

Greater Sage-Grouse Biology & Habitat Requirements in Colorado

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Avian Research Biologist



Presentation Outline

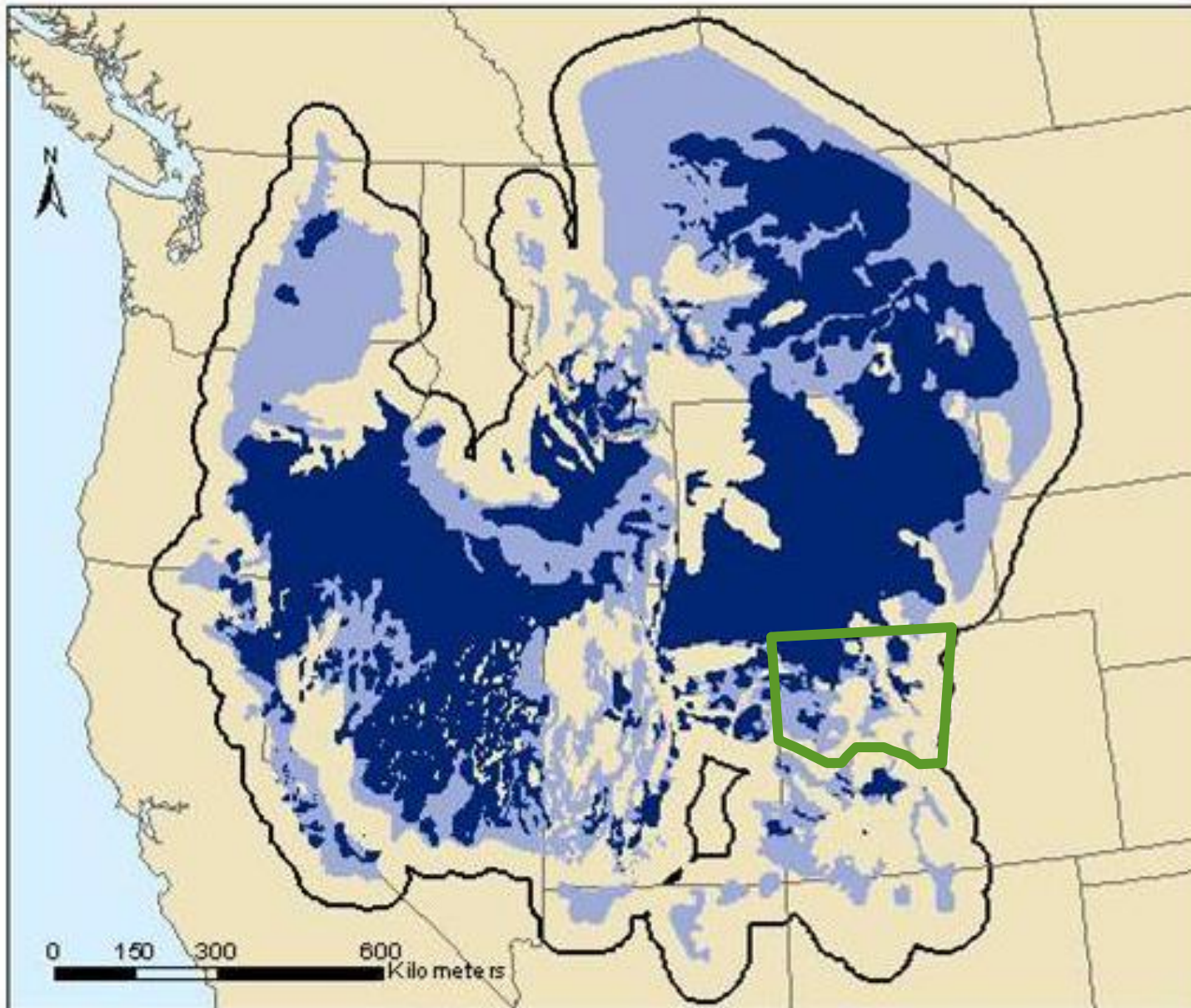
- **Sage-Grouse Biology**
 - **Distribution**
 - **Demography – vital rates**
 - **Productivity - nest success**
 - **Survival**
- **Sage-Grouse Seasonal Habitat**
 - **Scales of Selection**
 - **Fidelity**
 - **Movements**
- **Colorado Habitat Structural Guidelines**

