CREAMY			Black pepper	Green beans	Hot fudge
Drying	Almond	Vanilla				Black olive	Butterscotch
Tanic	Walnut	butter					
Bitter	Hazelnut	Lactic					

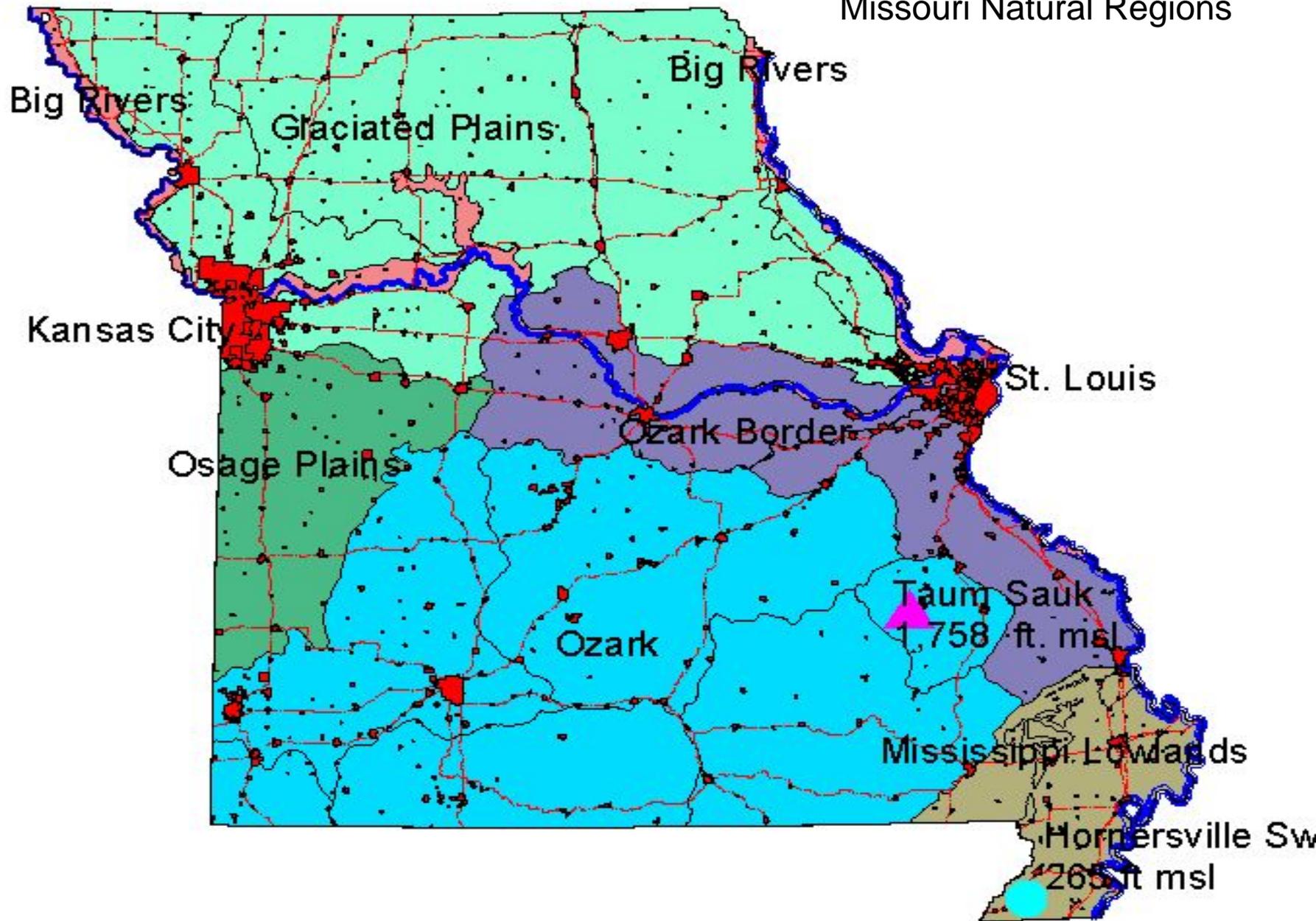
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# Welcome to Missouri: A brief tour

- Location
  - Geography
  - Climate
  - Familiar Places
-

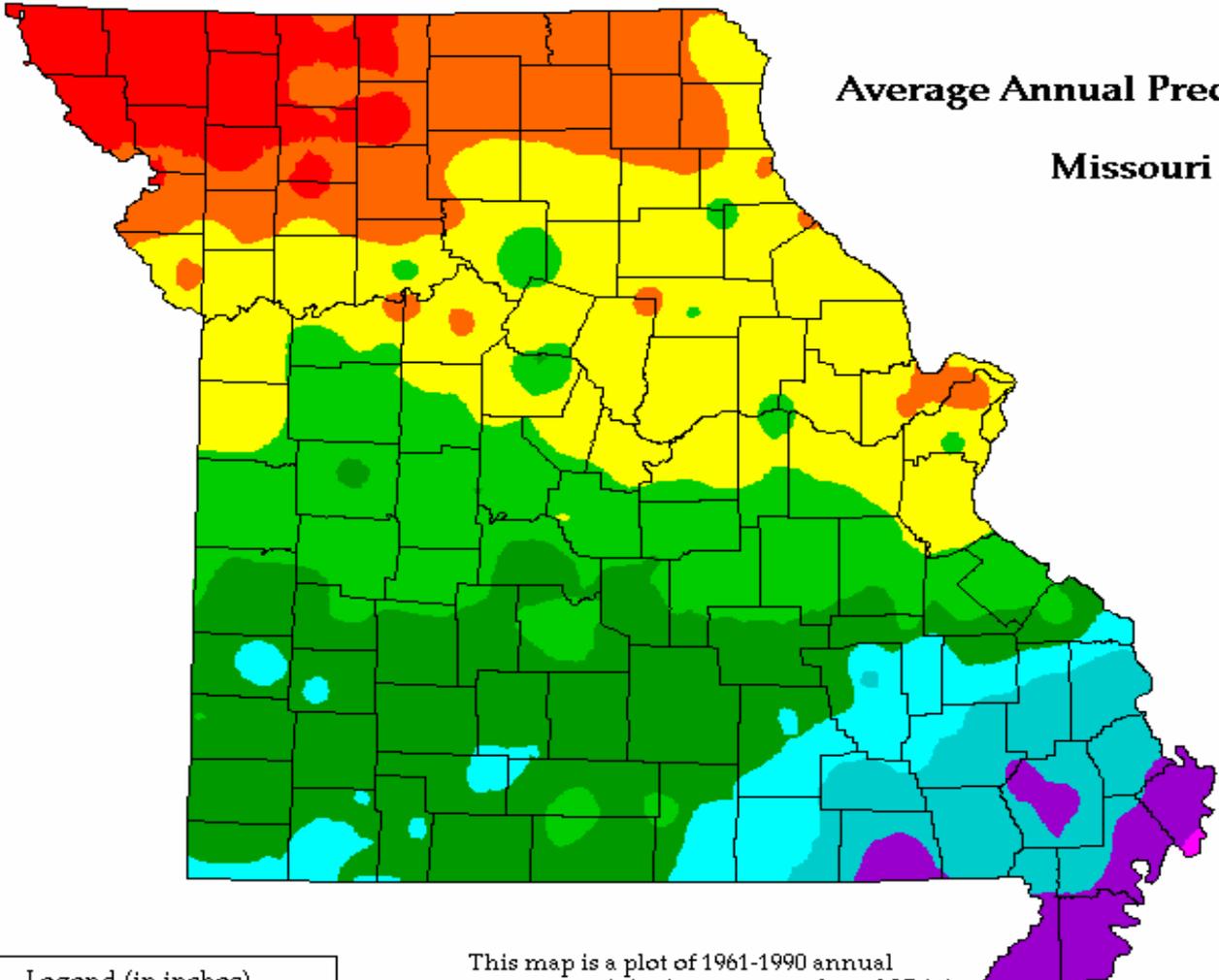


# Missouri Natural Regions



# Average Annual Precipitation

## Missouri



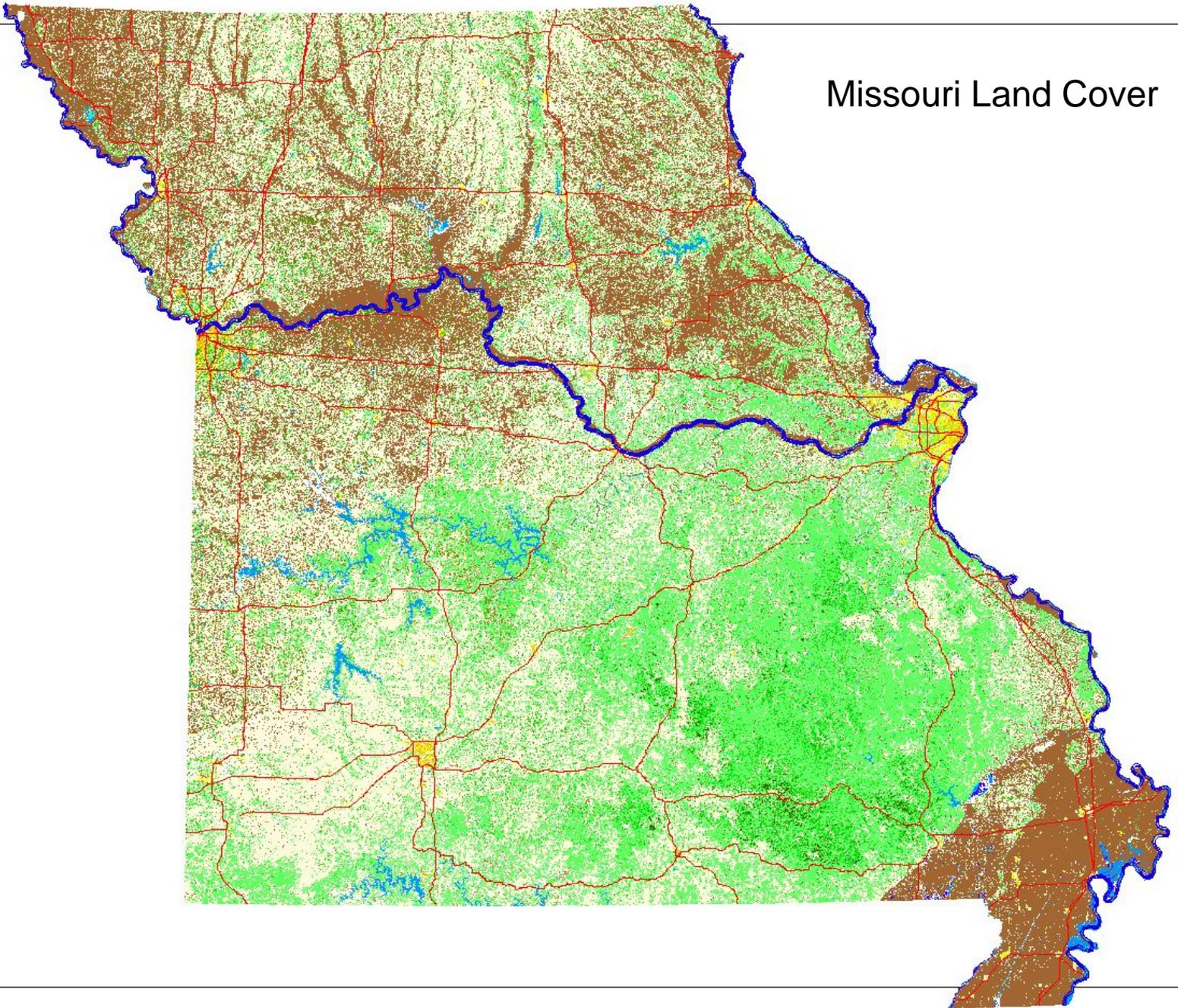
Legend (in inches)

