

Can We Manage Genetics in Wild Deer?

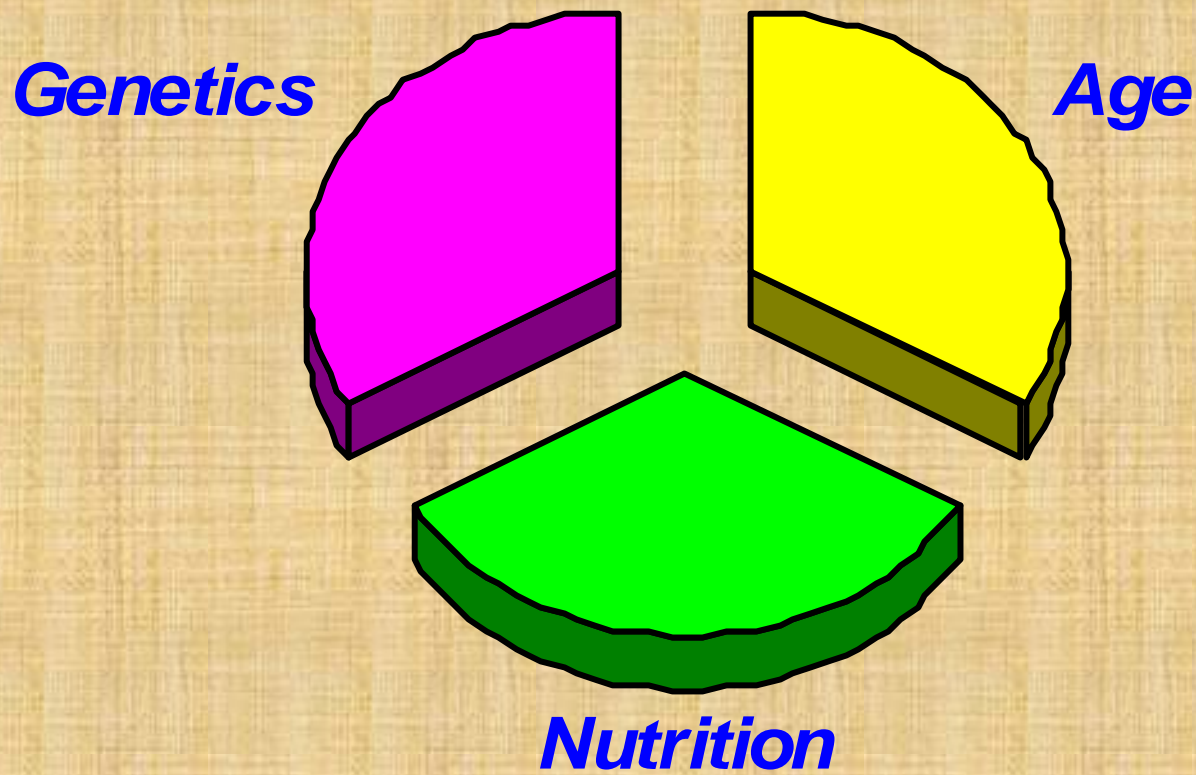


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Texas A&M University-Kingsville

CAESAR KLEBERG
WILDLIFE
RESEARCH INSTITUTE

Factors Affecting Deer Management

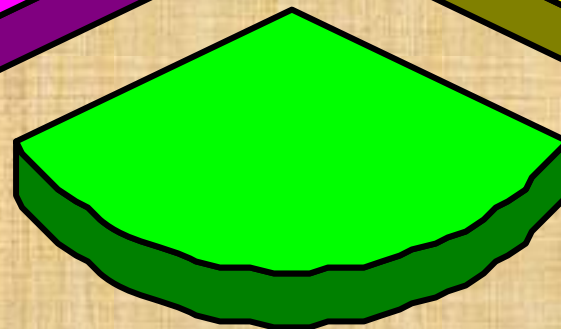
- Standard answer:
 - 3 “equal” components



Factors Affecting Deer Management

- Recently: focus on genetics only

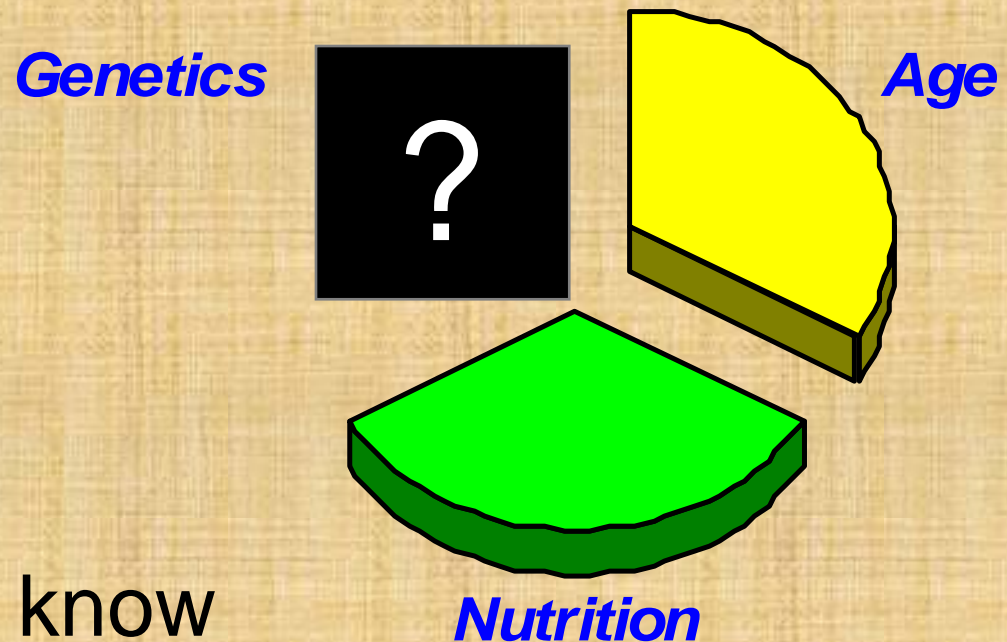
Genetics!!!



Nutrition

Factor Affecting Deer Management

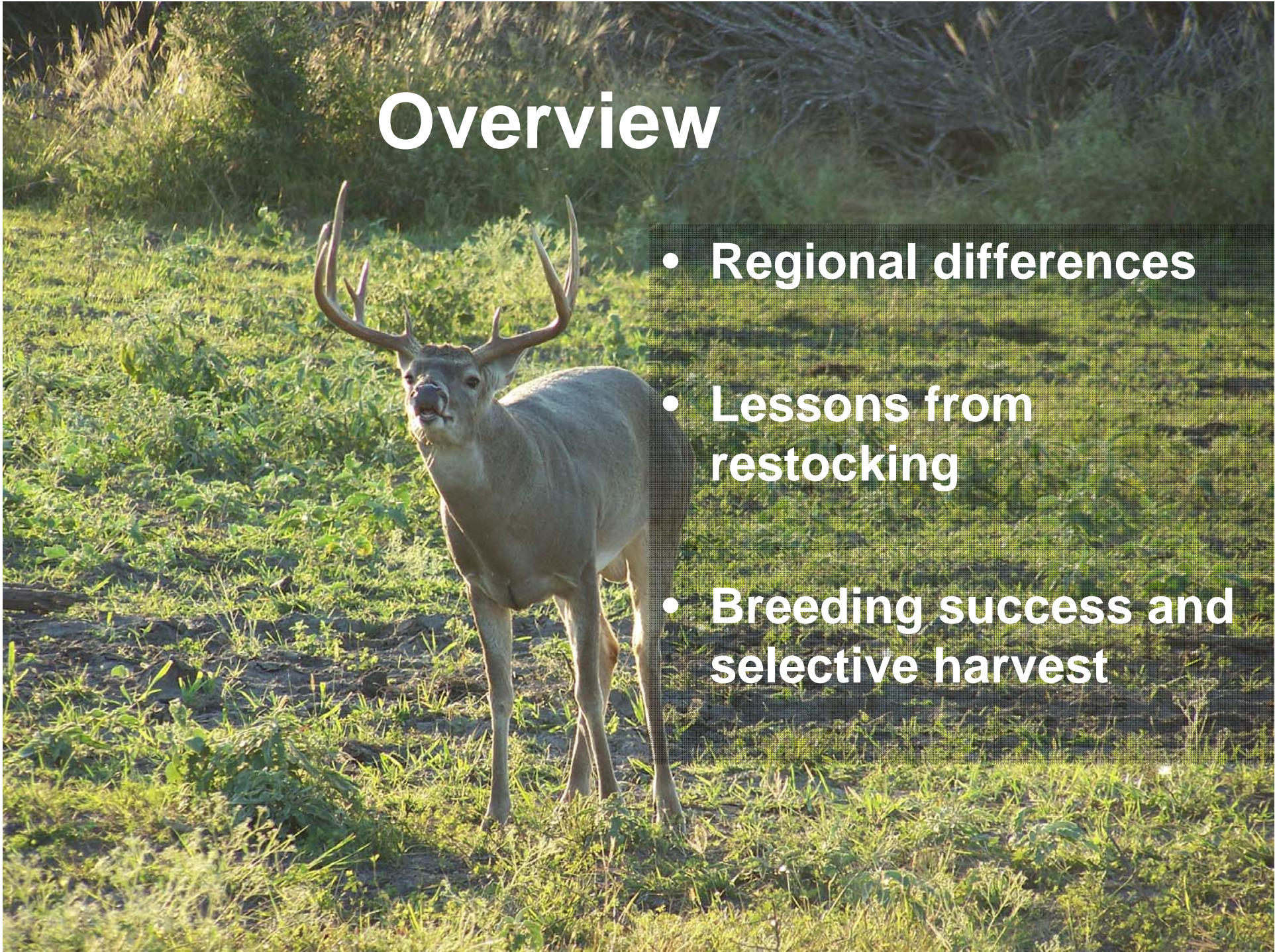
- We know about:
 - Age
 - Nutrition



- How much do we know about "Genetics" ???

Overview

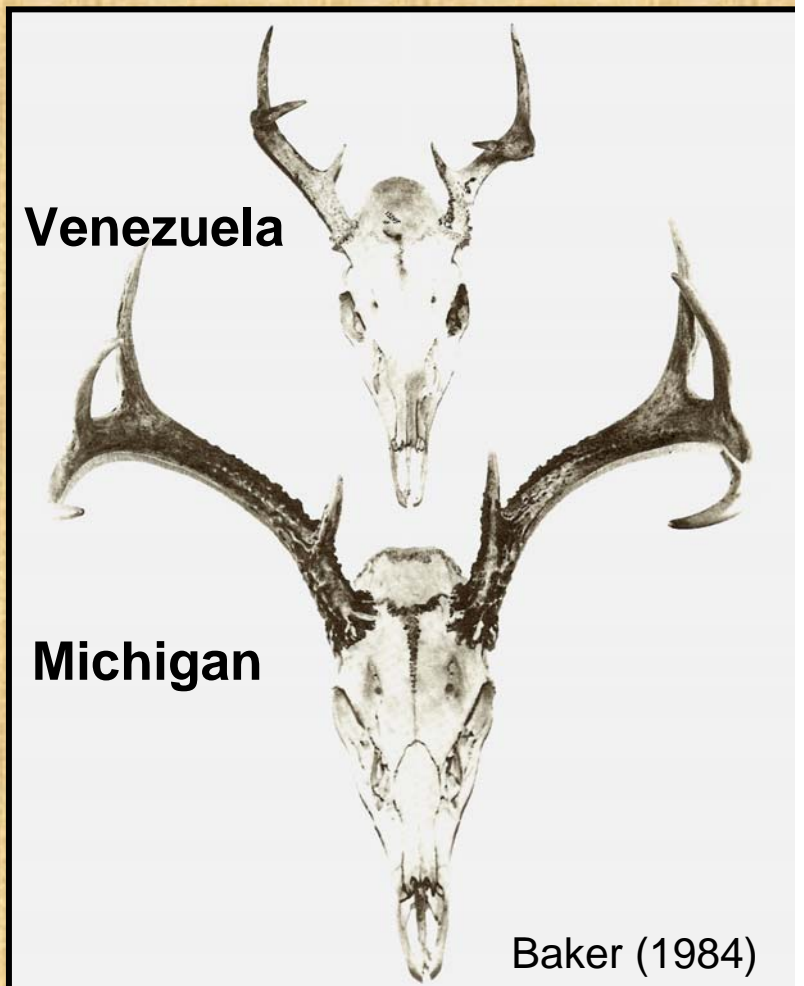
- **Regional differences**
- **Lessons from restocking**
- **Breeding success and selective harvest**