SAGE-GROUSE

**GREATER
SAGE-GROUSE**



Sage-Grouse Distribution

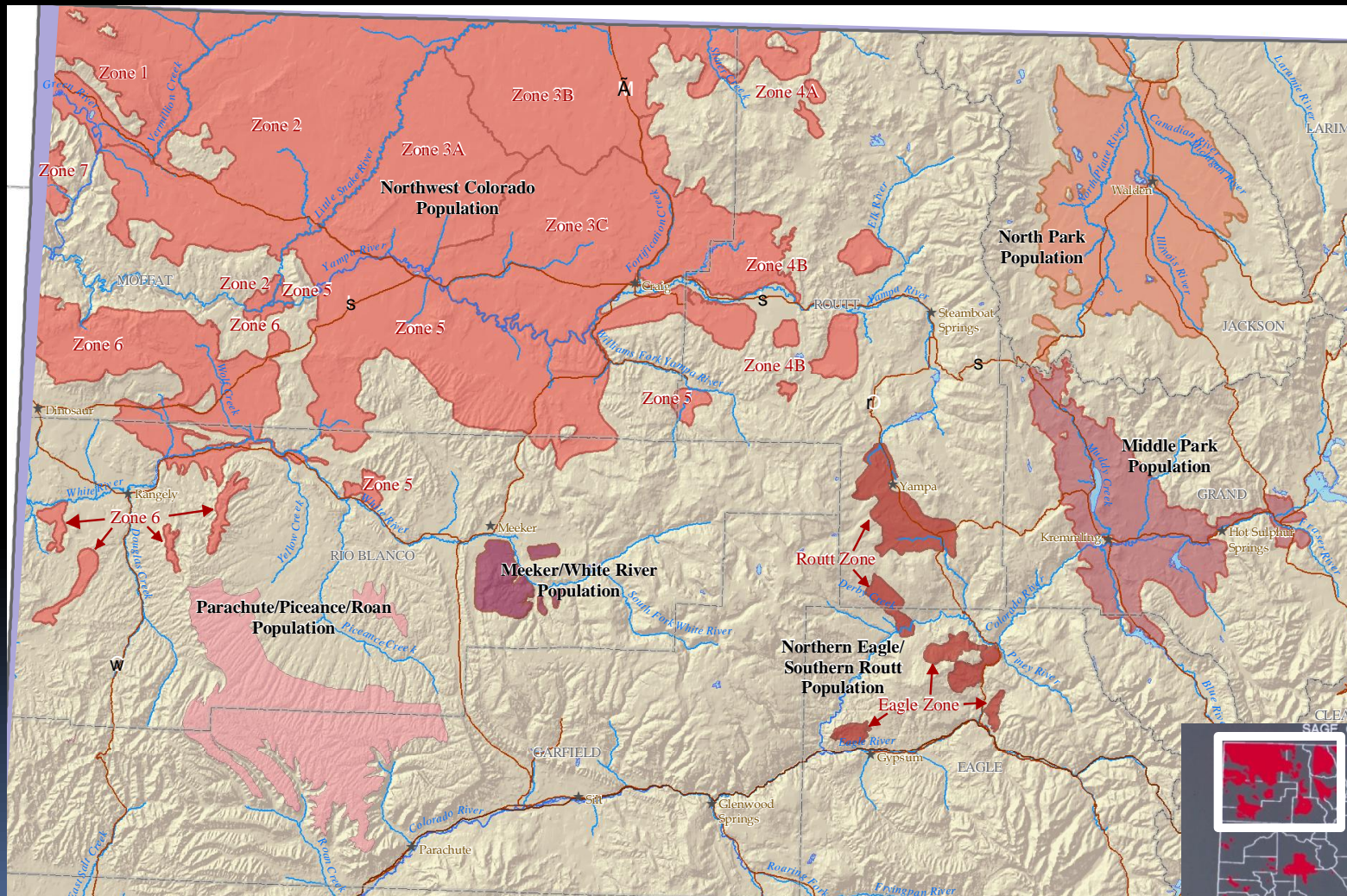


- Pre-Settlement Distribution of Potential Habitat
- Current Sage-Grouse Range
- State / Province Boundaries
- Conservation Assessment Boundary