Under 36	44 to 46
36 to 38	46 to 48
38 to 40	48 to 50
40 to 42	Above 50
42 to 44	

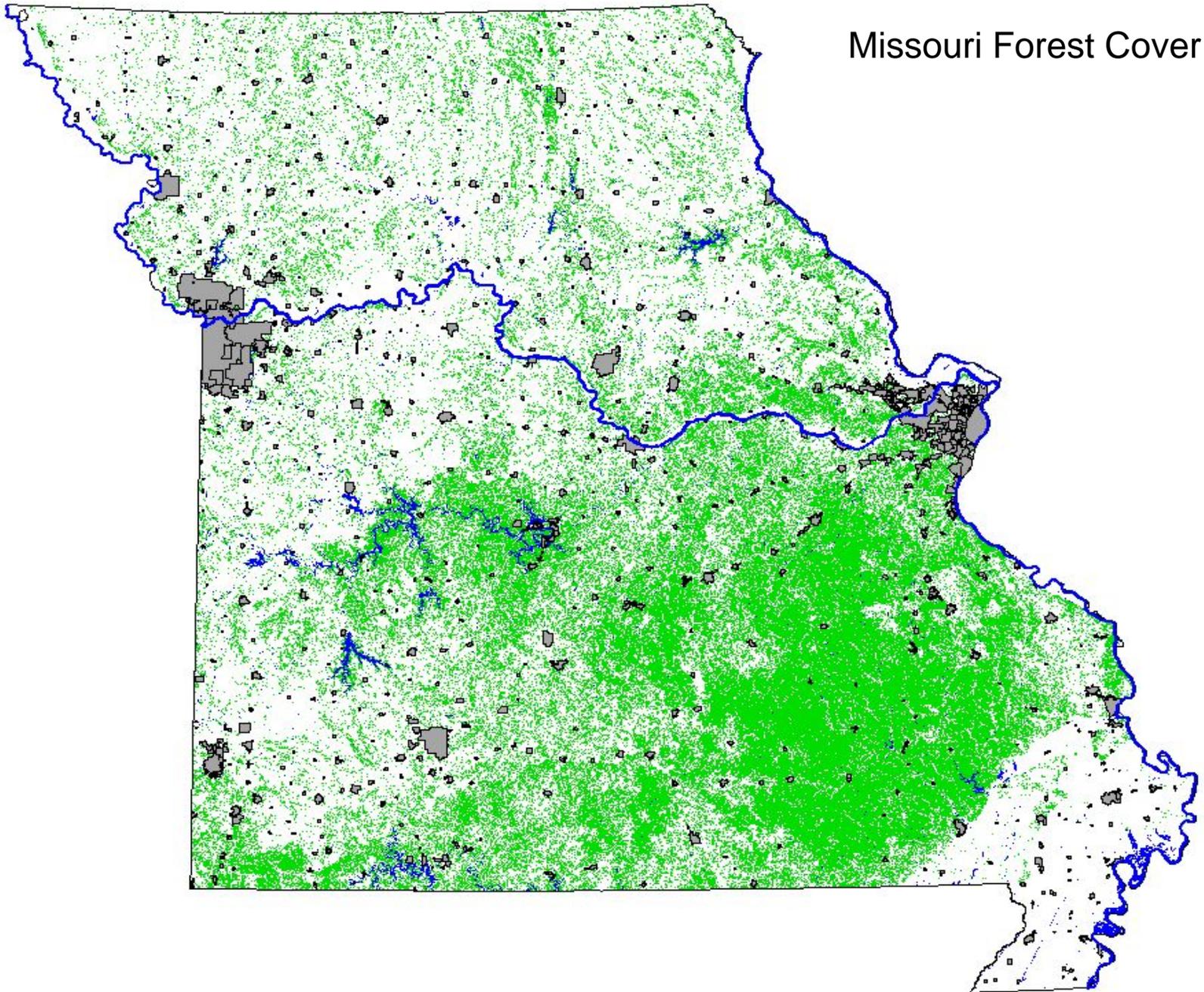
Period: 1961-1990

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by NRCS Water and Climate Center.