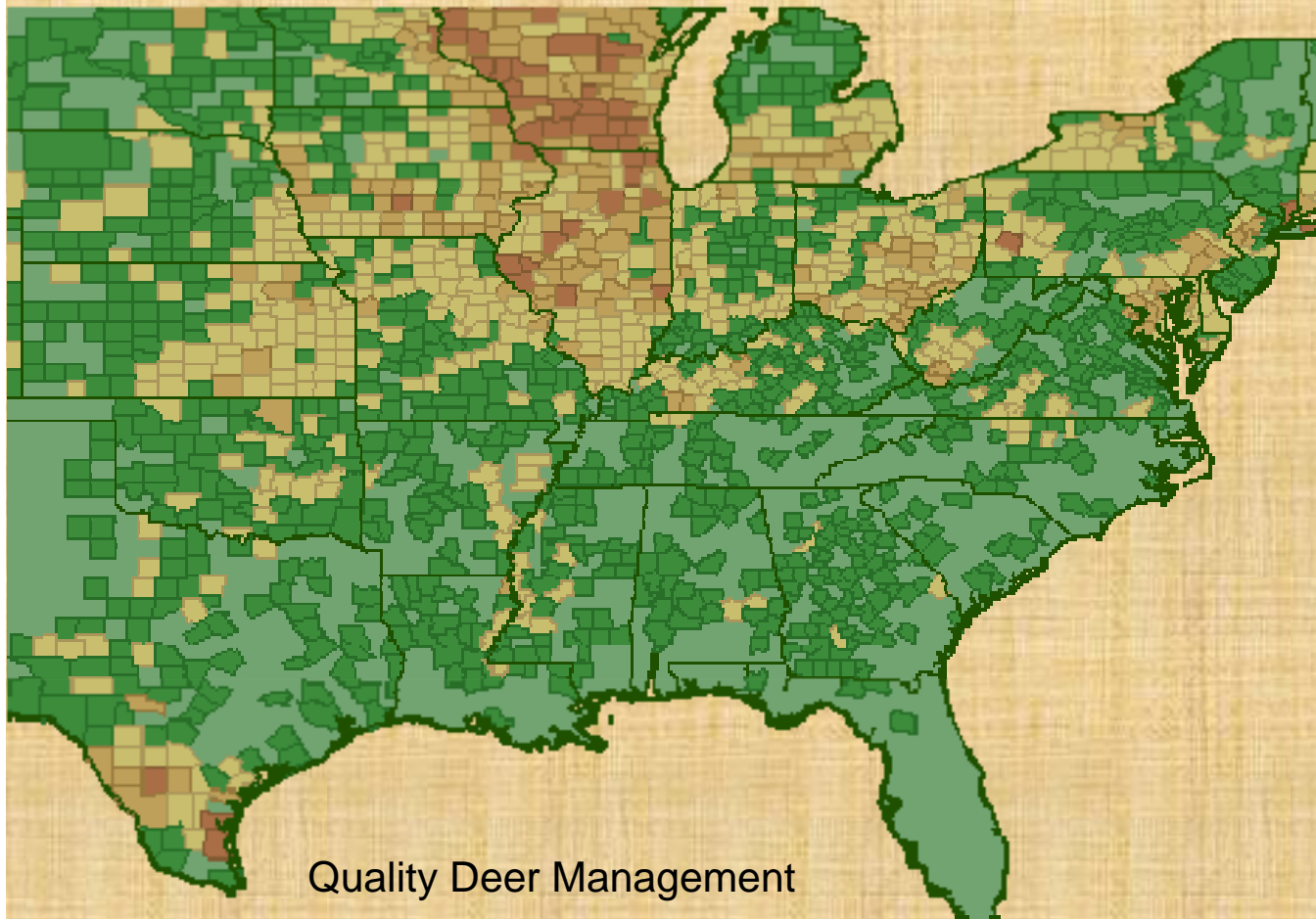
Deer Populations Differ

- Body size
- Antler size
- Breeding date
- Coat color, length

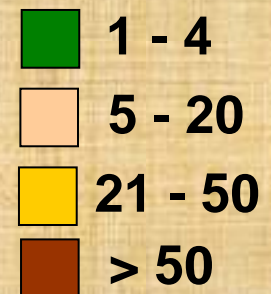
Adult (same-aged) bucks



Antler Size Differences by Region



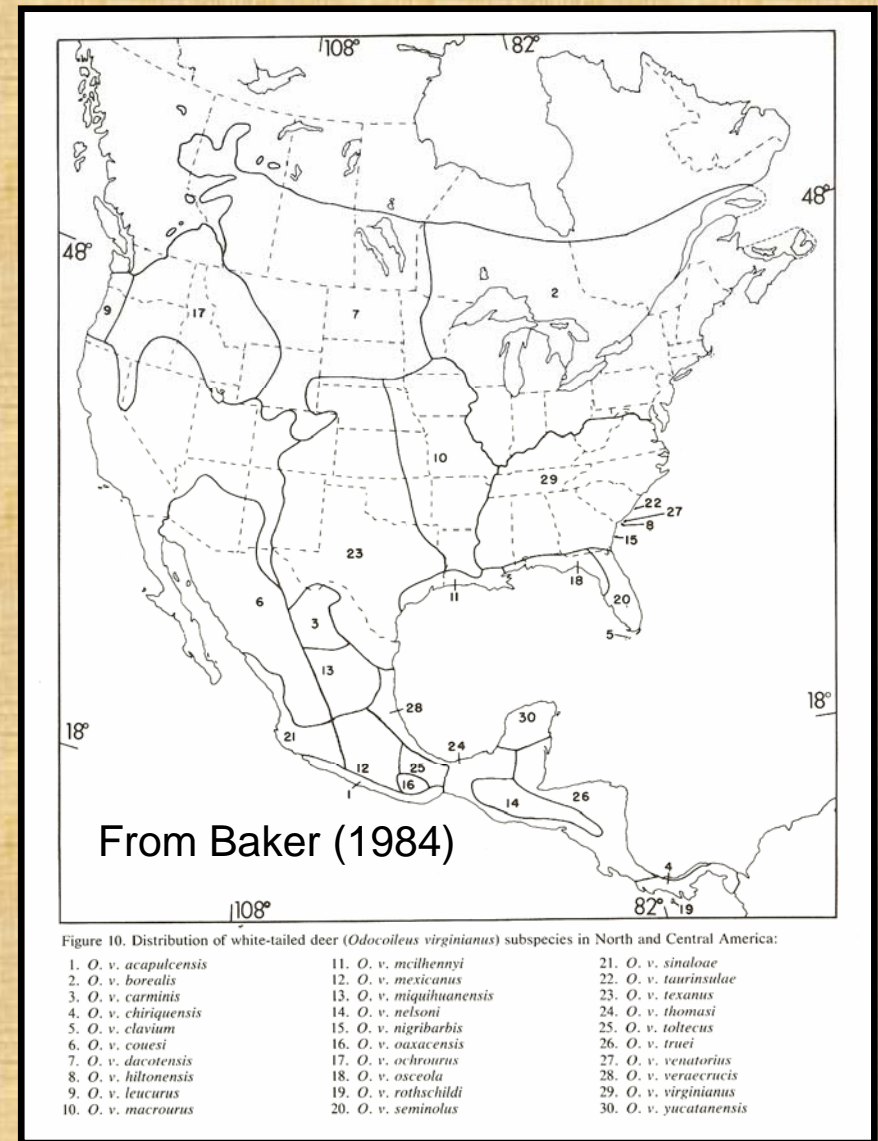
Total number of
Boone & Crockett,
Pope & Young



Quality Deer Management
Association

Genetics at a Large Scale

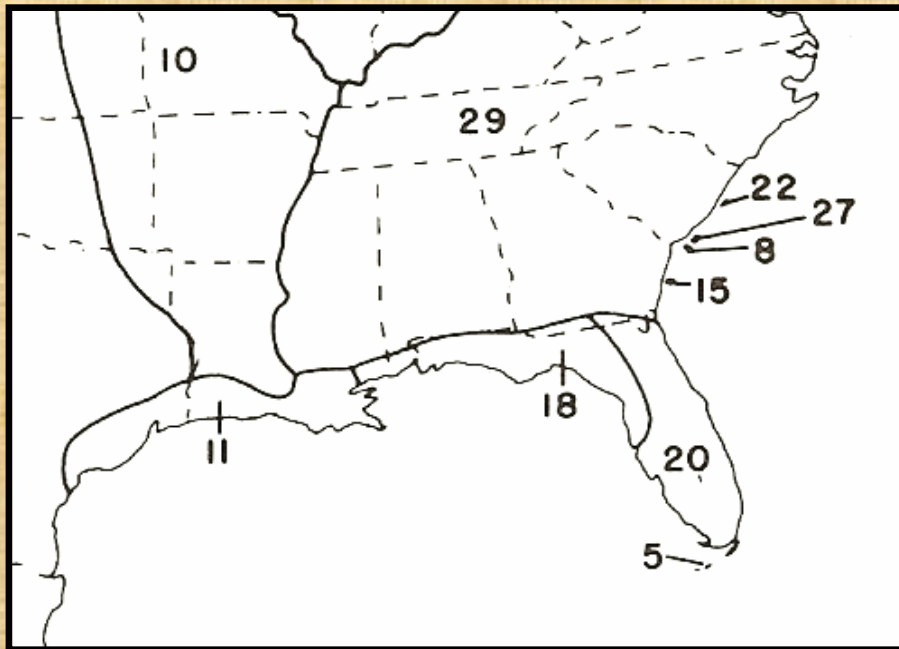
- 30 named subspecies
- Differ in size, color, etc.
- How “real” are these subspecies?
- How many differences due to “genetic” factors?



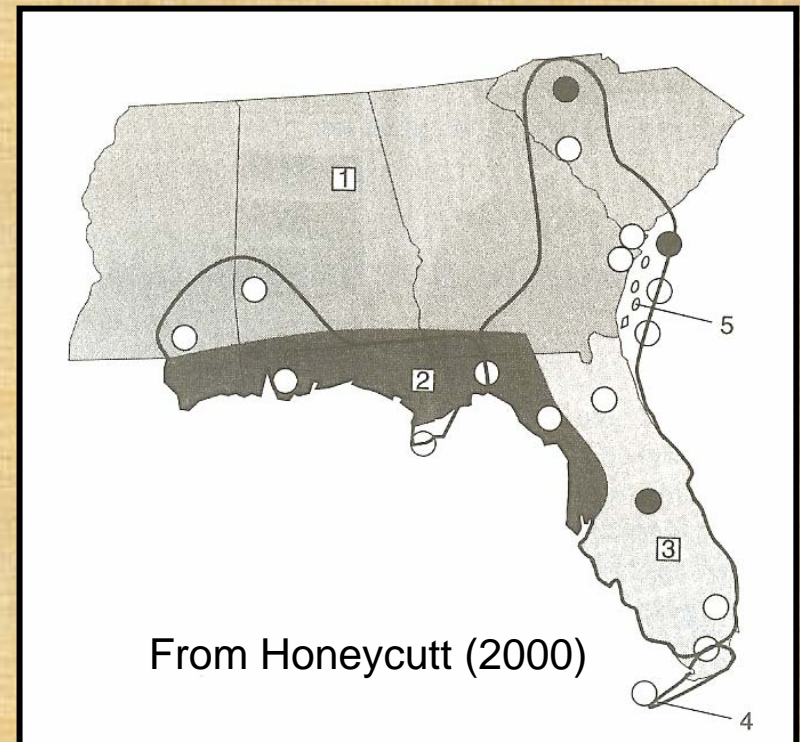
Genetics on a Large Scale

Genetic studies often support fewer unique groups than subspecies

5 Named subspecies



3 Genetic groups



Why do Deer Populations Differ??