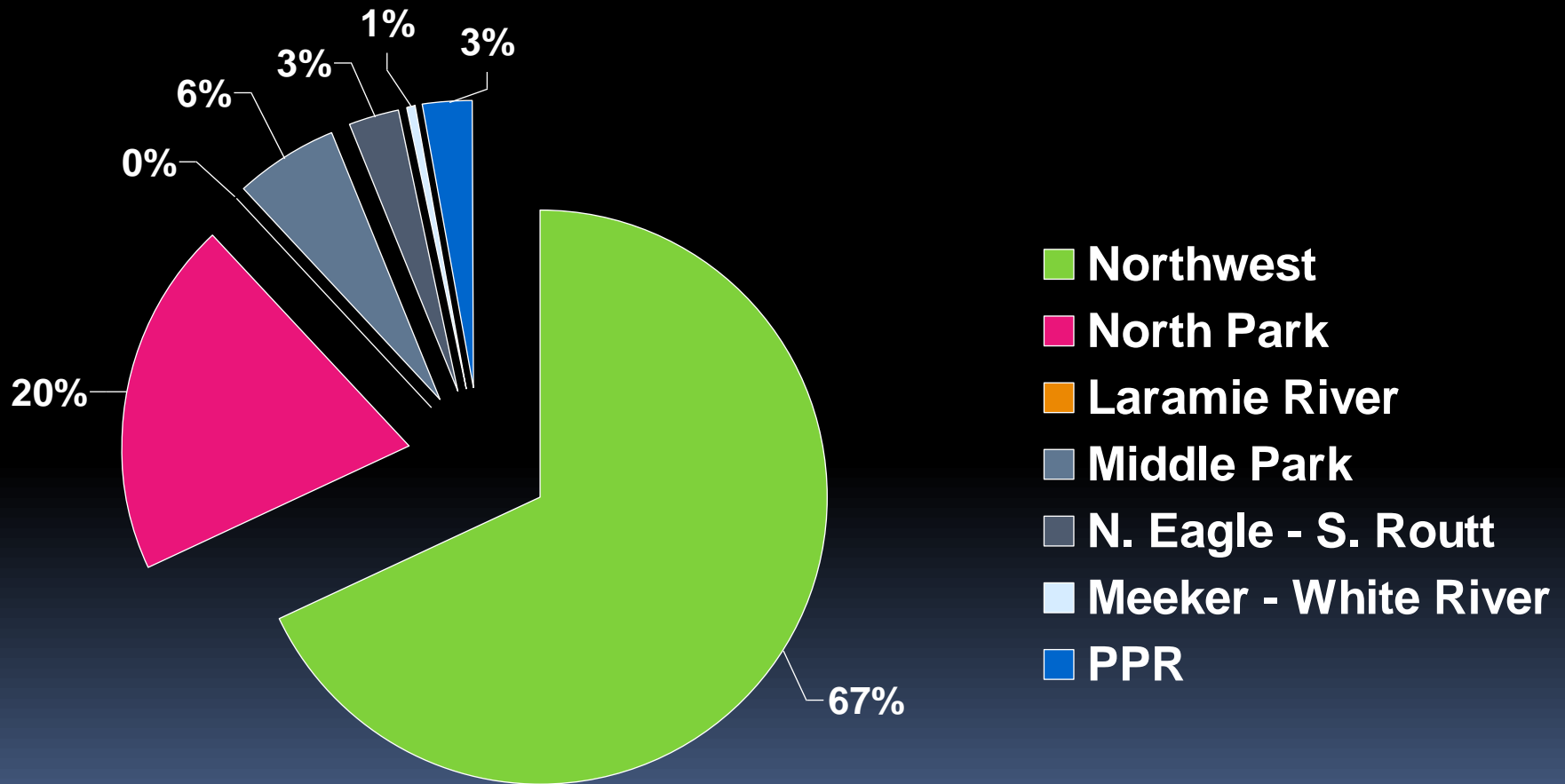


Sage-Grouse

Current Distribution-Colorado



Greater Sage-Grouse



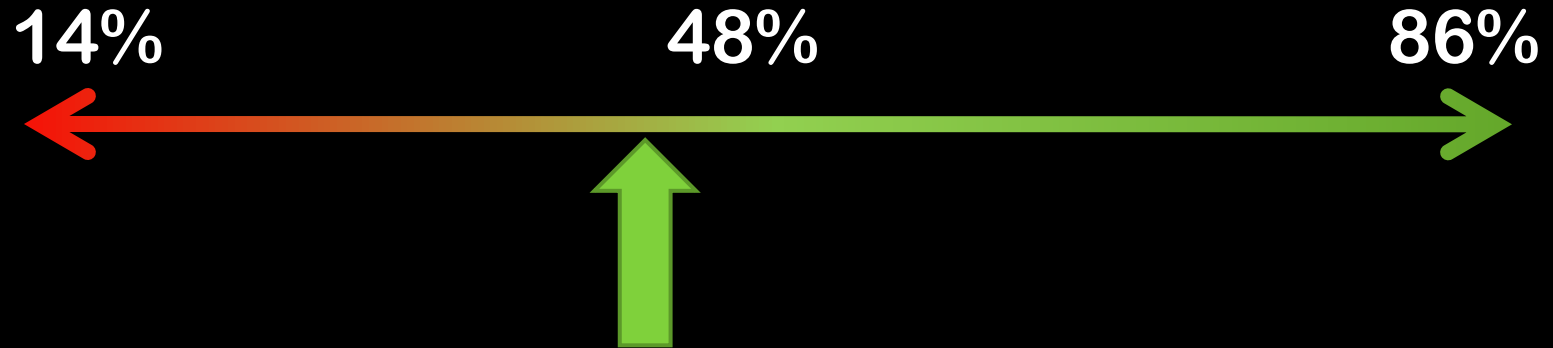
Demography

Vital Rates



Demography

Apparent Nest Success



4 Research Projects (7 years)
46% (n = 305/684)