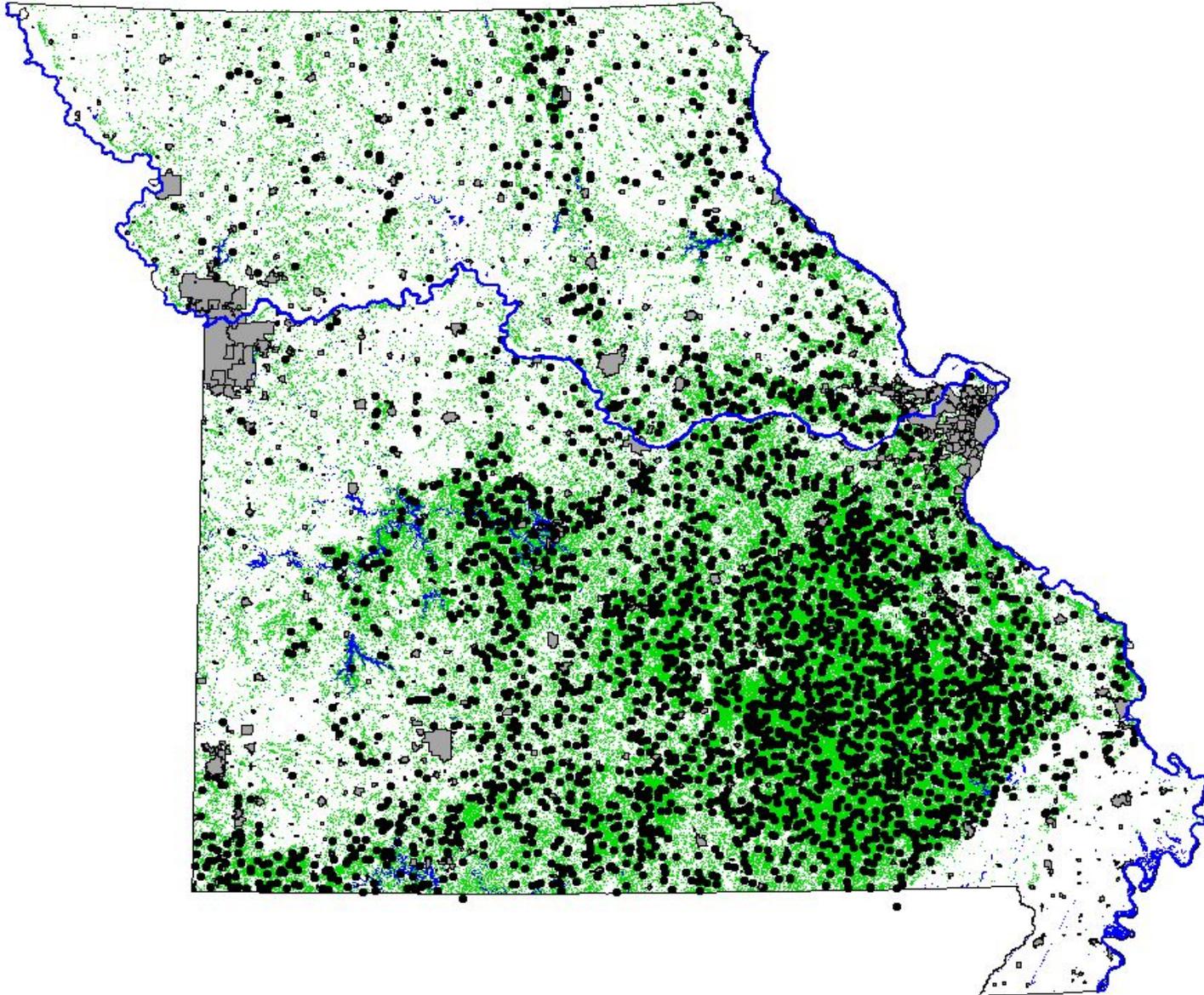
# Missouri Land Cover



# Missouri Forest Cover

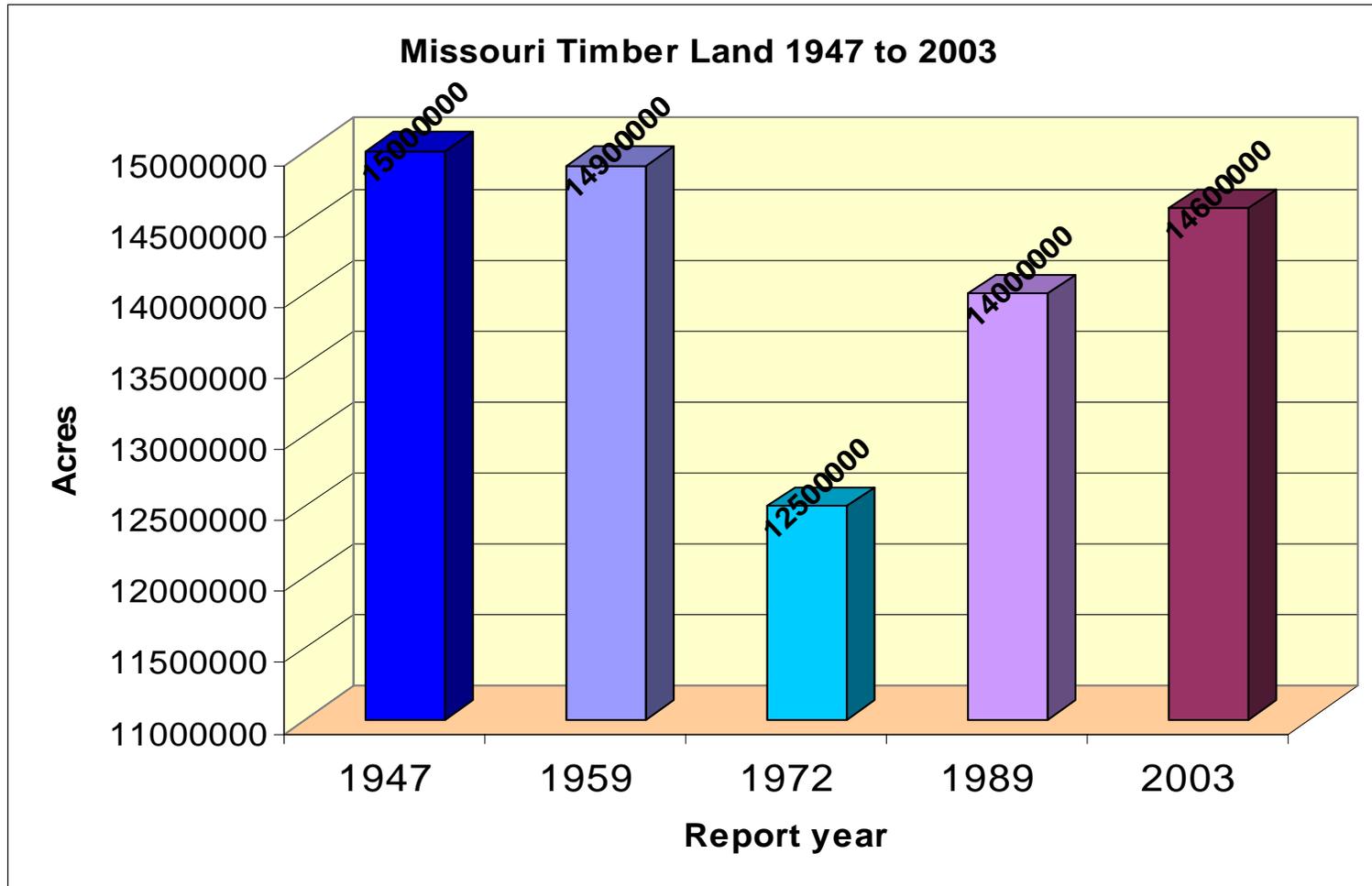


# Forest Inventory-- plots with white oak



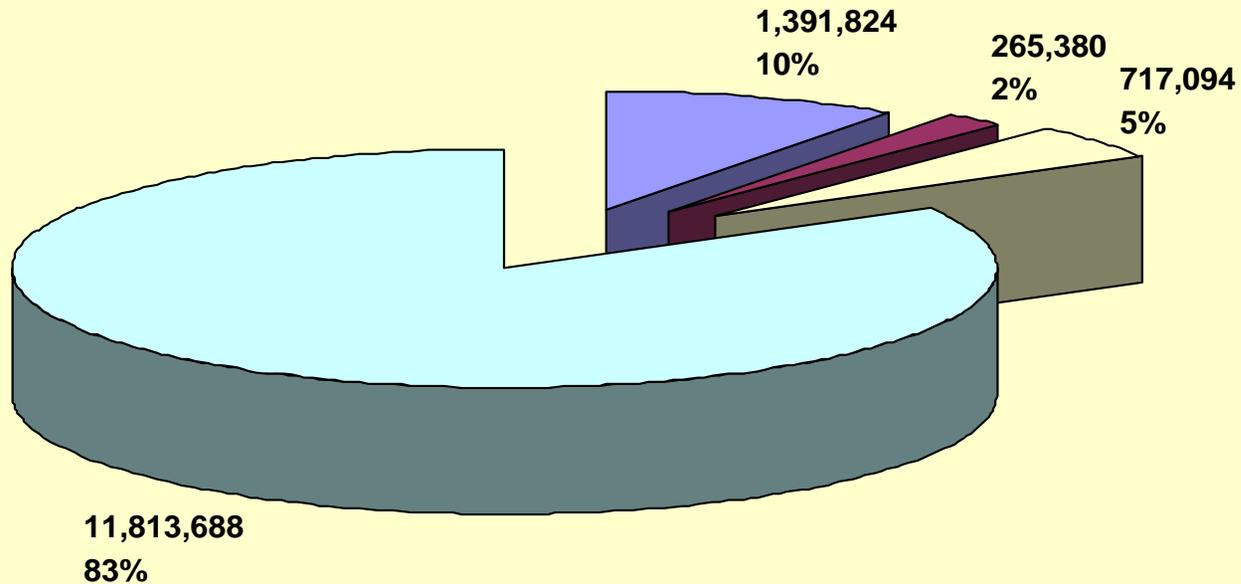
# Historical Perspective – 56 Years

Millions of Acres of Timberland (2003 data set)

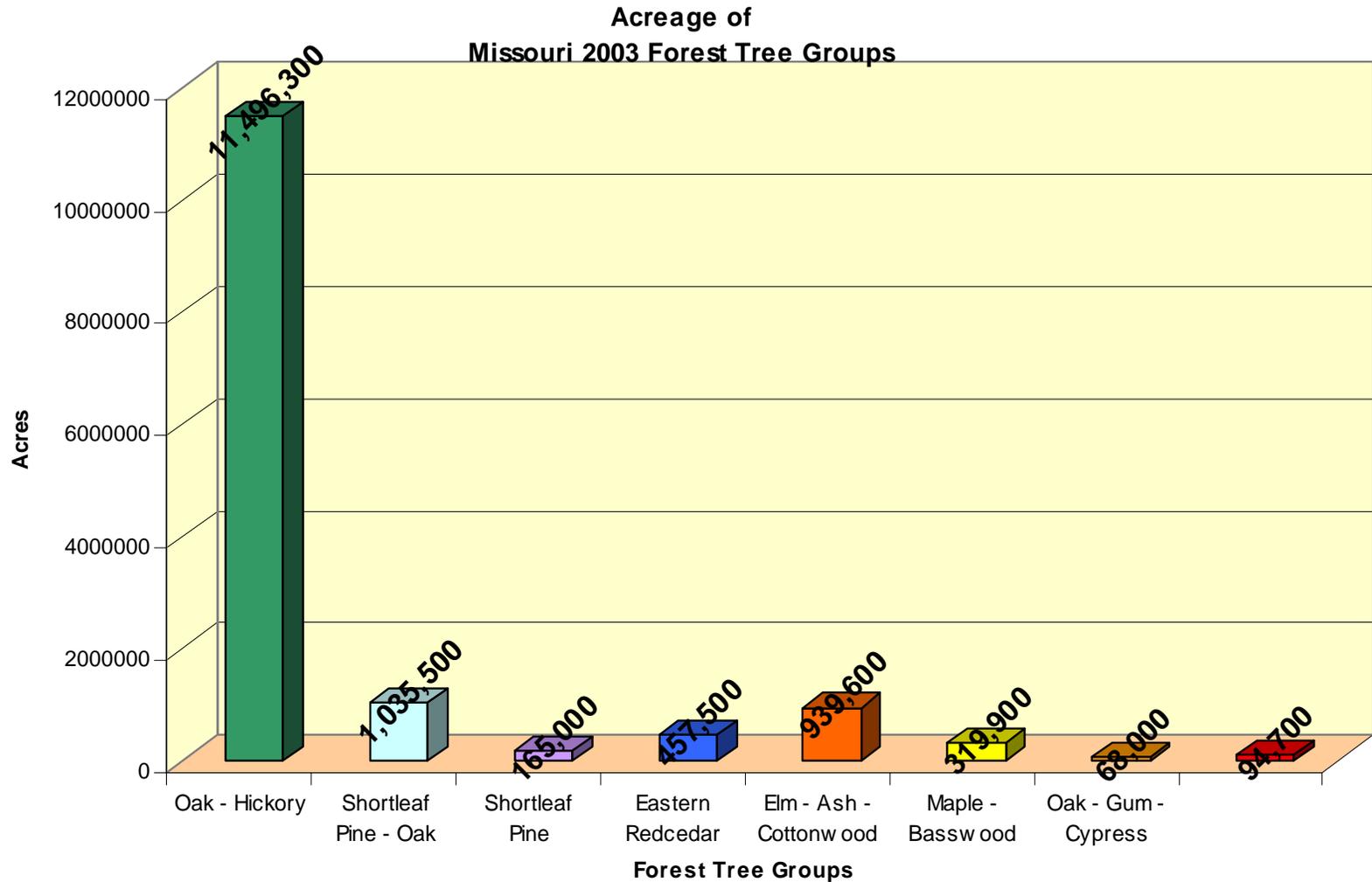


# Ownership of Missouri's Timberland

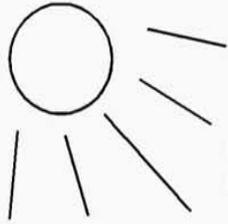
Ownership of Missouri Timber Land



# Area of Forest Types



# CURRENT RIVER OAK-PINE HILLS LTA UPLAND ECOLOGICAL MANAGEMENT GROUPS & ELT-Ps



Pine-Oak/Vaccinium  
Dry Ultic Woodland

2.1(2.2) 1.1 & 1.2 2.1

Mixed Oak-Hickory/Dogwood  
Dry-mesic Ultic Forest

3.1

1.3

Oak-Hardwood/Spicebush  
Mesic Dolomite Forest

Dolomite Glade/Woodland  
Complex

Pine-Oak/Vaccin  
Dry Ultic Woodla

Pine-Oak/Vaccinium  
Dry Ultic Woodland

Roubidoux

7.1 to 7.3

8.1

2.3

3.2/5.2

2.3

2.4

Upper Gasconade

4.2/6.2

Cryptozoan Reef

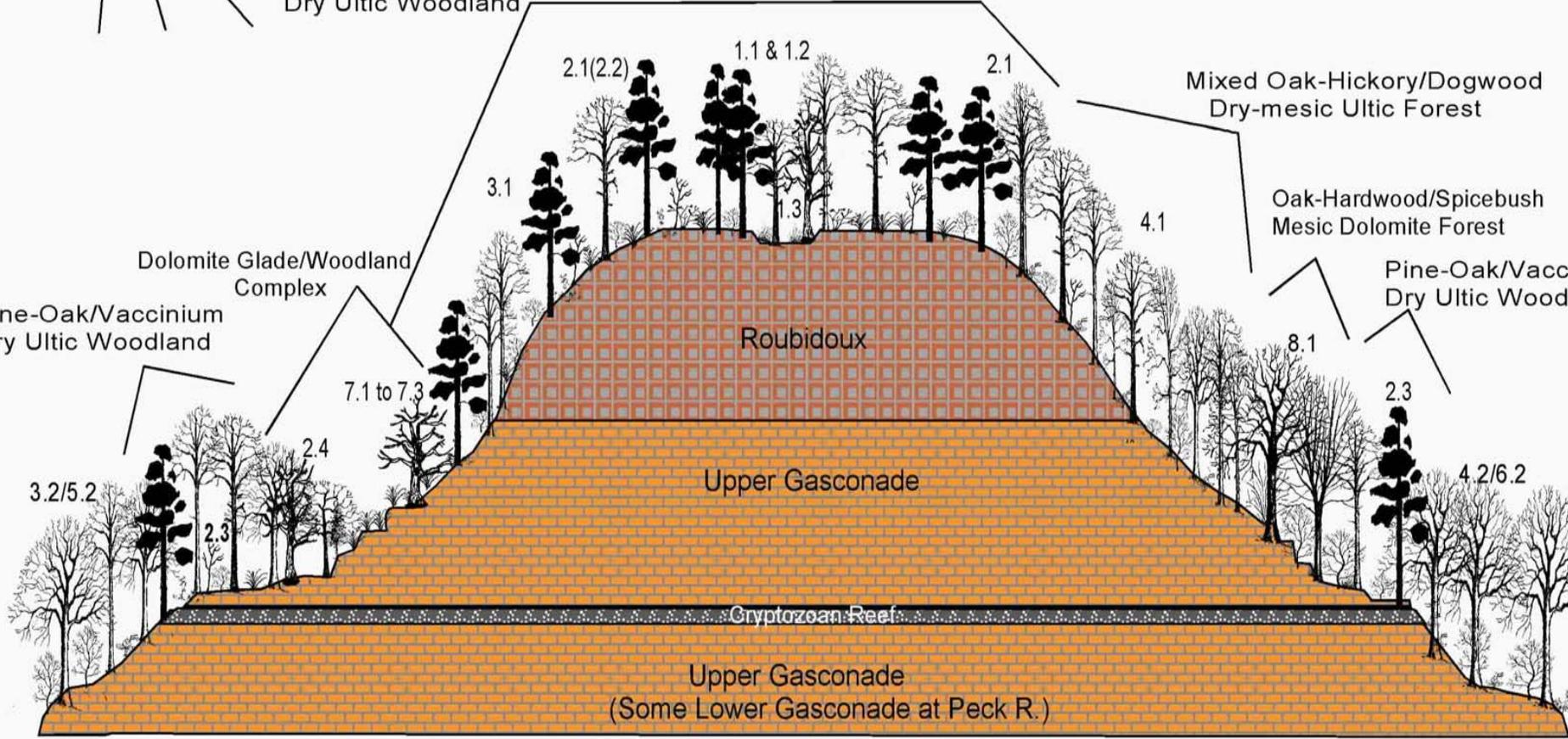
Upper Gasconade  
(Some Lower Gasconade at Peck R.)