– Differences among populations

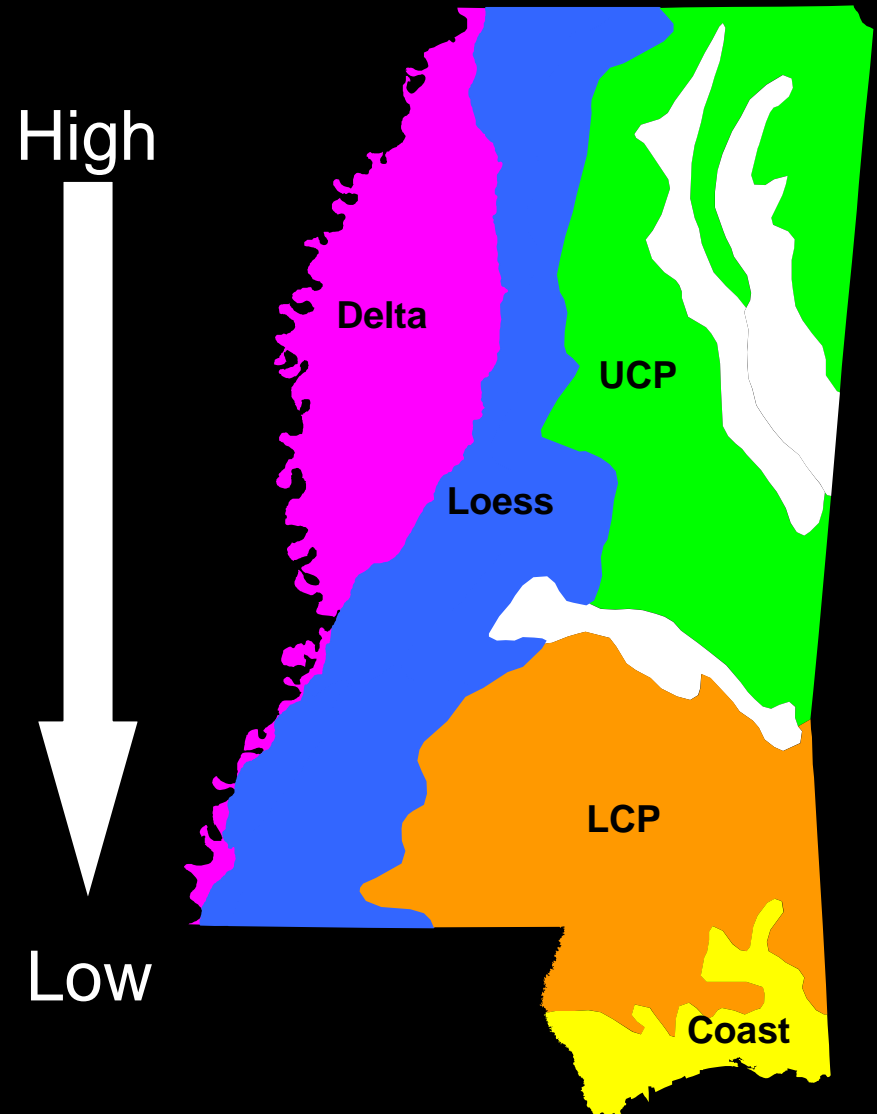
- Genetics
- Environment
(nutrition)

– How do we discriminate “genetic” vs. environmental (e.g., nutrition) effects?

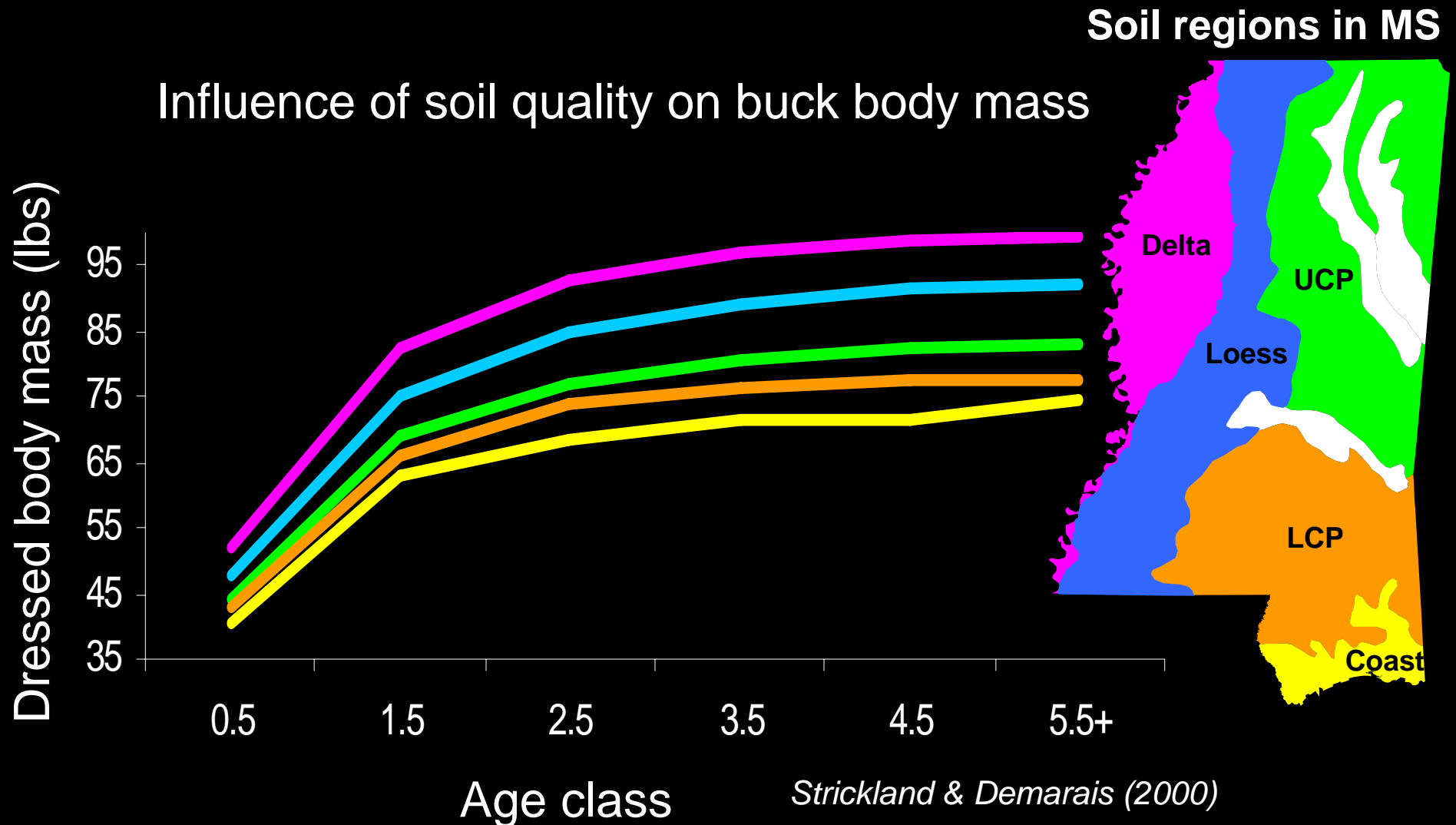
Example from Mississippi...

Regional Soil Quality

- Delta
- Loess
- Upper Coastal Plain
- Lower Coastal Plain
- Coast



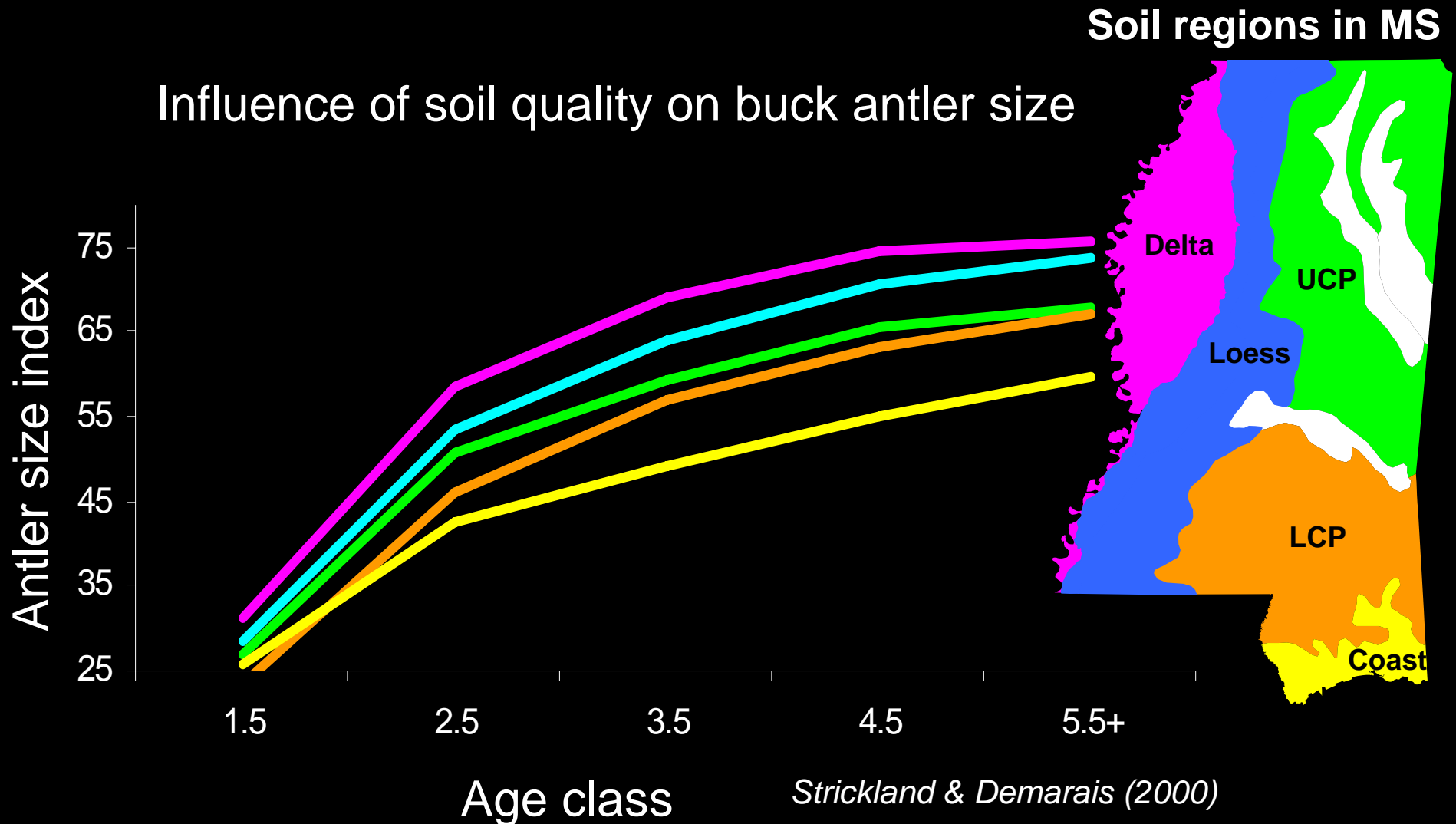
Regional Variation in Body Mass



Strickland & Demarais (2000)

Journal of Wildlife Management 64:903-911

Regional Variation in Antler Size



Strickland & Demarais (2000)