Range (33 – 55%)



Demography

Chick Survival



Demography

Chick Survival

0.30

0.39

0.36 - 0.53

0.5

0.12

21 days

n = 75

28 days

n = 506

35 days

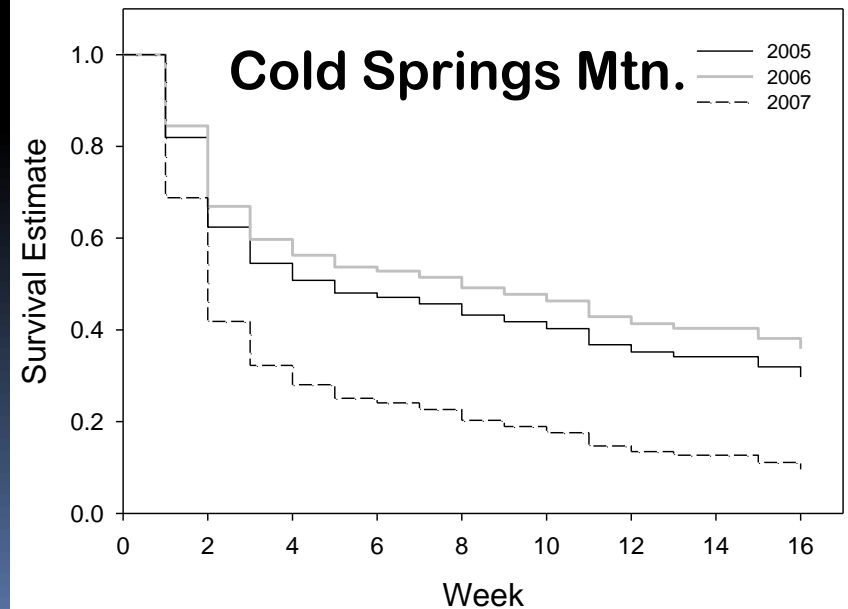
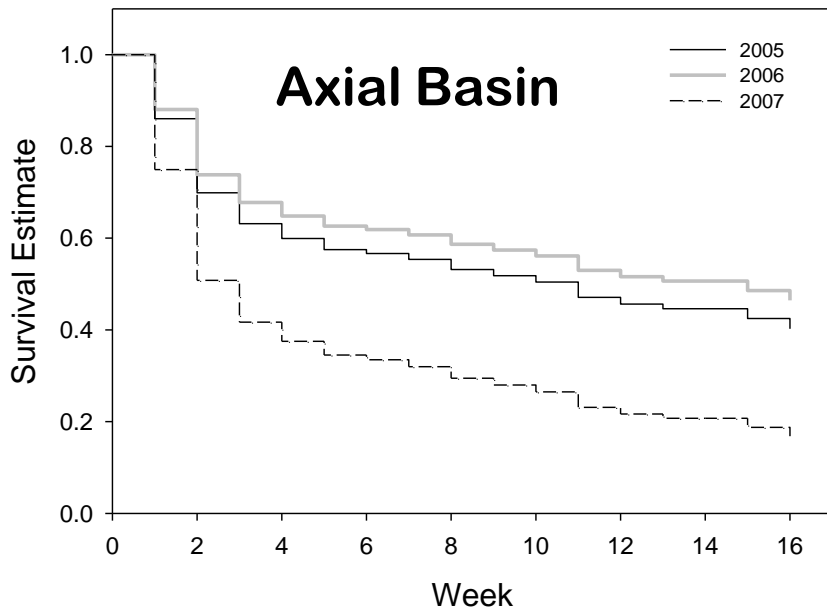
n = 431