\*\*Note: At Peck Ranch, some low slopes are in Lower Gasconade with Alfic ELTPs

10

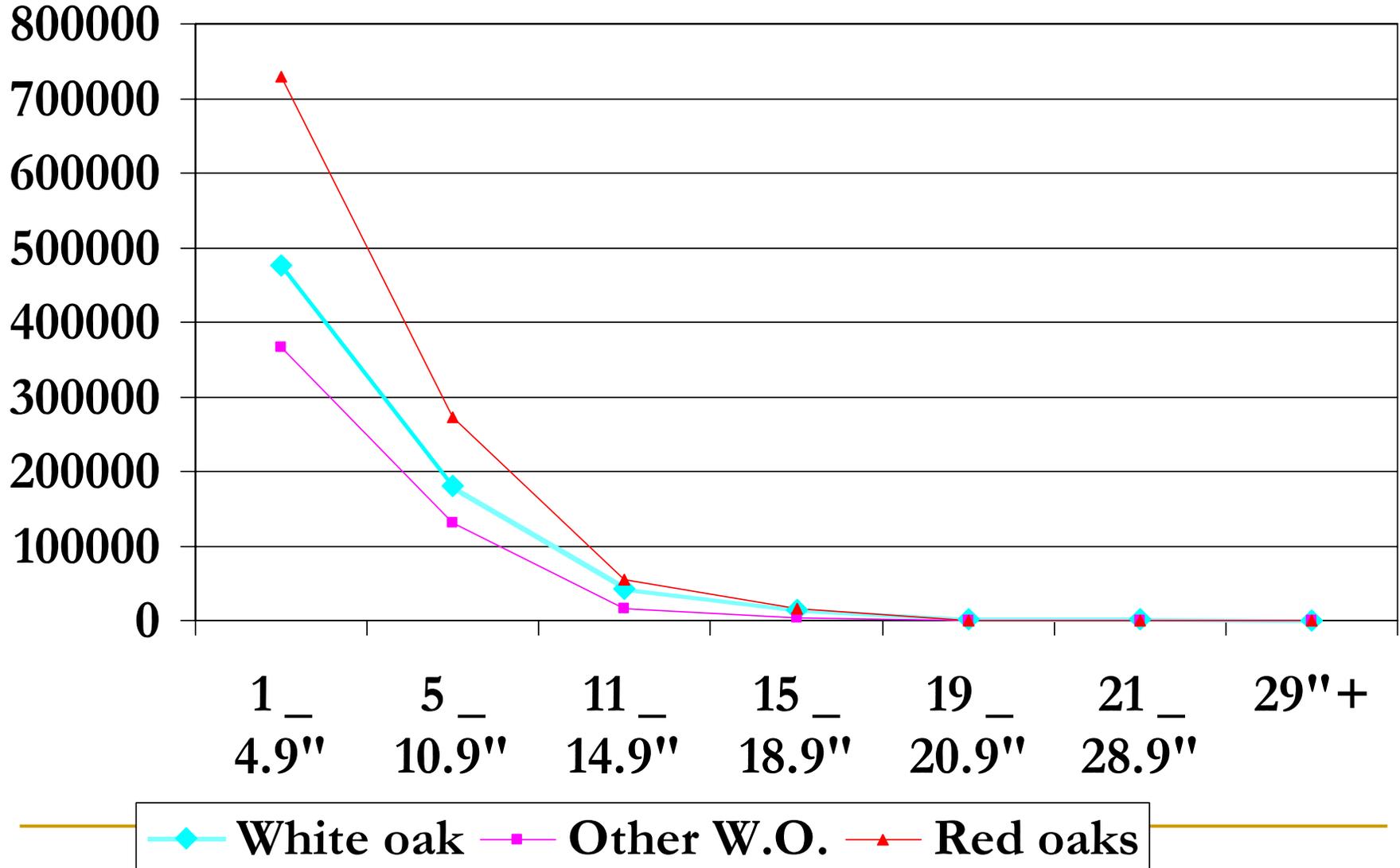
Mixed Oak-Pine/Desmodium, Vaccinium  
Dry-mesic Alfic Forest