Journal of Wildlife Management 64:903-911

Genetics on a Large Scale

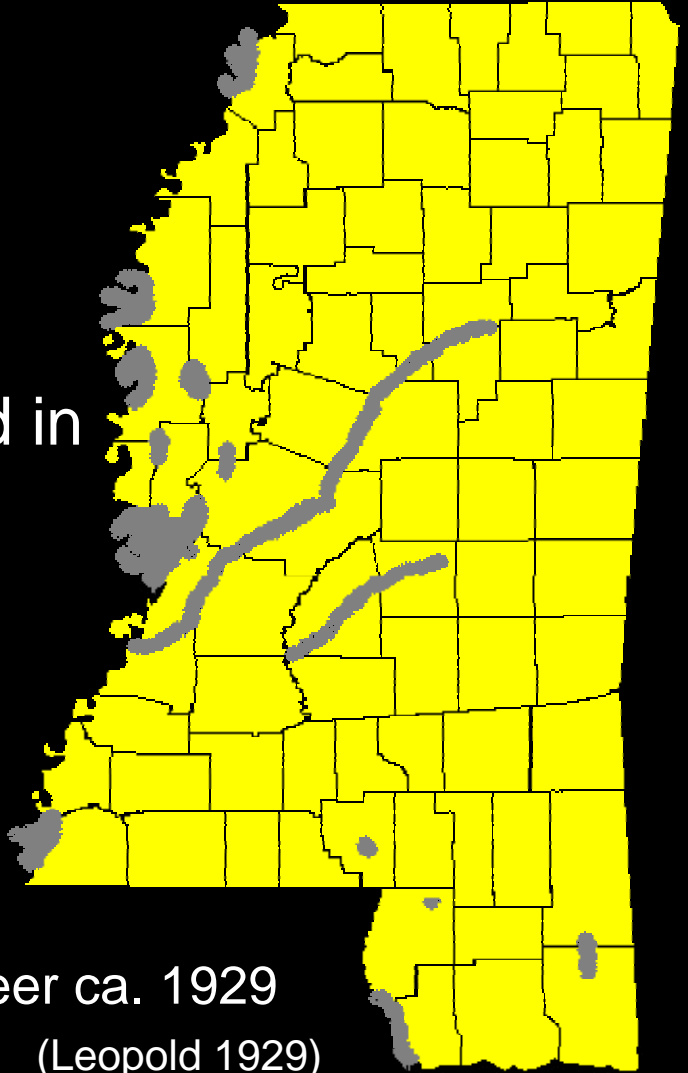
- Same trends for doe body weights
- Same trends for growth rates of bucks & does
 - Higher soil quality = faster growth

Are these differences due to genetics?

Or does soil quality (nutrition) play a large role?

Genetics at a Large Scale

- Lessons from deer restocking:
 - Less than 500 deer in MS in 1929
 - Trapping and transplanting resulted in population recovery
 - Some native deer survived
 - Transplants populated other areas



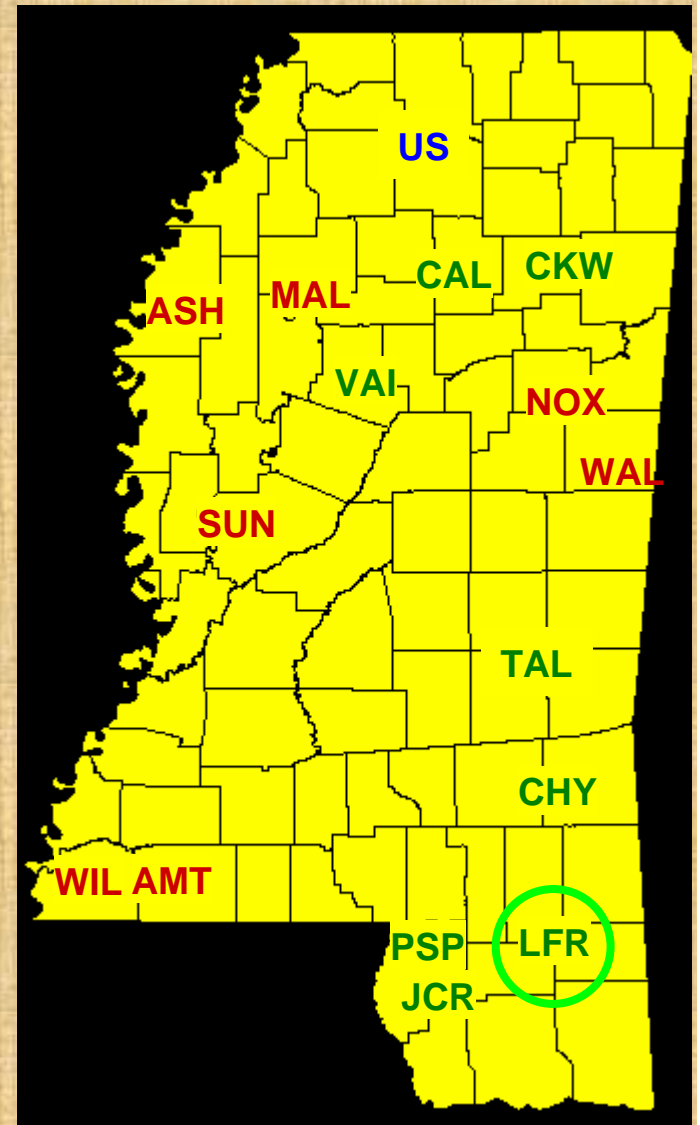
Remnant deer ca. 1929
(Leopold 1929)

Genetic Consequences of Deer Restoration in Mississippi

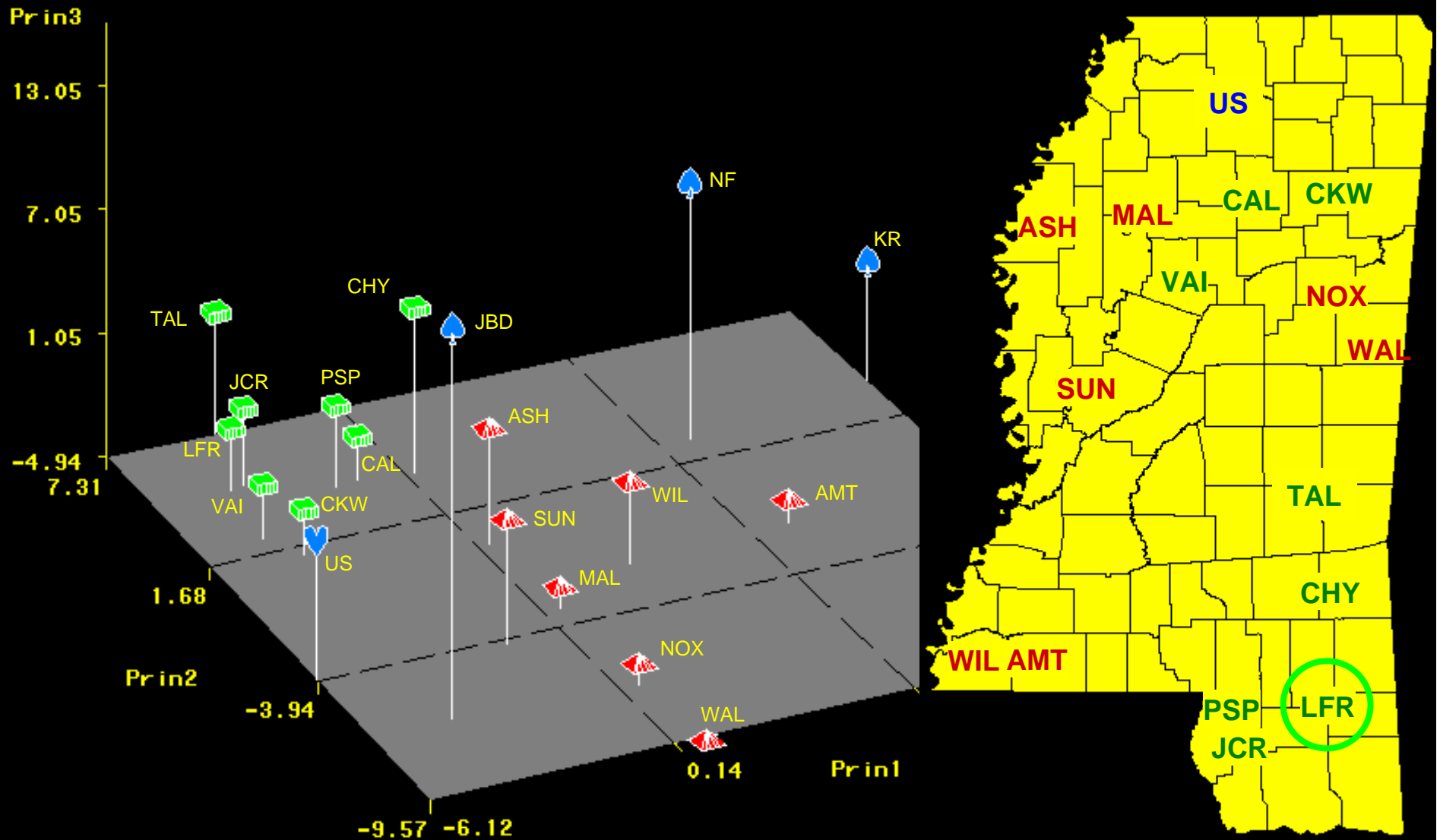
- Recovery successful
 - Populations widely distributed
 - High genetic diversity
- Genetic structuring
 - Diverse stocks
 - Native, transplanted deer

DeYoung et al. 2003

Molecular Ecology 12:3237-3252



Genetic Similarity of Current Populations



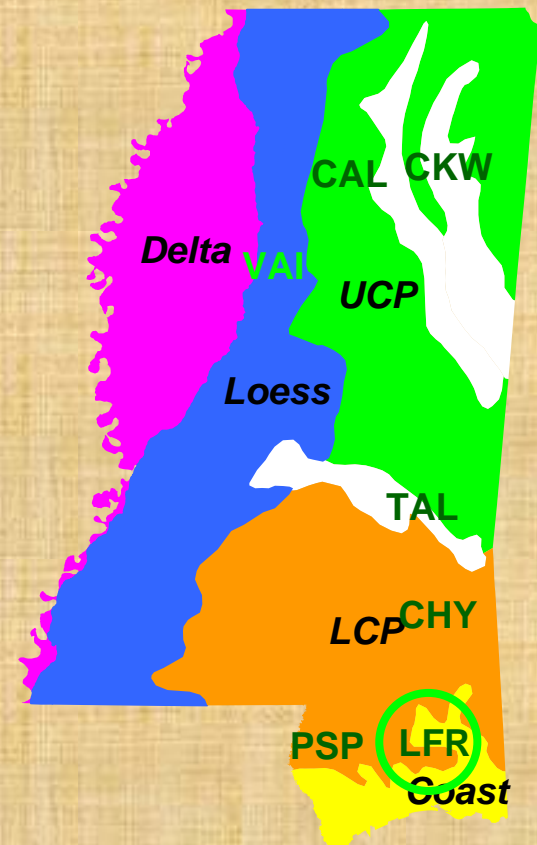
Leaf River Stocks

– Leaf River stock

- Chickasawhay WMA
- Tallahala WMA
- Calhoun WMA
- Chickasaw WMA
- Pine Springs DMAP
- Vaiden Hill DMAP