42 days

n = 150

56 days

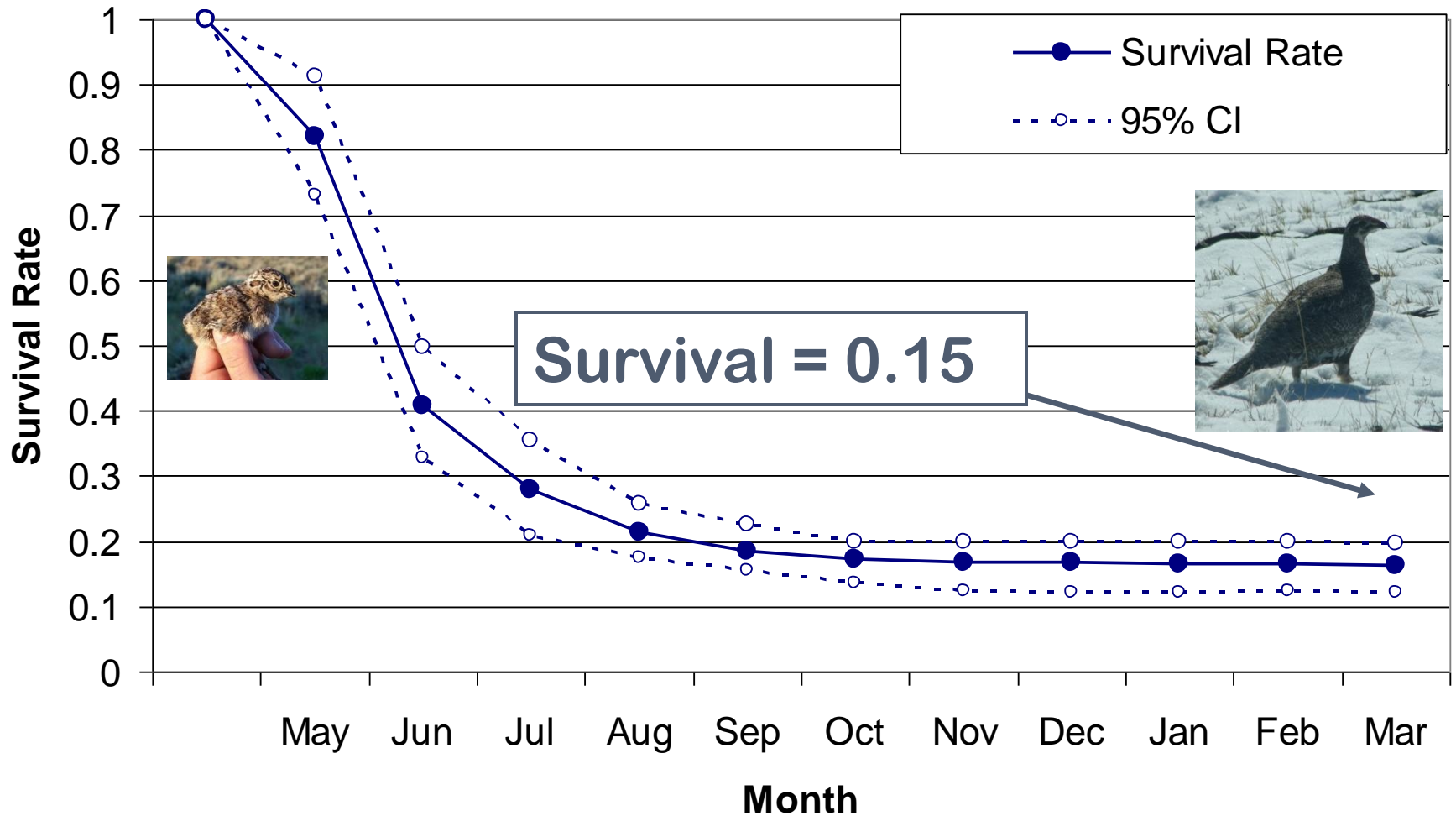
n = 41



Demography

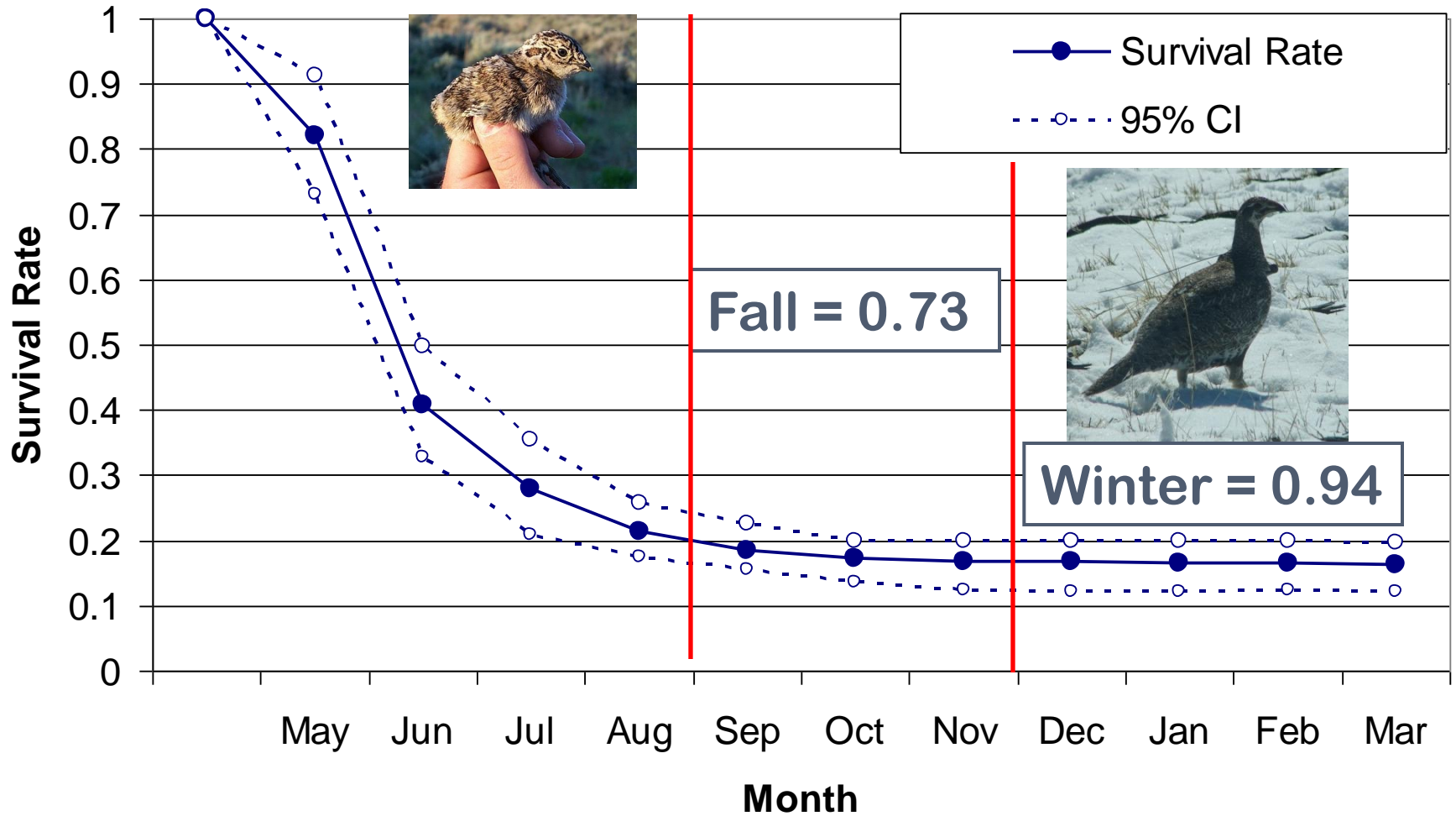
Chick Survival

2005 – 2008 (n = 415)