White (Red)Oak/Dogwood  
Dry-mesic Alfic Forest



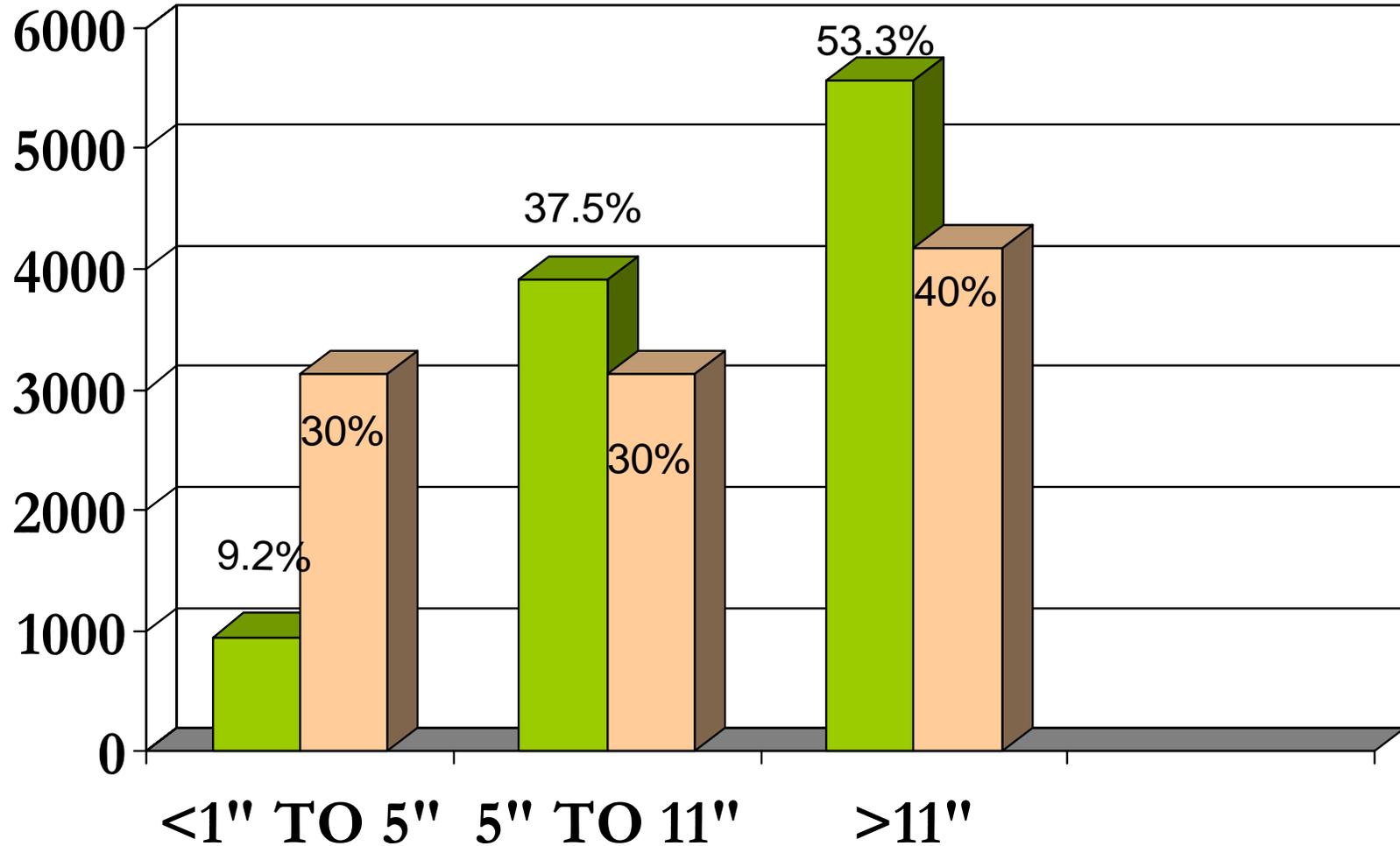
# Number of Growing Stock Trees

Thousands of Trees



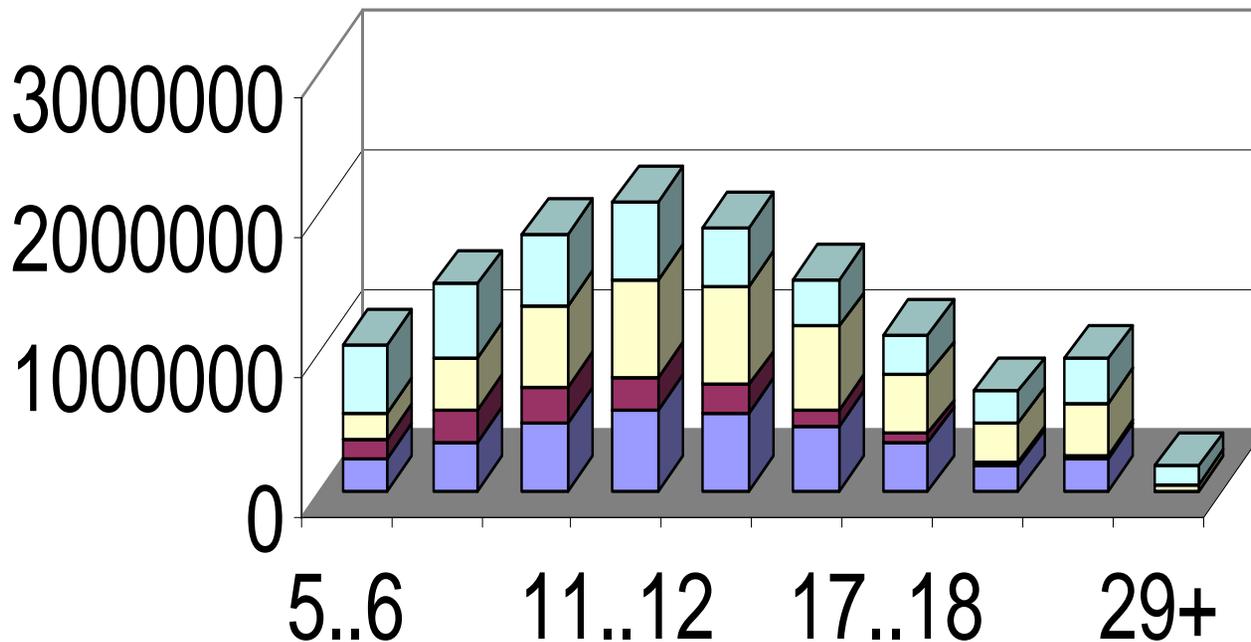
# Timberland Area by Forest Type

Thousand Acres

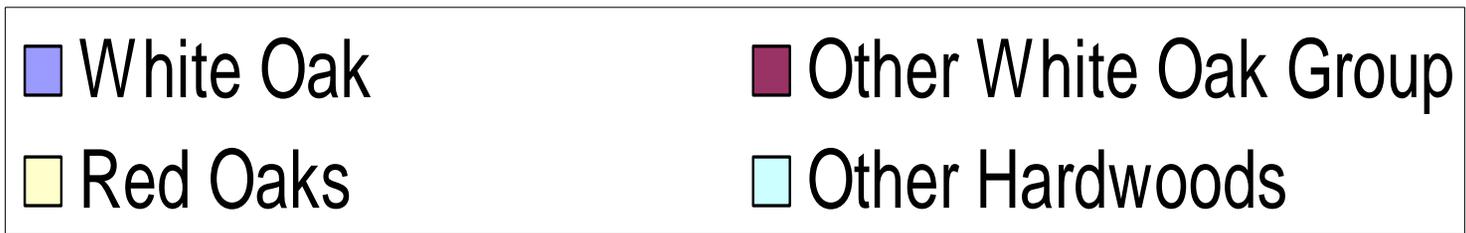


■ OAK-HICKORY ■ IDEAL

# Cubic Foot Volume in Thousand Cubic Feet in Live Trees

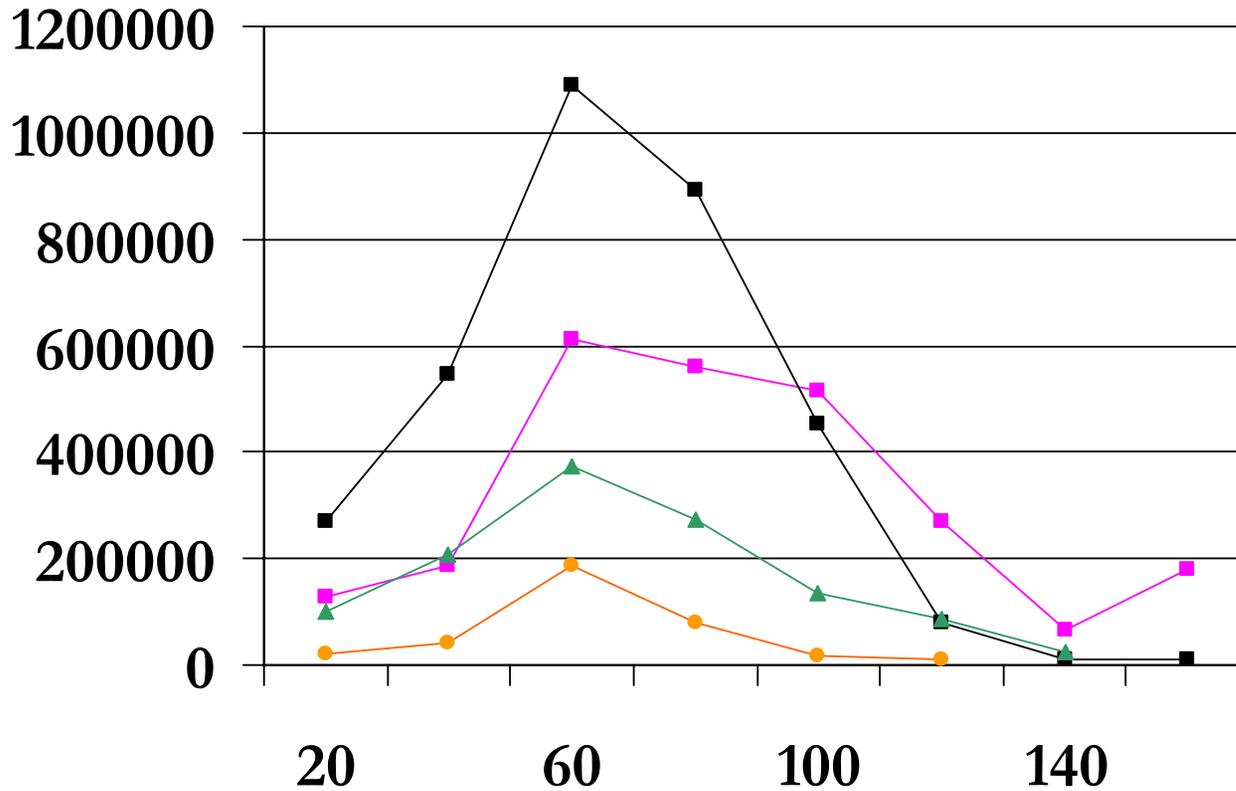


## Diameter Classes



# Growing Stock Age Classes by Forest Type

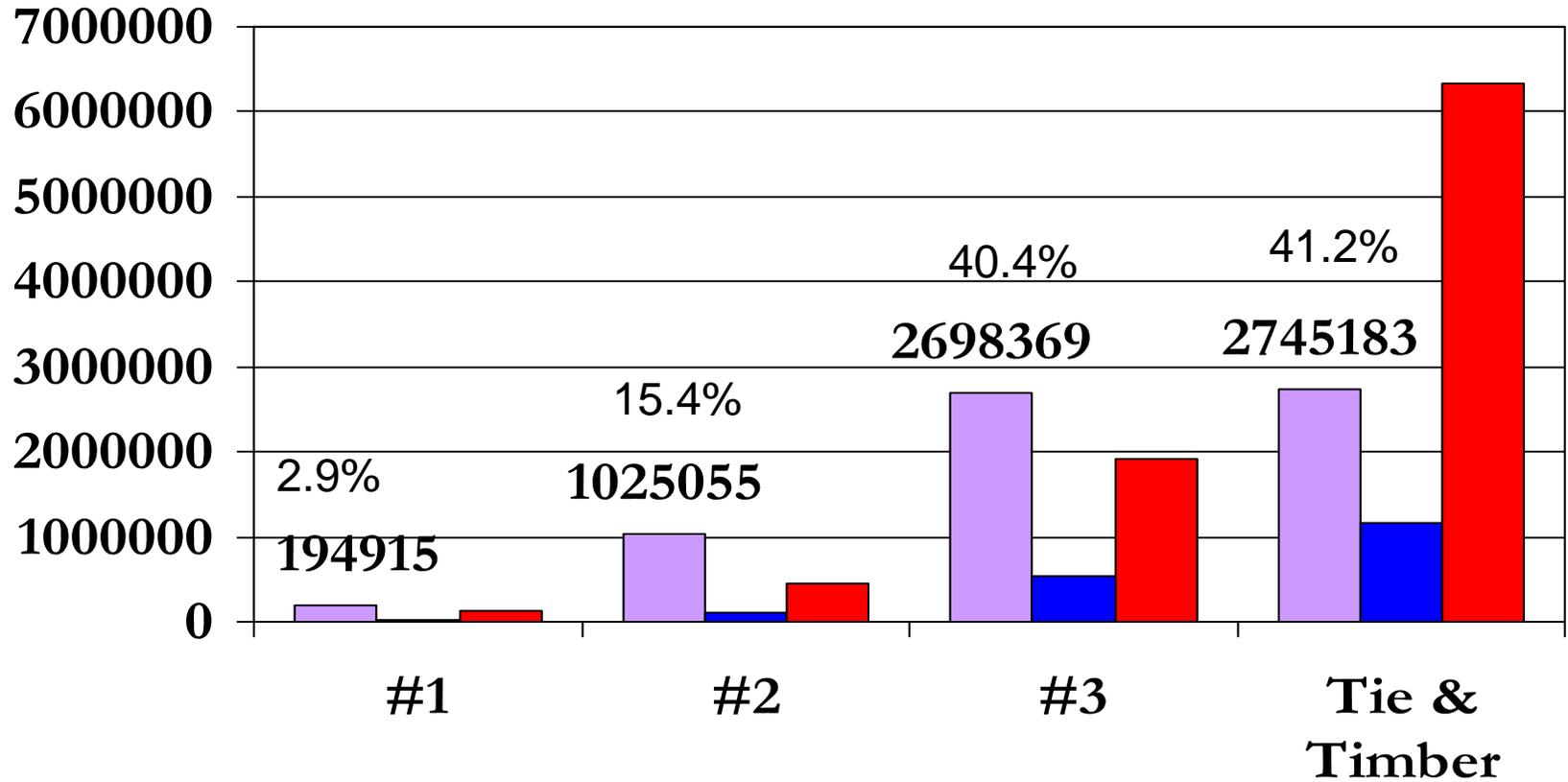