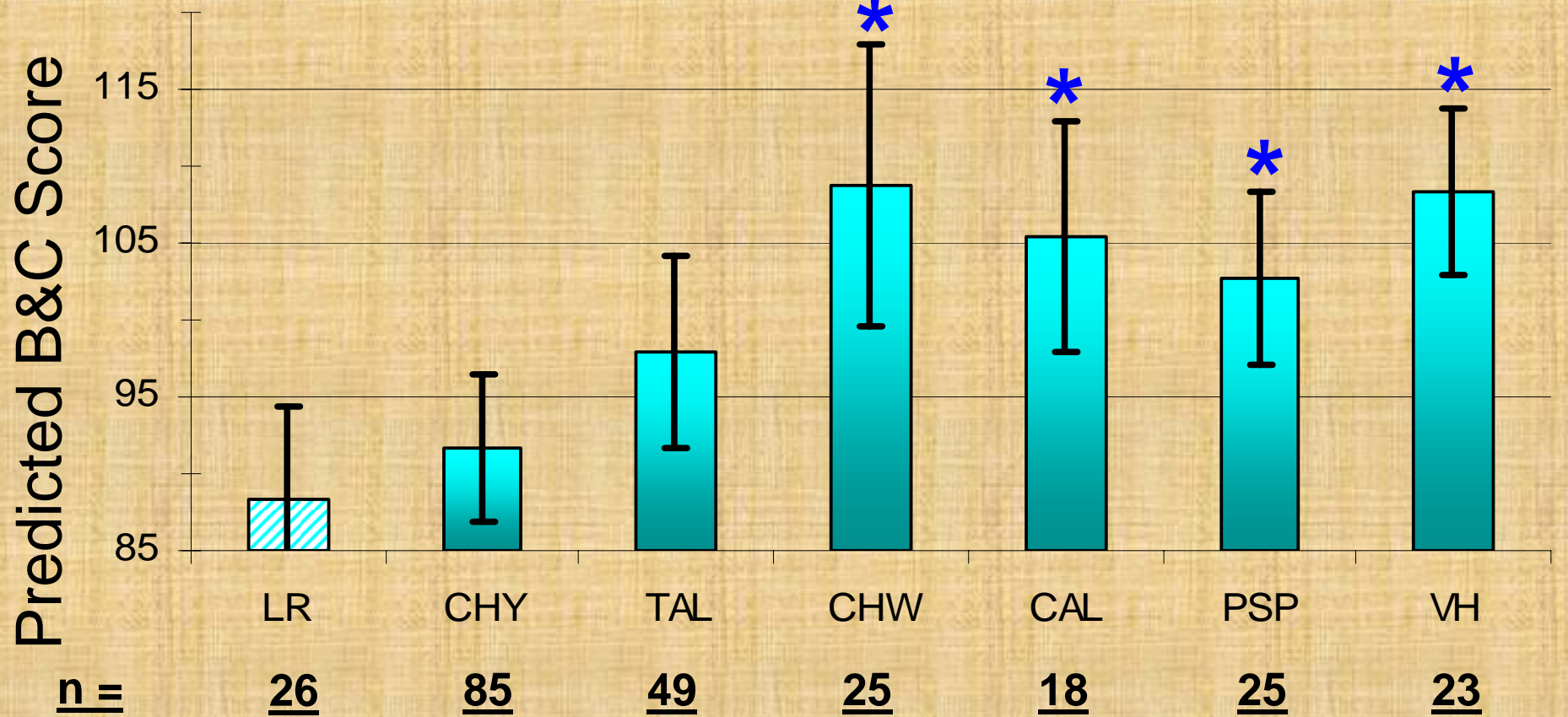
– How similar are these?

- Body mass
- Antler size



Results: Antler Size

Bucks Aged 3.5 Years+ (1991-1994)



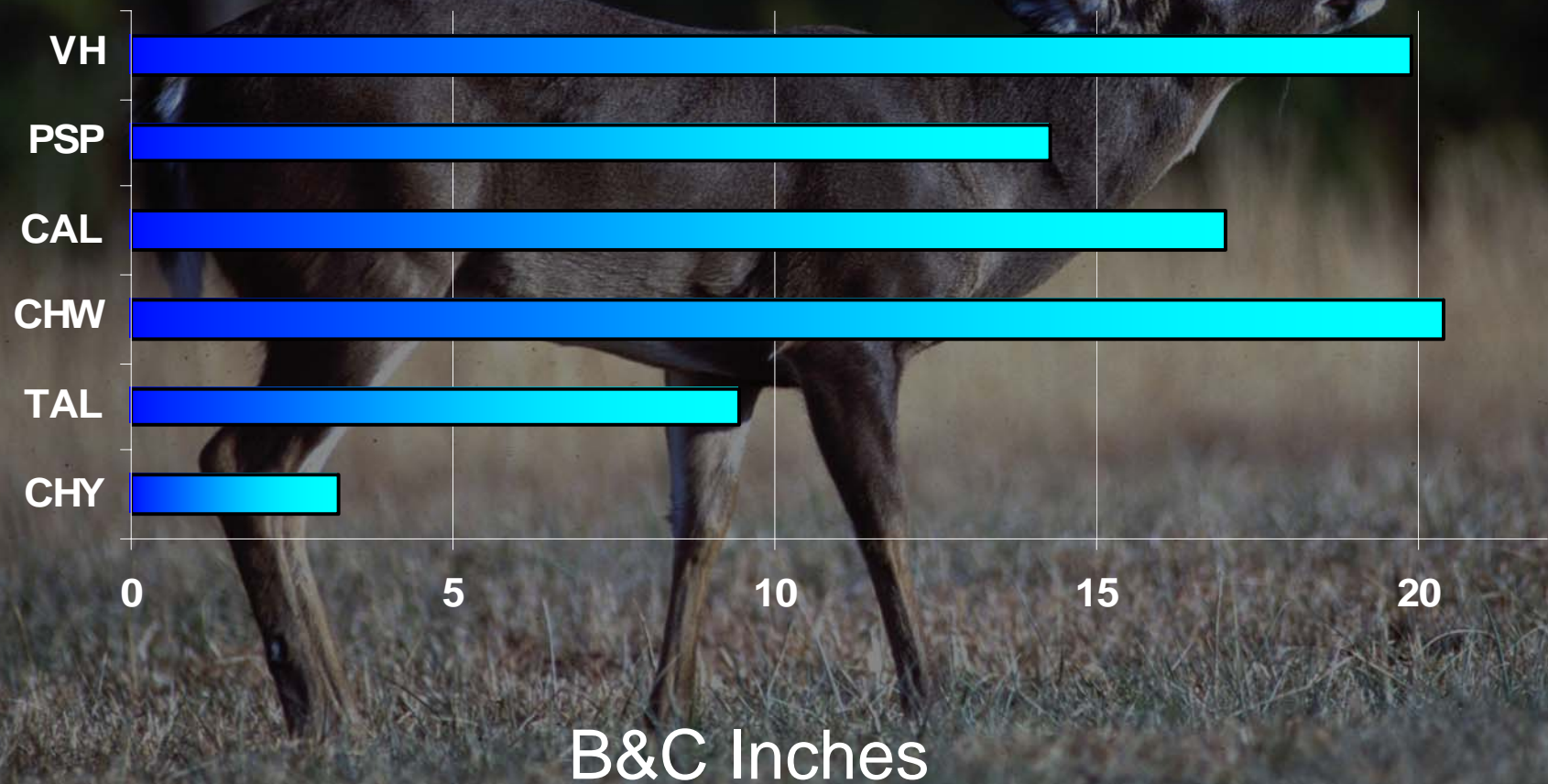
Area

*

95% CI do not overlap LR

Results: Antler Size

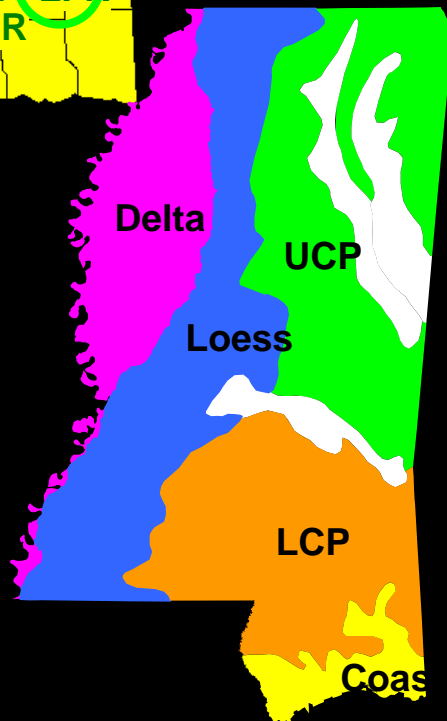
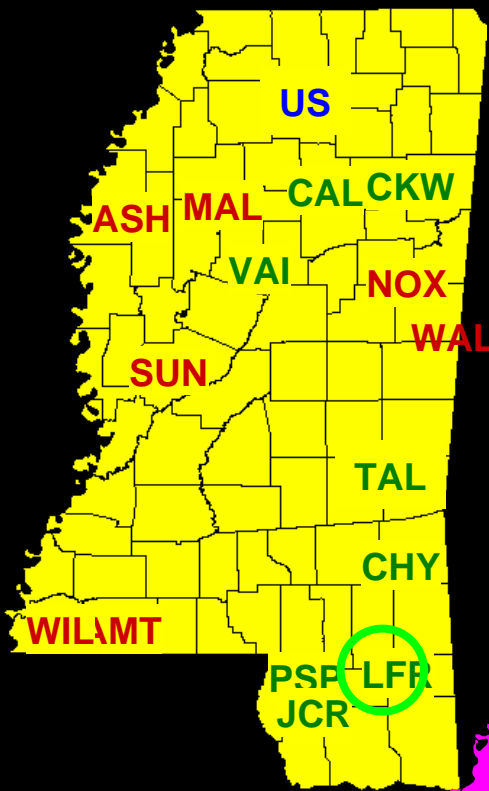
Difference from Leaf River: Bucks Aged 3.5 yr+



B&C Inches

Conclusions

- Regional basis:
 - Different genetic stocks within regions
 - Yet, physical differences correlated with soil quality



Conclusions

- Population basis:
 - Same genetic stocks in different soil regions
 - Today, 30-70 years after restocking, biologically meaningful differences
 - Body weights: 5-14 lbs. for adult does
 - Antler size: 14-20 B&C inches for adult bucks

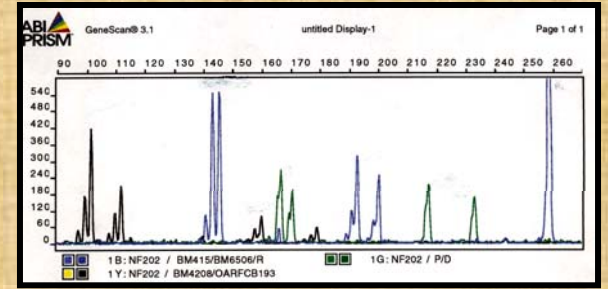
Selective Harvest and Deer Management



- How effective?
 - Selective removal
 - Selective protection
 - Introduction
- Assumptions of selection
 - *Antler characters heritable*
 - *Large-antlered bucks will breed*
 - *Can we predict or control breeding??*



Deer CSI

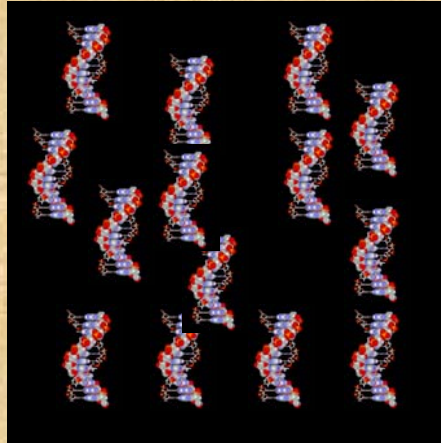


(live deer)

(pretty colors)



(deer parts)



(PCR: black box)

154 156 178 182 220 246.....

(numbers)



(lab hocus-pocus)

blah, blah blah,
DNA blah blah
blah **DNA**.....



Results!!!