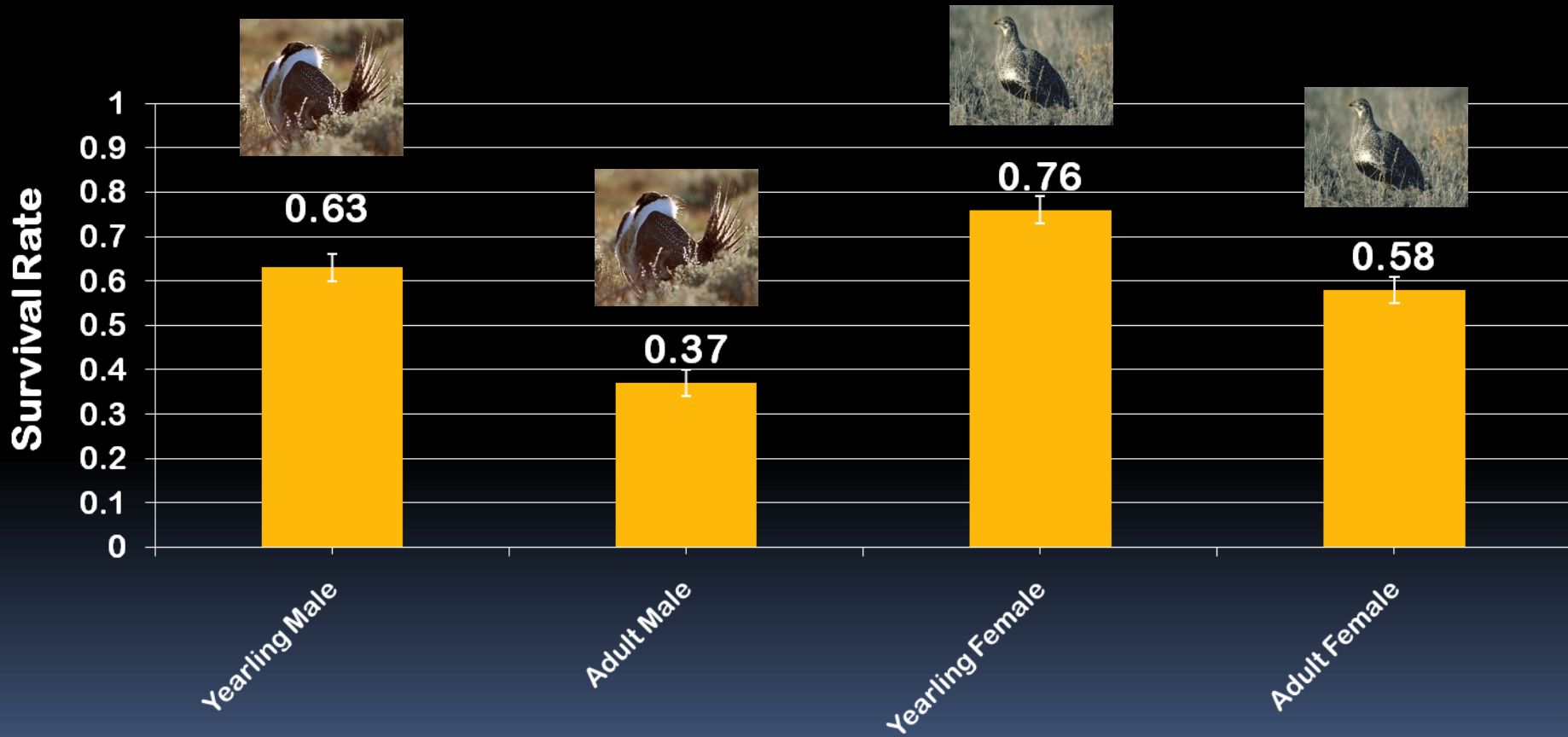
Demography

Chick Survival 2005 – 2008 (n = 415)