Thousands of Cubic feet



—■ White Oak —■ Black-Scarlet —▲ Post-Blackjack —● Pine-Oak

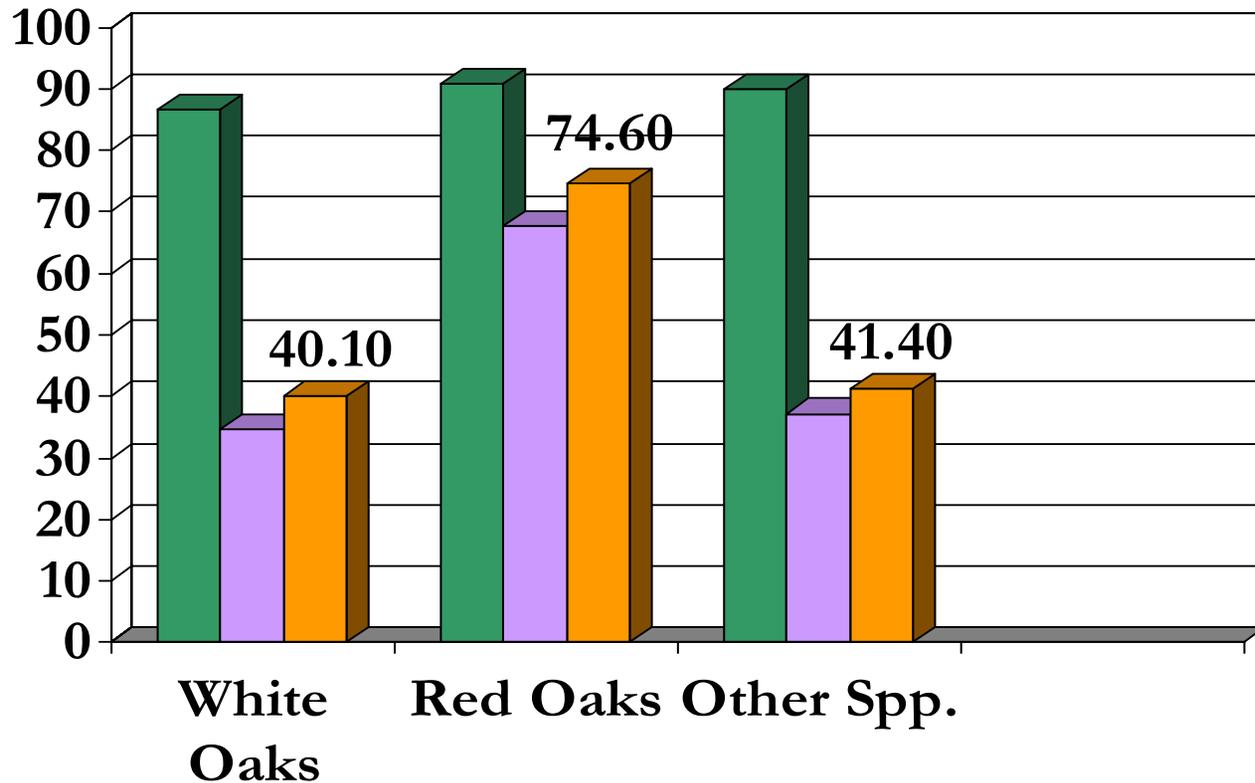
# Oak Volume by log Grade

in Thousand Boardfeet



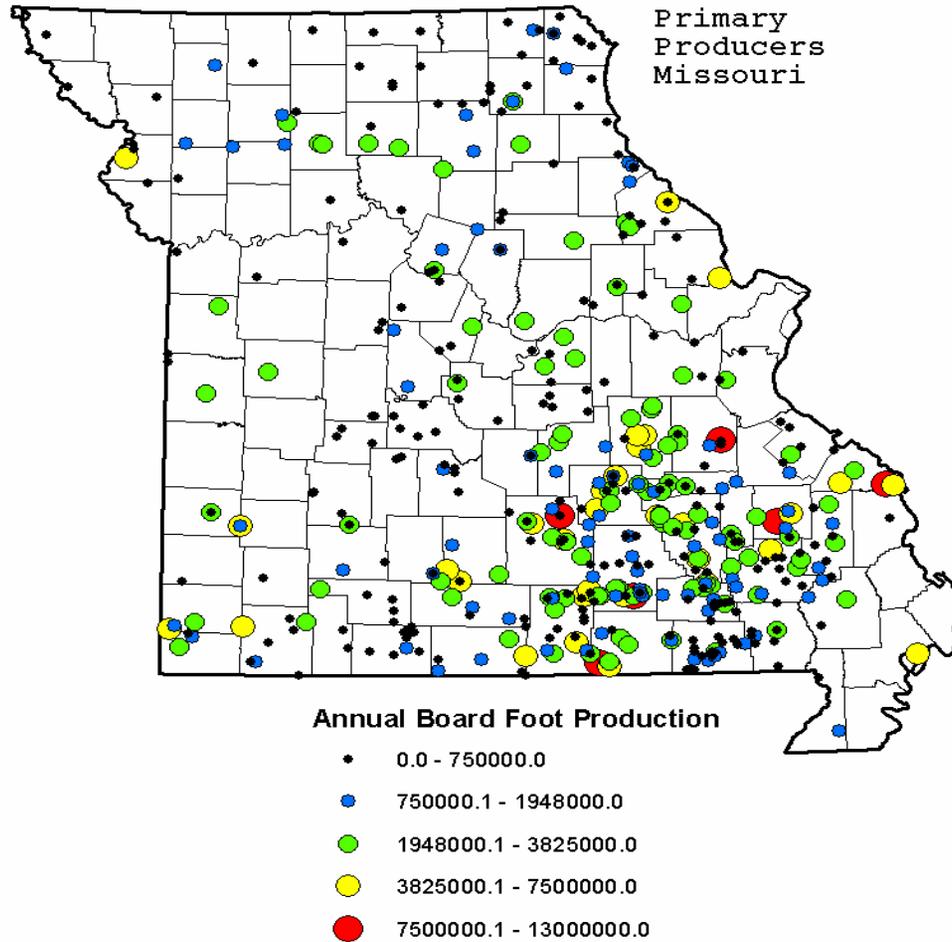
White Oak WO Group Red Oaks

# Average Annual Growth on Growing Stock and Removals in Million Cubic Feet



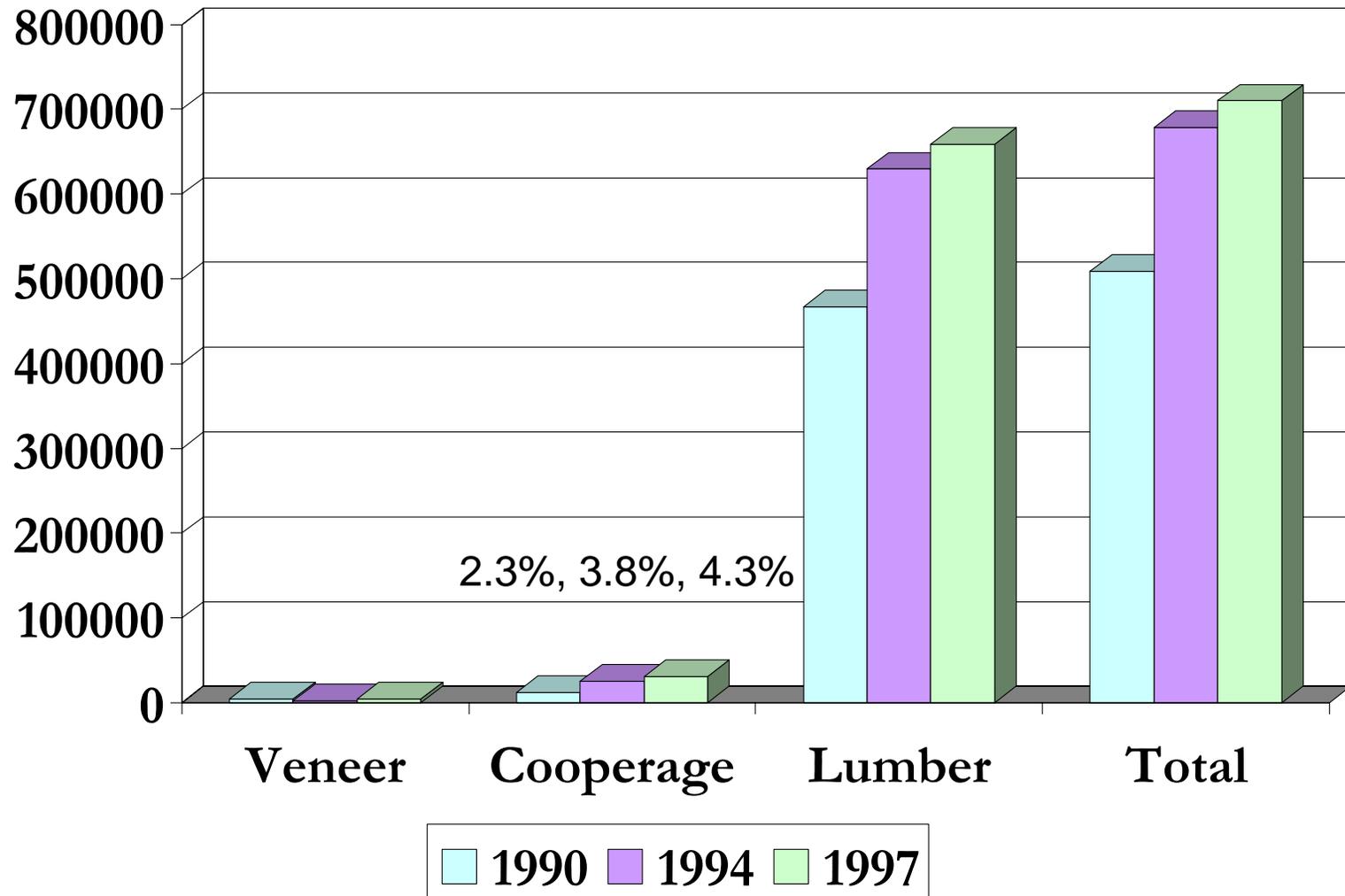
■ Growth on Growing Stock ■ Removals ■ Percent