Results:

- 439 total deer, 237 fawns during 1998-2001
- 46 bucks sired 70 fawns



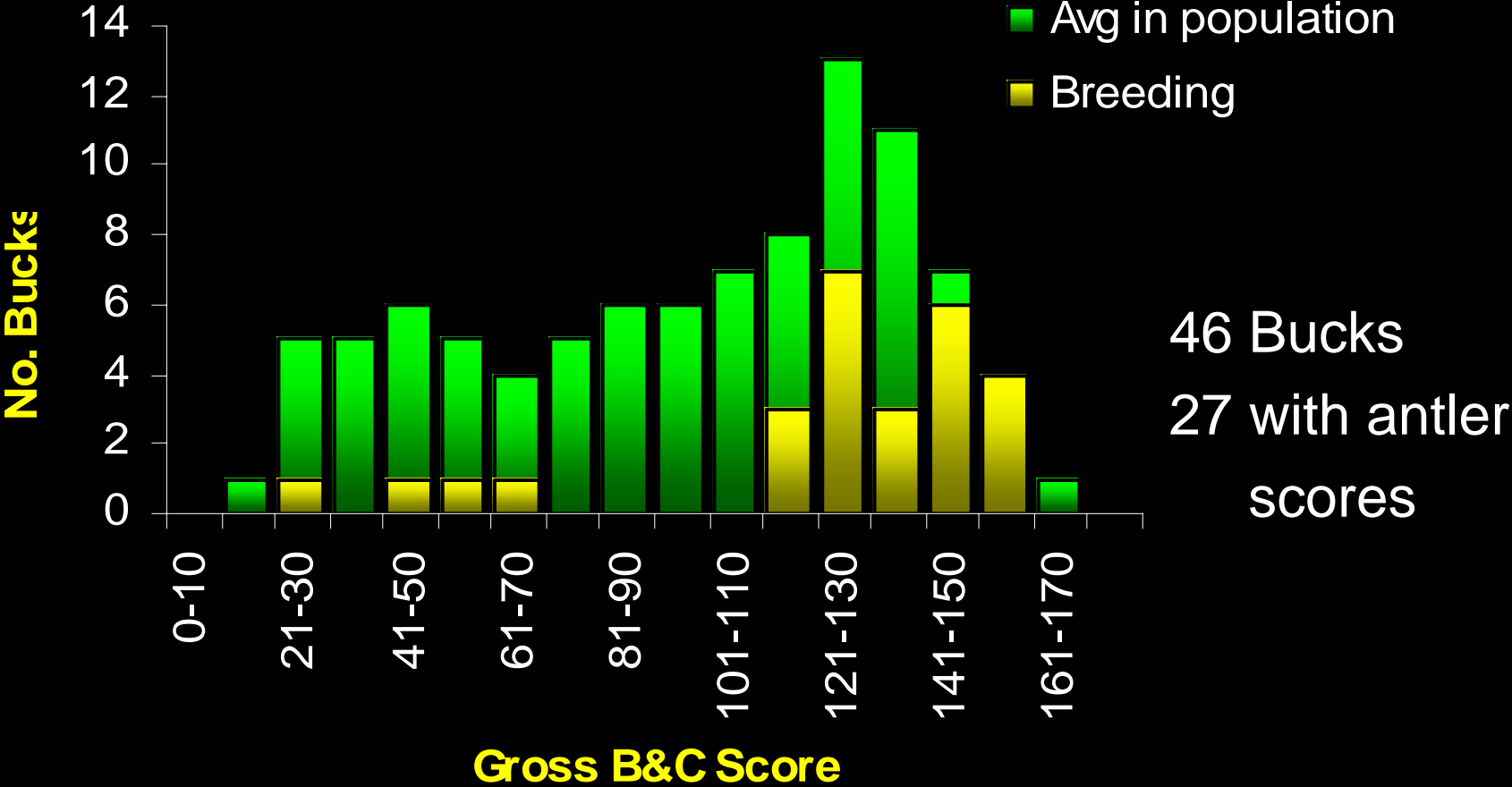
Buck Breeding Success by Age Class

King Ranch

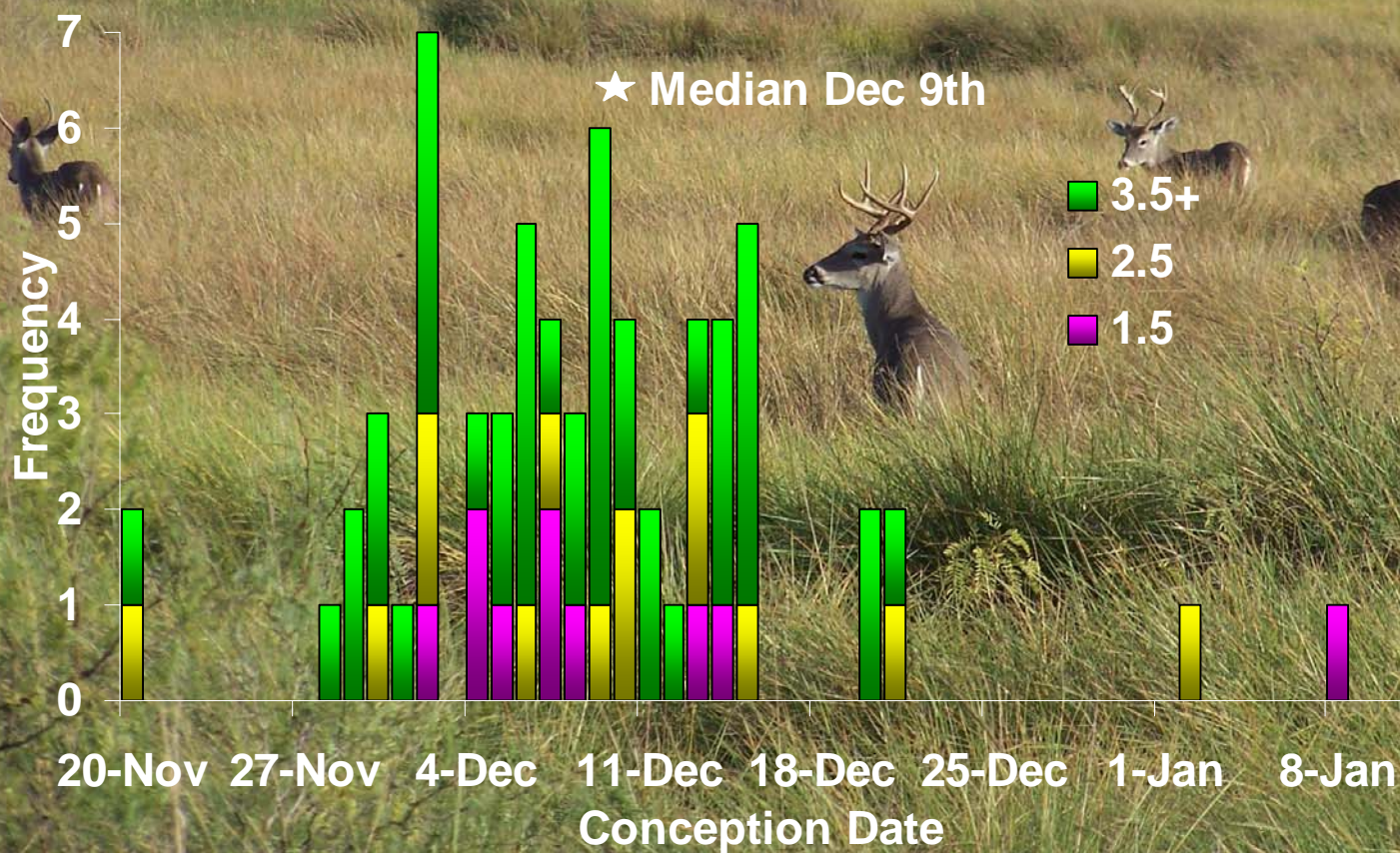


Buck Breeding Success by Antler Size

King Ranch

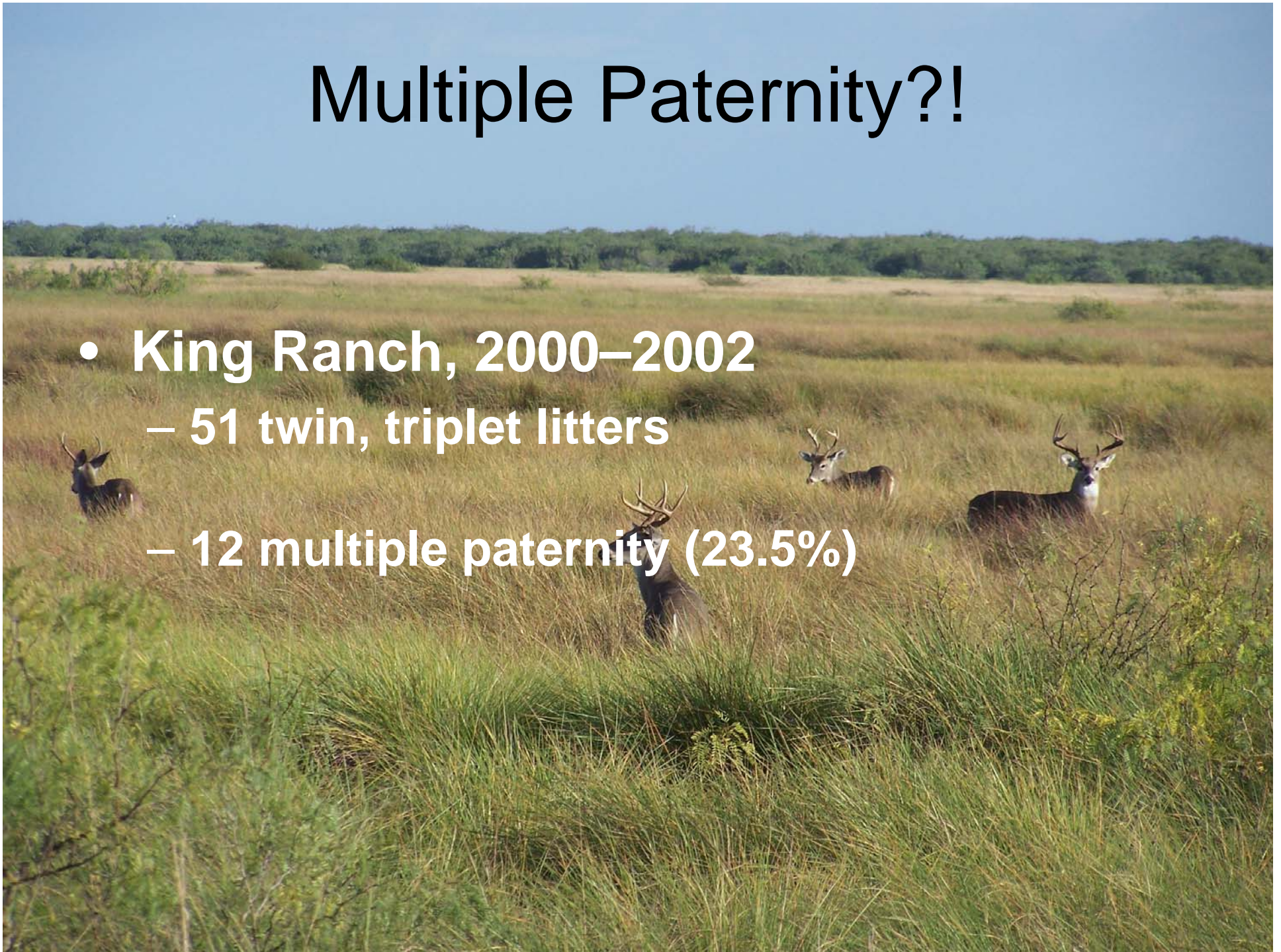


Young Bucks Breeding?!



Multiple Paternity?!