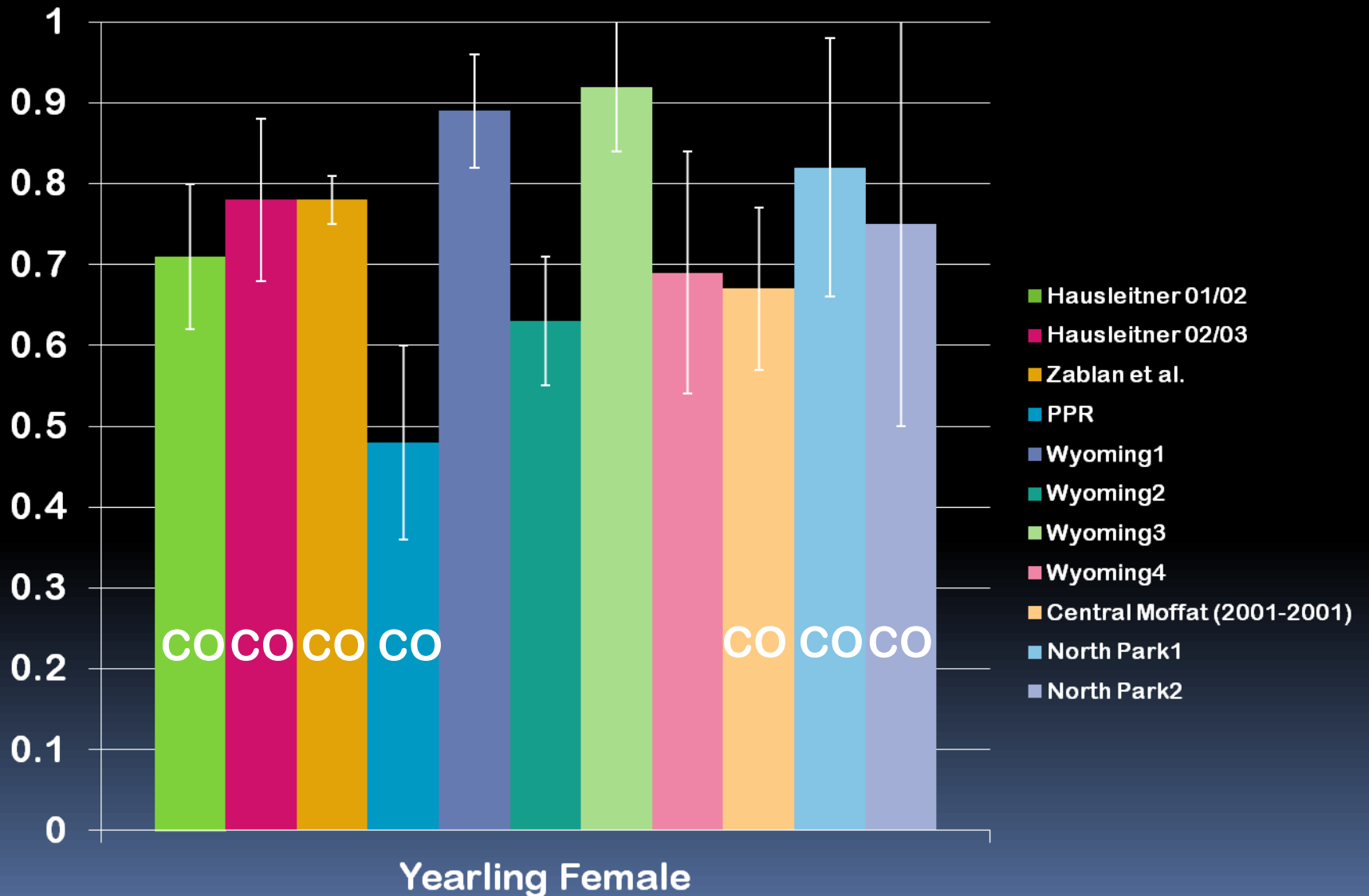
Demography

Yearling & Adult Male/Female Survival



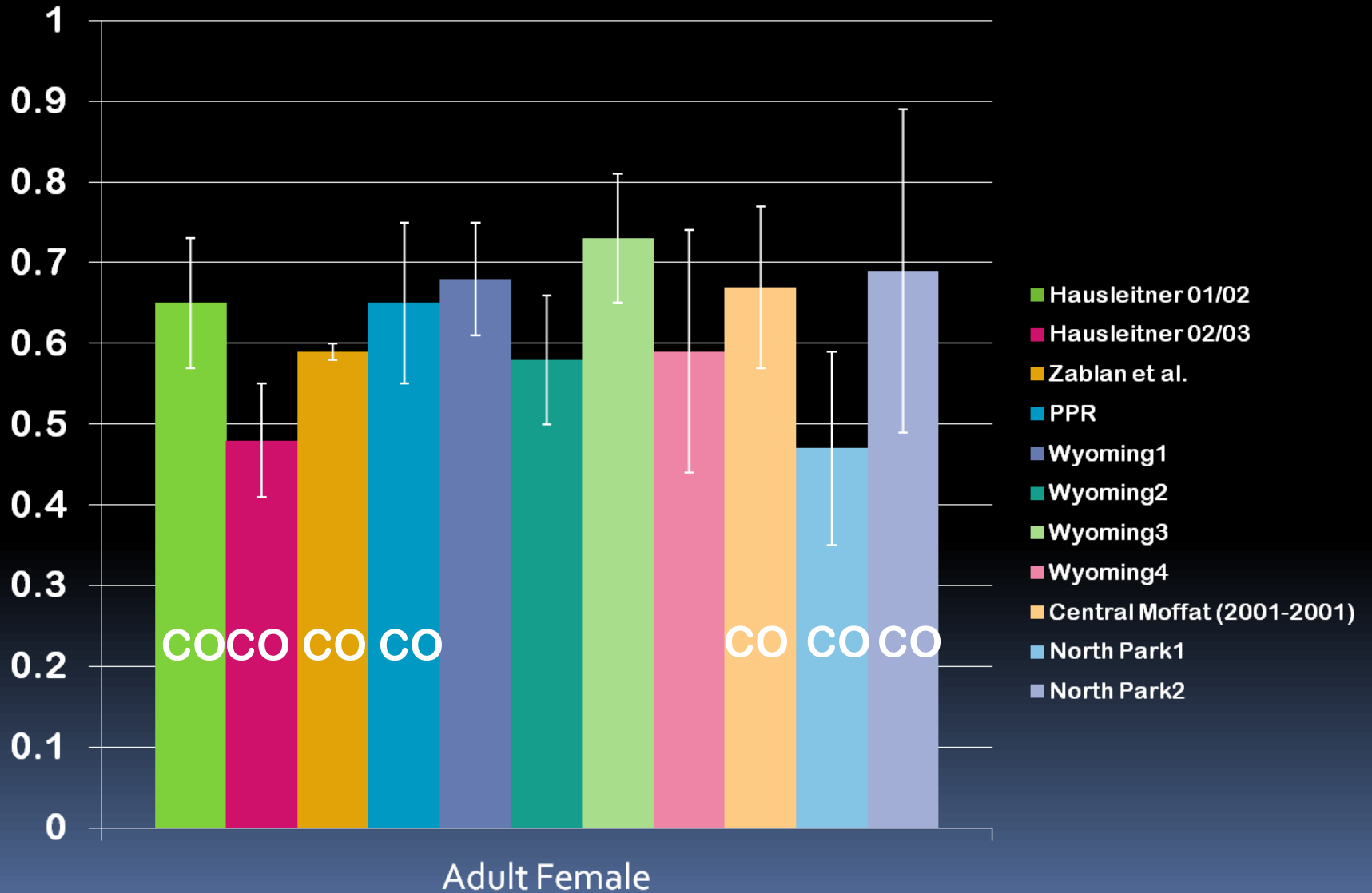