# Primary Producer Mill Locations

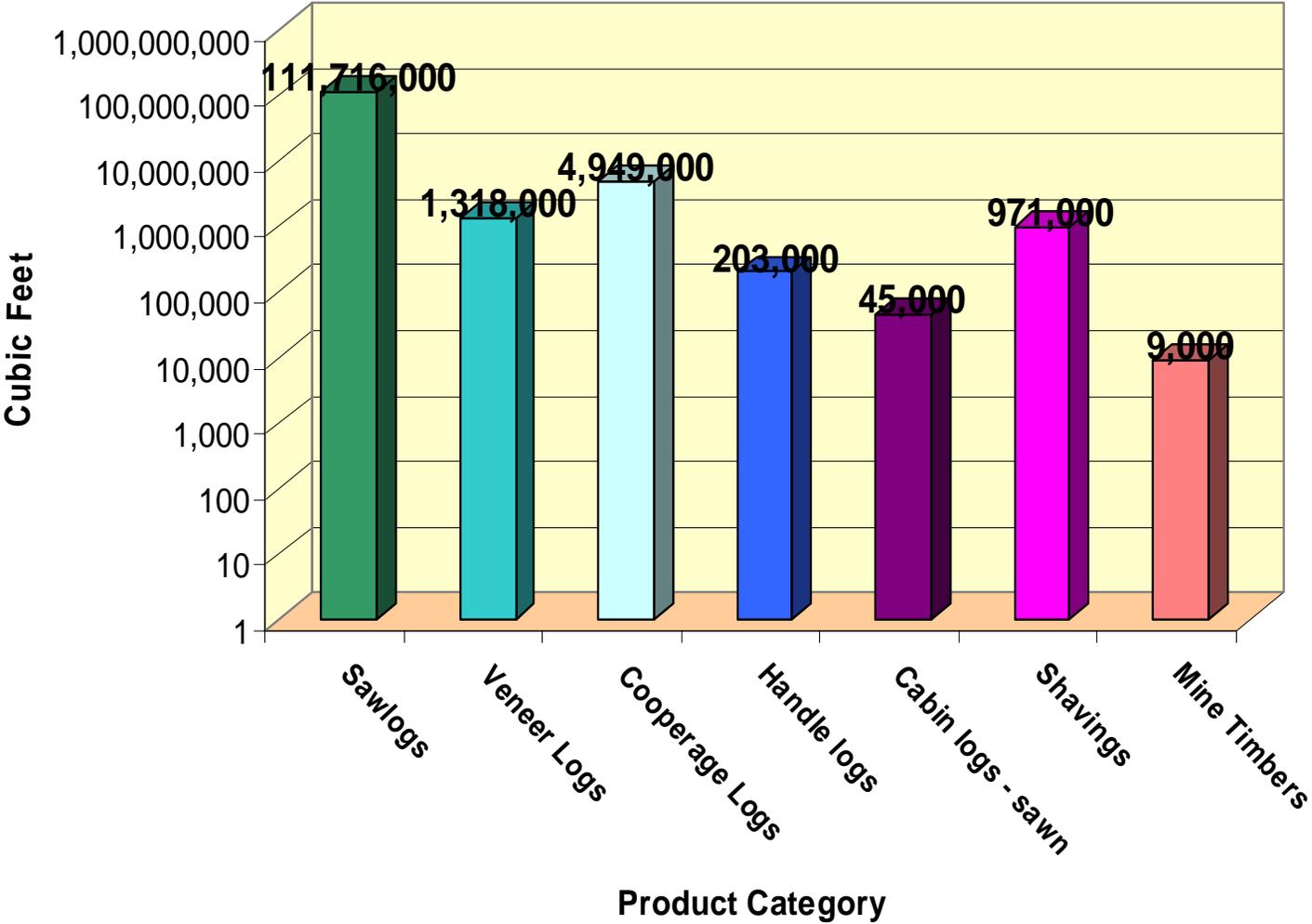


# Sawlog Production 1990 to 1997

Thousand Board Feet

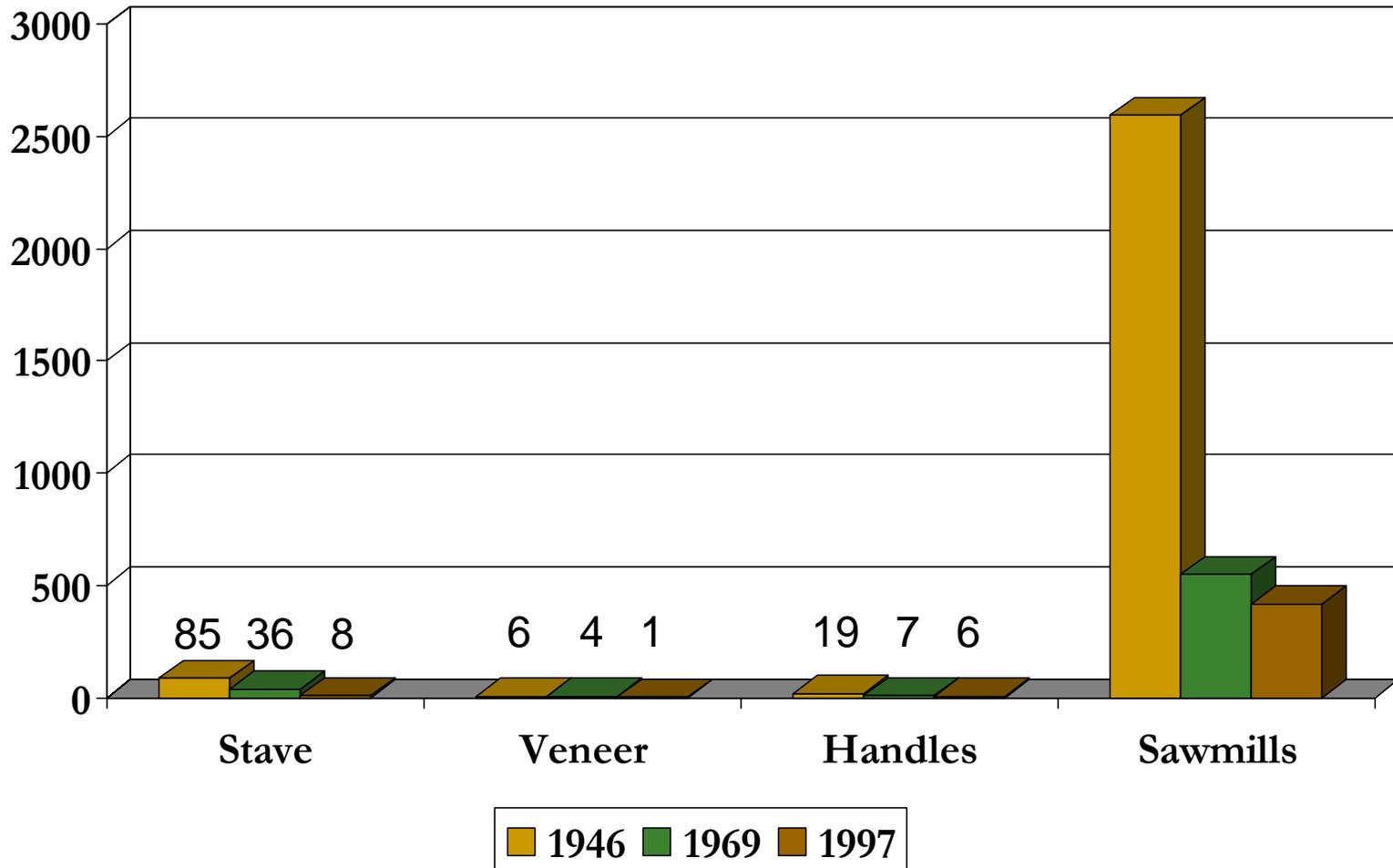


# Missouri 2003 Harvest by Product Categories



# Log Processing Mills 1946 to 1997

Missouri – Number of Mills



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# Challenges

Oak Decline – A Complex of vectors

Gypsy Moth – A threat 15 to 20 years

Many Forest Owners – 300,000

Understanding Forests

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# Summary

- Missouri's forest has been subject to many changes: boreal forest, presence of glaciers, and now oak-hickory dominated, including 20 oak species, 8 are of the white oak group, 4 used in cooperage.
  - The oak-hickory forest type establishes through response to disturbance, natural or human induced.
  - Presently, approximately 14.61 million acres of commercial forest that is a part of the Central Hardwood Region and is a transition to the Great Plains and southern forest.
  - The aging Oak-Hickory forest type comprises 74% of the timberland, white oaks are estimated to account for 27% of the Oak-Hickory type and 25% of the timber volume.
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# Summary

- Approximately 83% of the forest is privately owned by over 300,000 owners.
  - There is considerable competition for the upper grades of white oak logs. Cooperage captures 4% of the timber volume sold and 5% of the price paid for timber.
  - Industry is adapting to technological change.
  - Challenges: The oak decline complex, gypsy moth, number of forest owners, and the need to understand the forest is dynamic in response to change.
  - Please remember: The forest is dynamic & continued orders for wood helps perpetuate a healthy, sustainable forest.
-

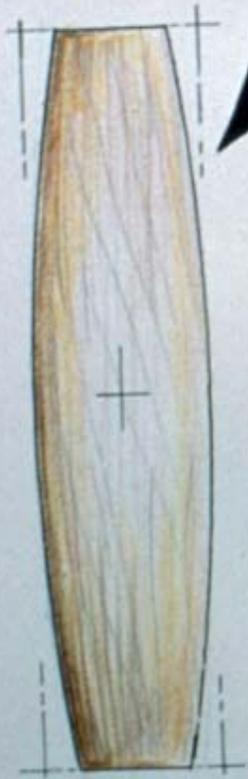






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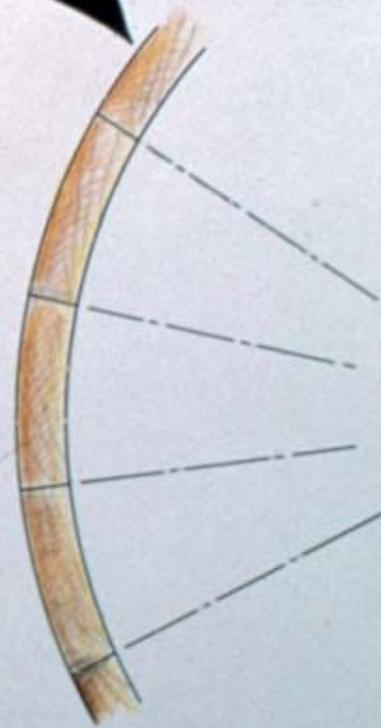




Length of Stave  
is tapered on  
jointer wheel  
to form bilge  
of barrel when  
assembled