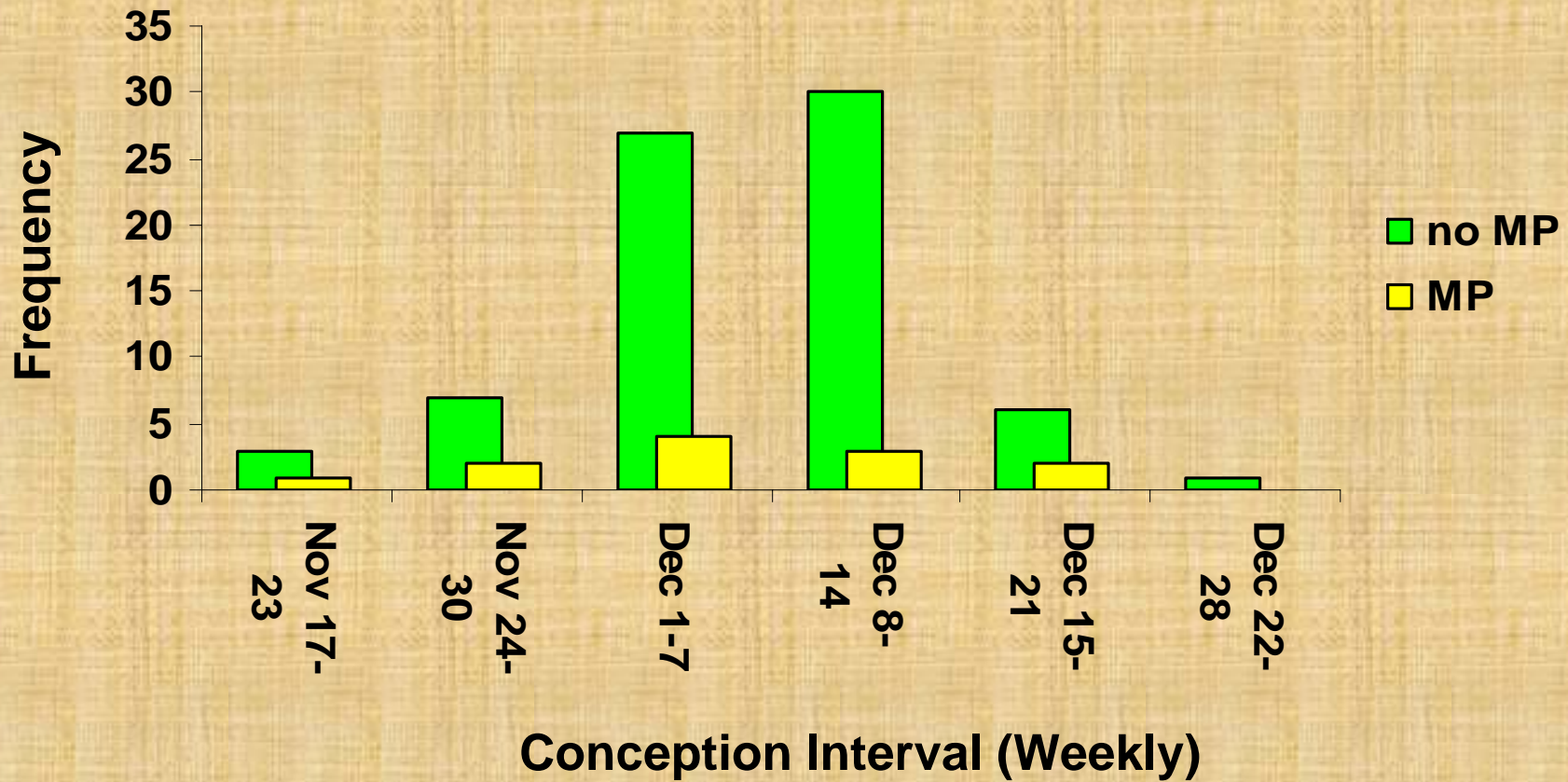
- **King Ranch, 2000–2002**
 - 51 twin, triplet litters
 - 12 multiple paternity (23.5%)



Conception Dates: King Ranch

MP: 4 Dec
No MP: 7 Dec

**No late-season evaluation



Why are so many bucks breeding?

- “Tending bond”
 - 1 buck, 1 doe
 - Buck stays with 1 doe 24-48 hrs

– No herds or “harems”

– No territories



Why are so many bucks breeding?

- Does live in small groups
- Bucks chase individual does
- Most does bred in 2-4 weeks



Why are so many bucks breeding?

Dominance is probably important unless you are the only one to find that doe

Fewer chances to exert dominance if you have to court individual does



Why are so many bucks breeding?

- Competition among bucks
- “Sneaky” tactics
- Tending buck replaced by dominant buck

Why are so many bucks breeding?

- **Competition**

- **Changes over time**

- **How many does in estrous at 1 time?**

- **More competition during early, late rut**

- **What happens if you affect the number of competitors through harvest, etc??**



Breeding Behaviors

- Response to local conditions
- Buck ***breeding success*** depends on...
 - Degree of competition (fighting)
 - Resources
 - Does
 - Age structure, buck:doe ratio
 - Population density



Breeding Behaviors

- Buck breeding success depends on...
 - Buck age
 - Buck body condition
 - ***May vary if conditions change***
 - ***How much control can we exert on the system through management?***



Prospects for Management

In many cases, selective harvest or introduction plans will be highly inefficient for changing population genetic characters

- Many different bucks are breeding
- Most successful bucks will have few fawns
- Can not predict successful breeders on the basis of antler characteristics

Remaining Unknowns

- What are the effects of more extreme management strategies?
 - High fencing of “small” properties
 - Distribution of breeding changes in small areas
 - Single bucks can monopolize breeding
 - Potential for inbreeding?
 - Predictability is still a problem- who breeds??

Remaining Unknowns

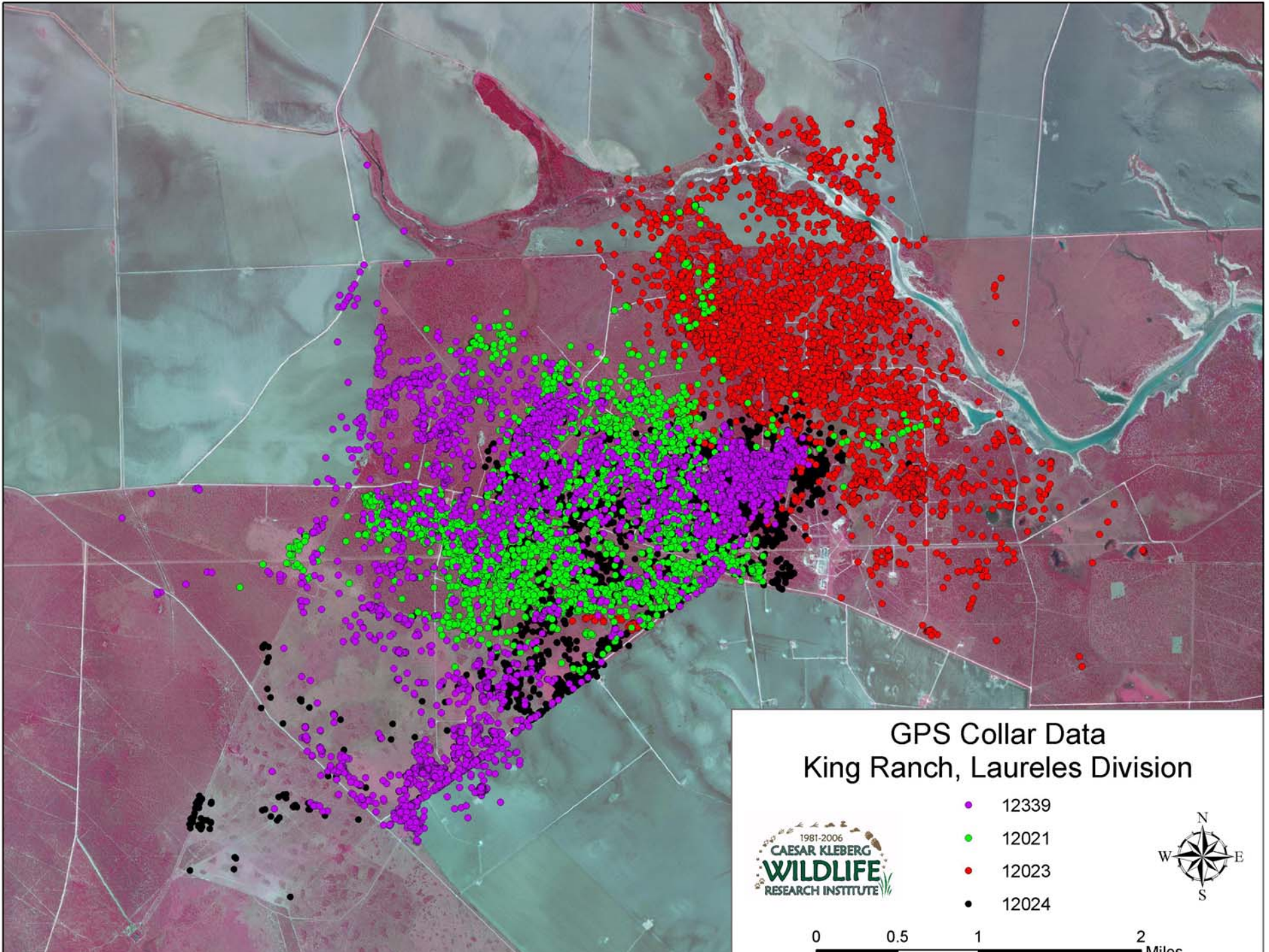
- Why are some bucks more successful?
- Individual deer differ widely in movement patterns and activity level- is this related to breeding success?

Remaining Unknowns

- Why do some bucks breed early in life, while others breed later or not at all?
- What about doe movements? Are does completely passive or do they “choose” bucks?







GPS Collar Data King Ranch, Laureles Division

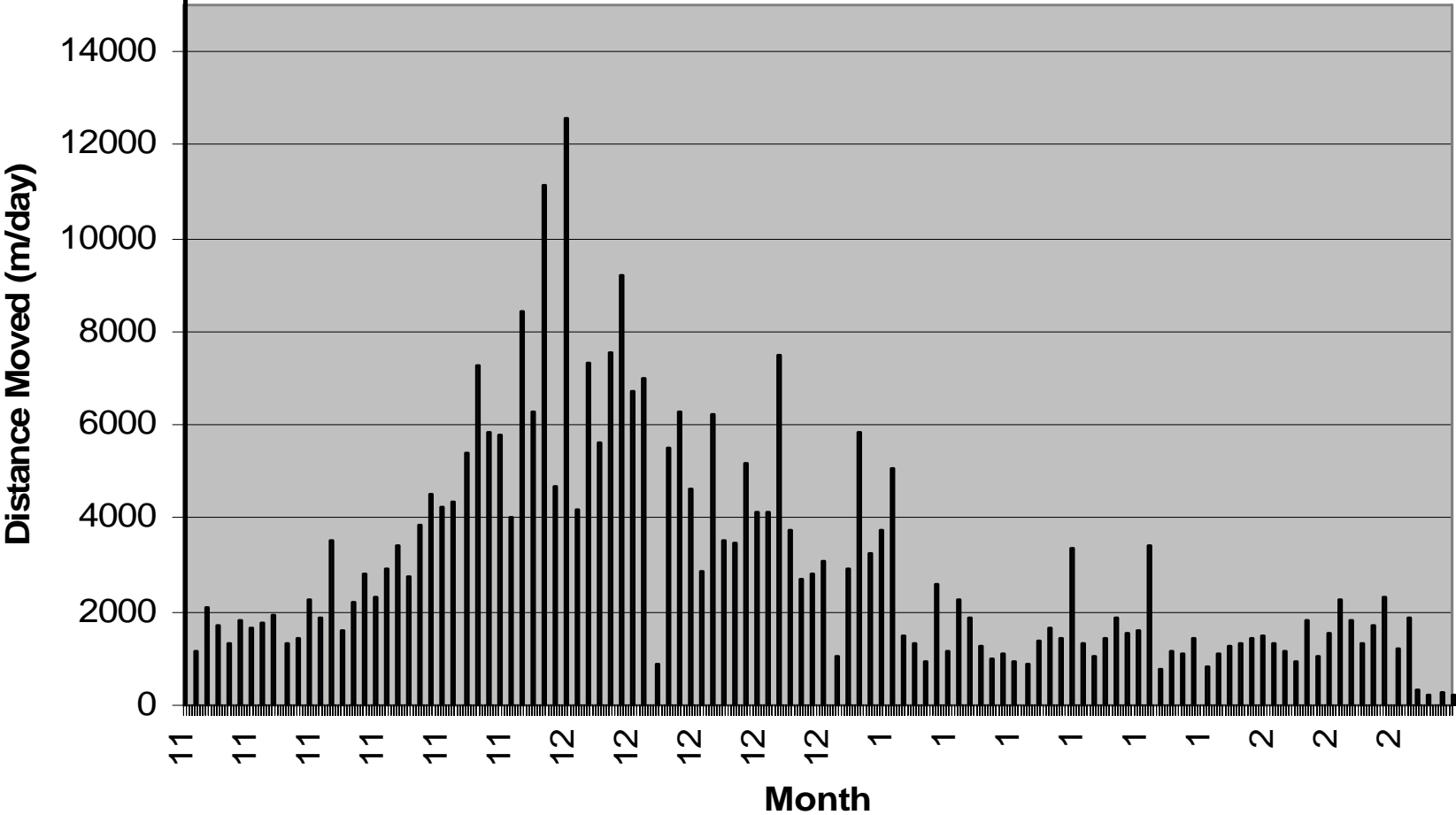


- 12339
- 12021
- 12023
- 12024



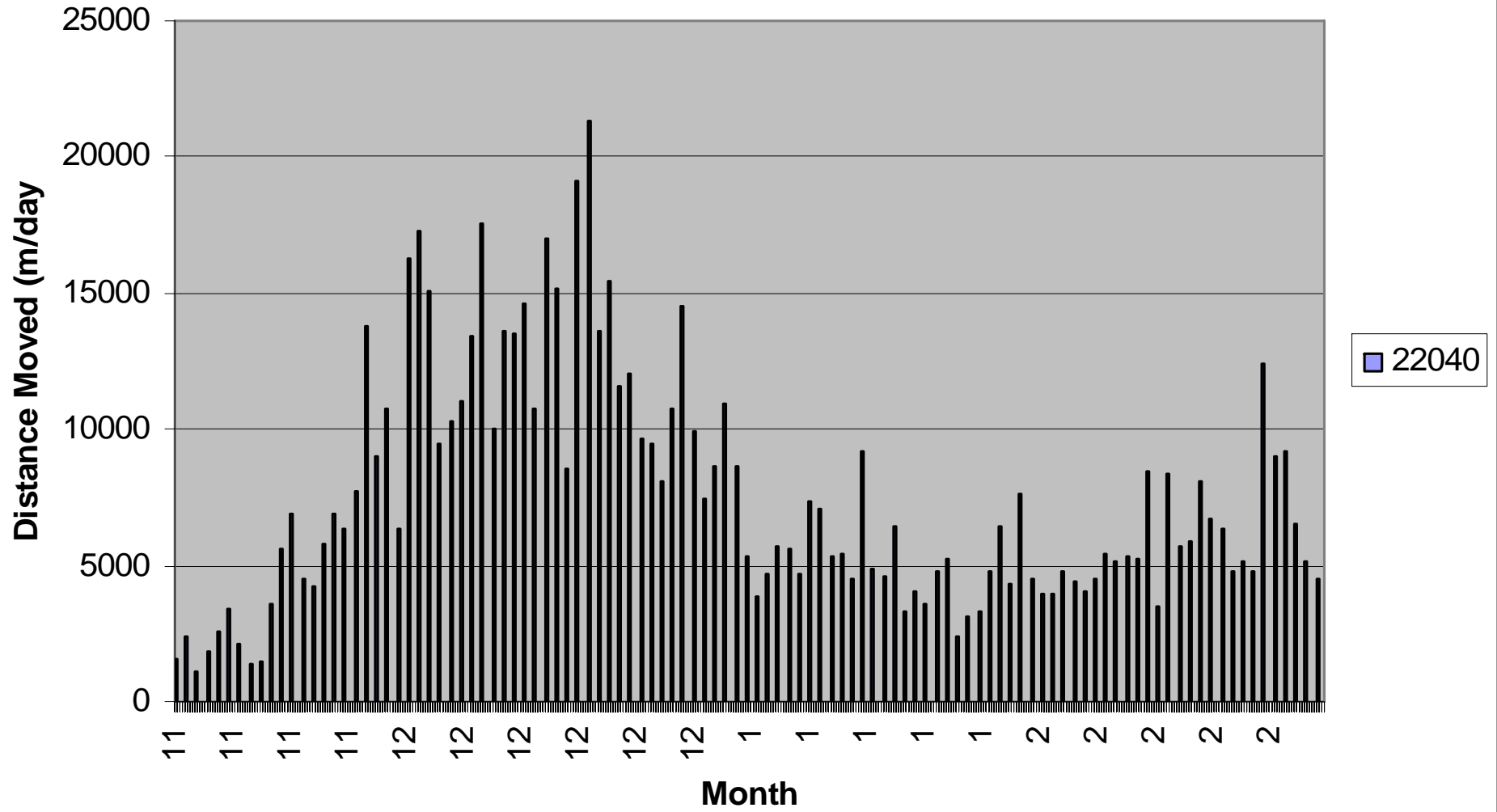
0 0.5 1 2 Miles

22013

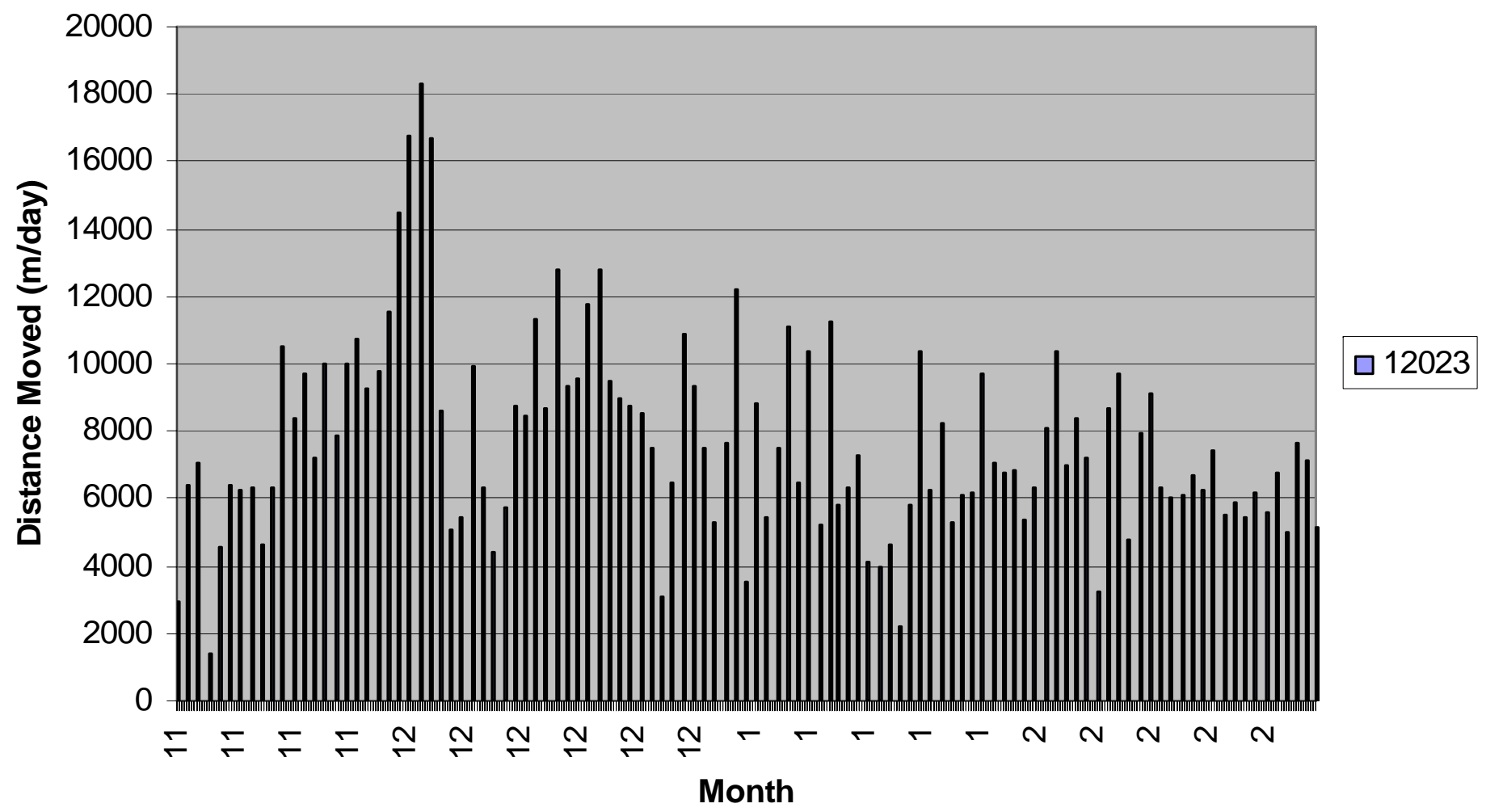


22013

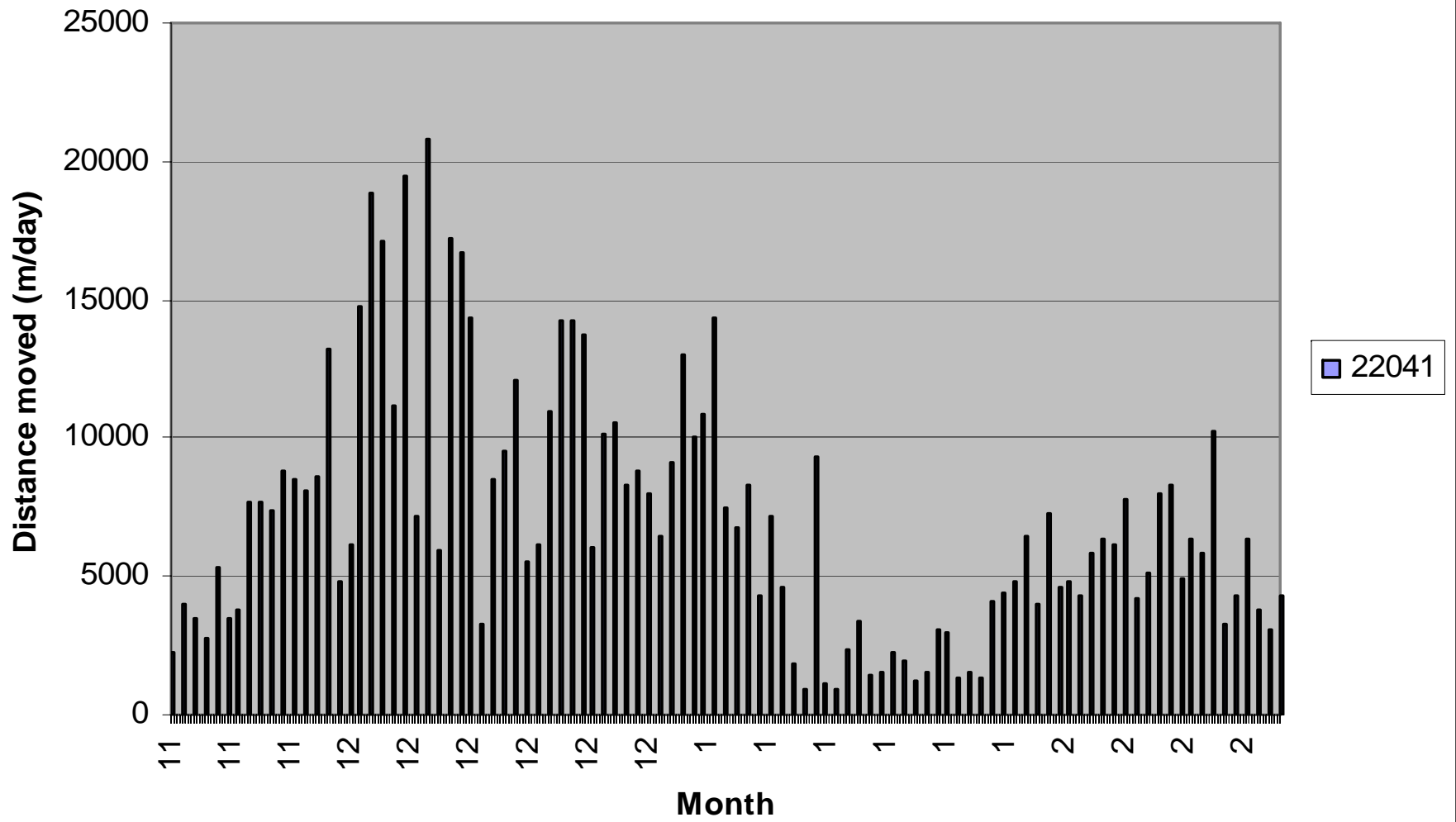
22040



12023



22041





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Wildlife Research and Education

Questions??