Edges of  
staves are  
tapered to  
fit snugly  
when barrel  
is assembled





12'8 25

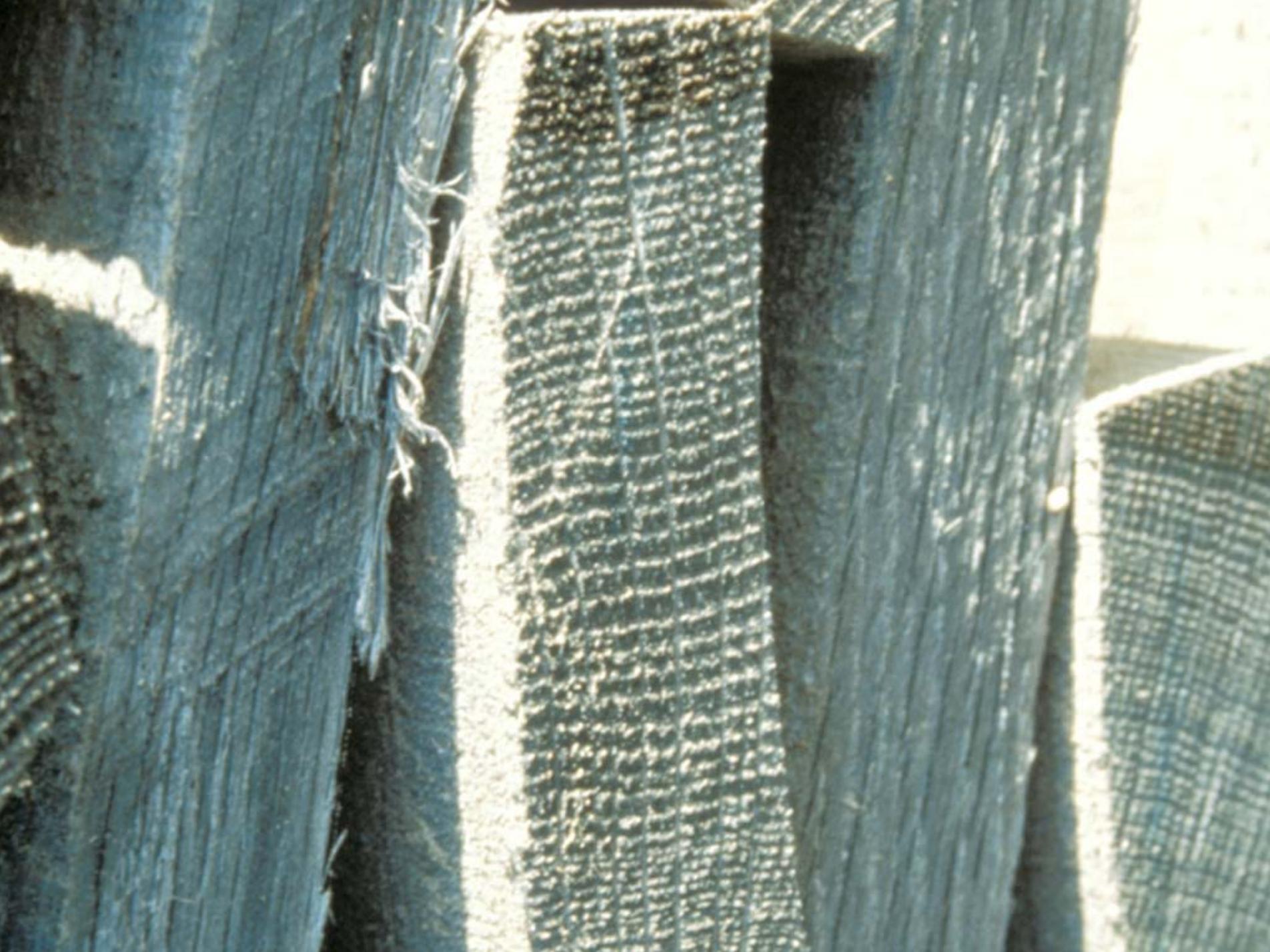




23:20:14

















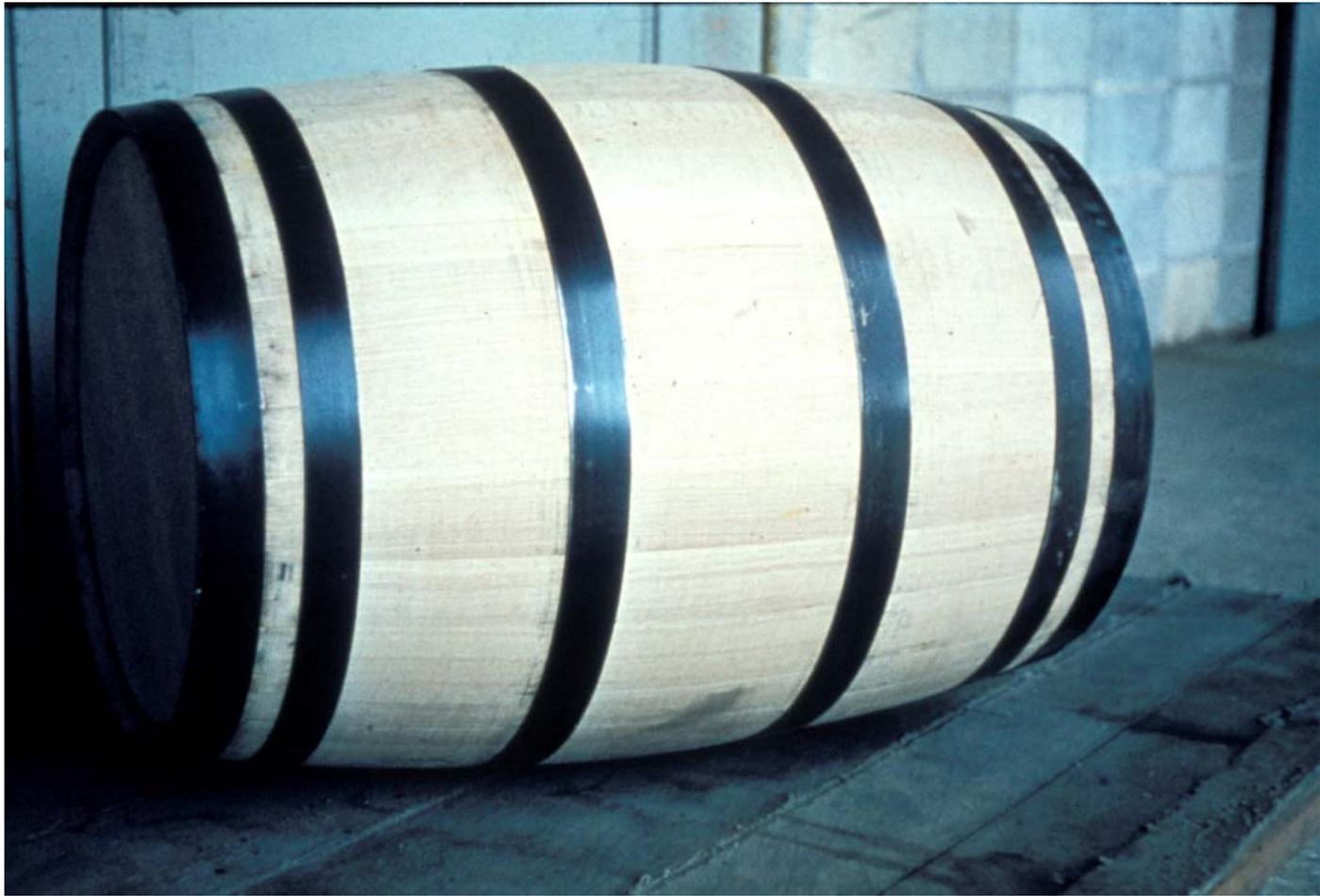










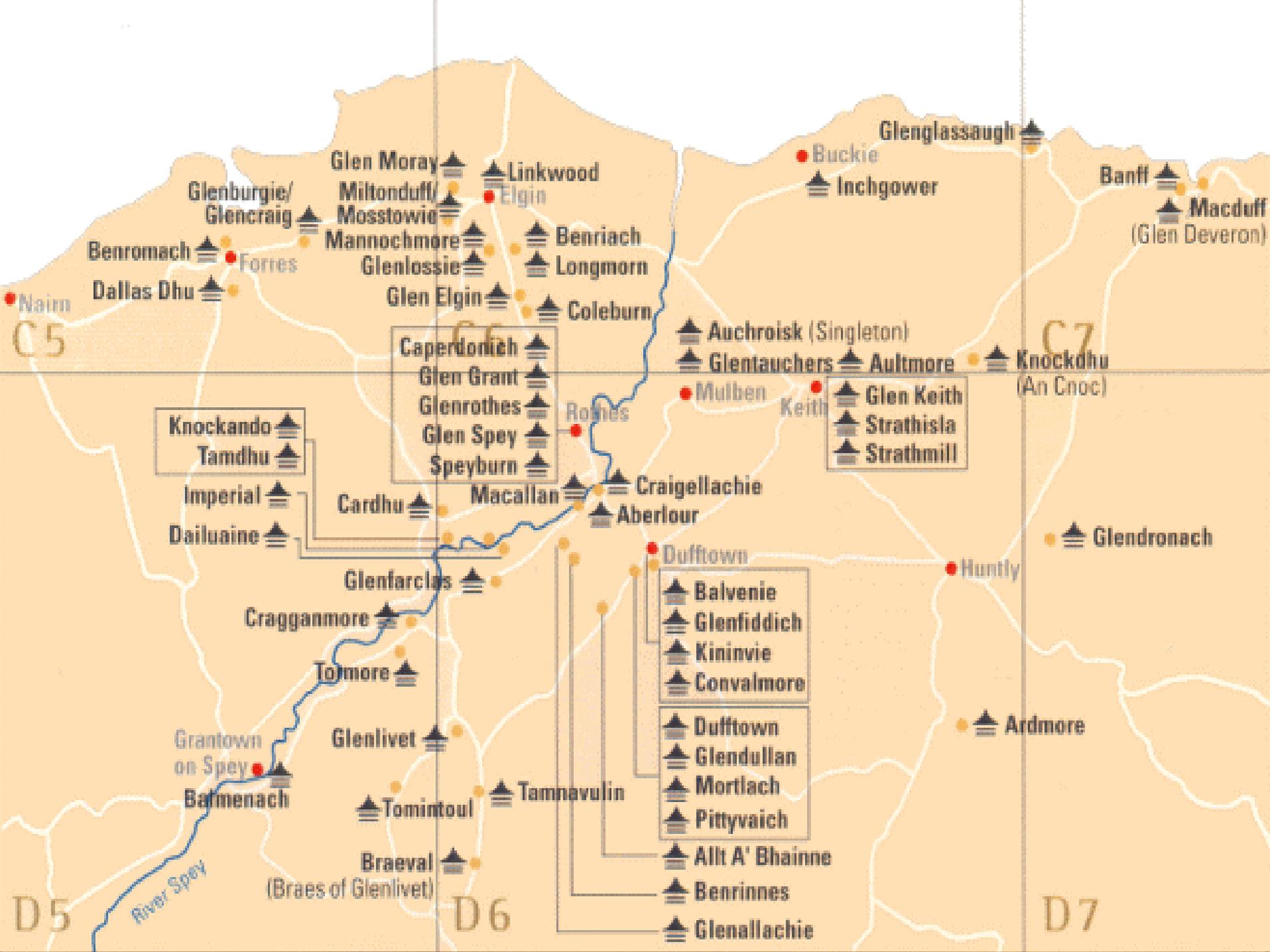


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## FINISHED BARRELS

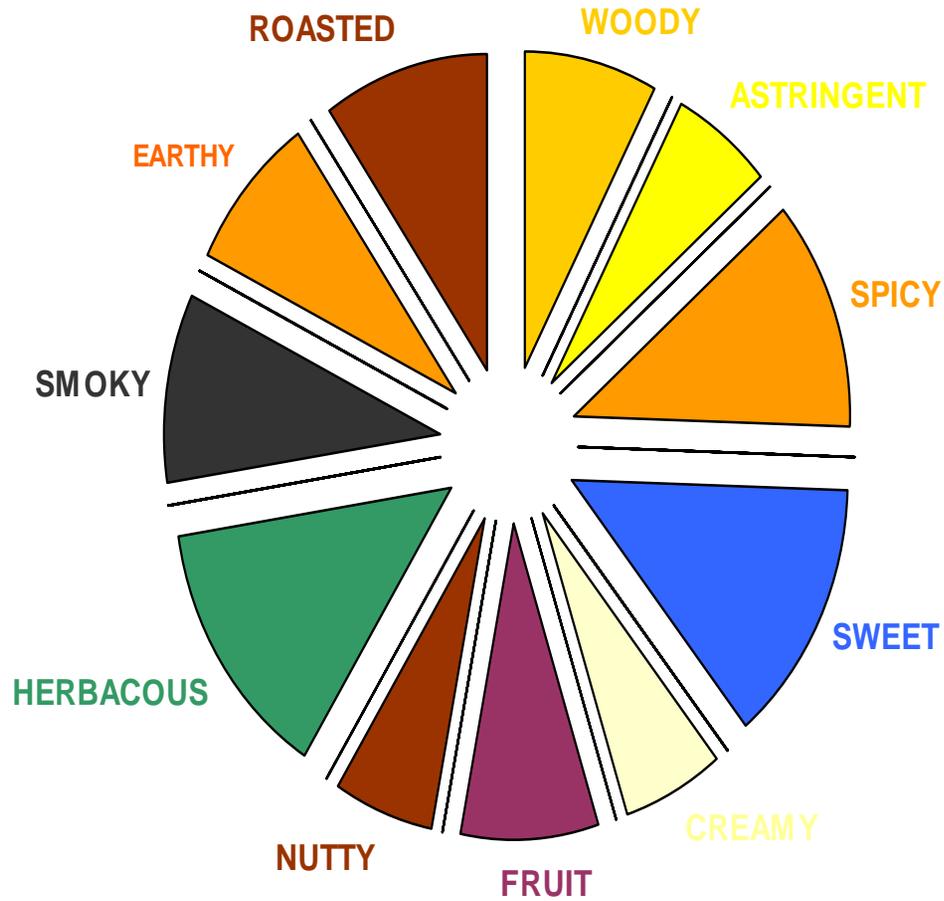
- SHIPPED TO A DISTILLERY
  - LOADED WITH BOURBON ONE TIME
  - A WINE BARREL IS SHIPPED TO A WINERY AND LOADED WITH WINE MULTIPLE TIMES
  - UPON RETIREMENT THE BARREL MAY BE RE-USED BY A SCOTCH DISTILLER UNTIL THE BARREL NO LONGER MEETS THE NEEDS OF THE BLENDER
-





# FLAVORS DERIVED FROM THE OAK & FLAVORS FROM THE TOAST

From World cooperage Flavor Wheel



# FLAVORS FROM THE OAK & TOAST

WOODY	FRUIT	ROASTED	EARTHY	SMOKY	SPICY	HERBACEOUS	SWEET
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ASTRINGENT	NUTTY	CREAMY			Black pepper	Green beans	Hot fudge
Drying	Almond	Vanilla				Black olive	Butterscotch
Tanic	Walnut	butter					
Bitter	Hazelnut	Lactic					

- 
- SO,
  - IS IT FLAVOR
    - OR
  - THE POWER OF SUGGESTION?
-