Demography

Yearling Survival



Demography

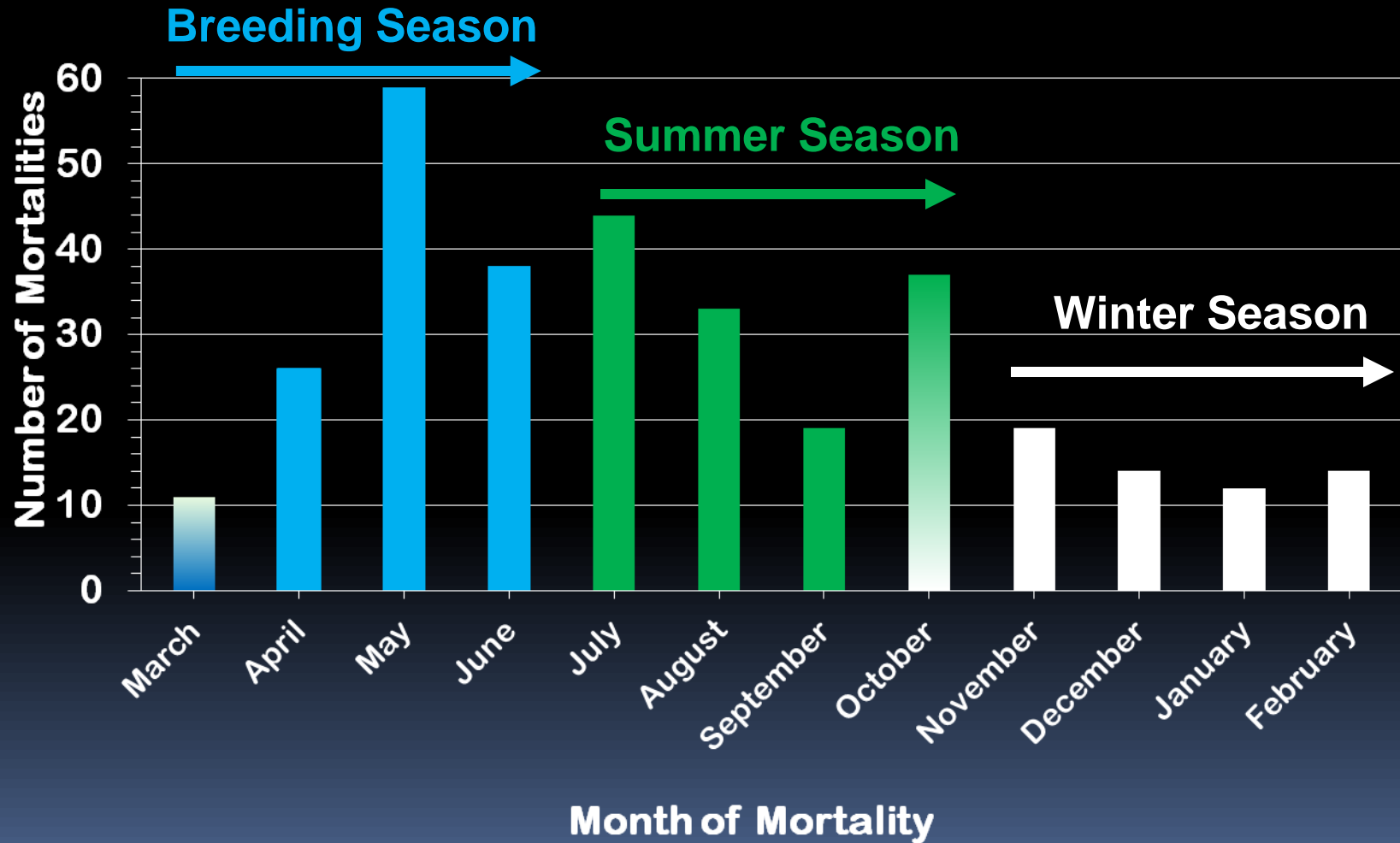
Adult Survival



Demography

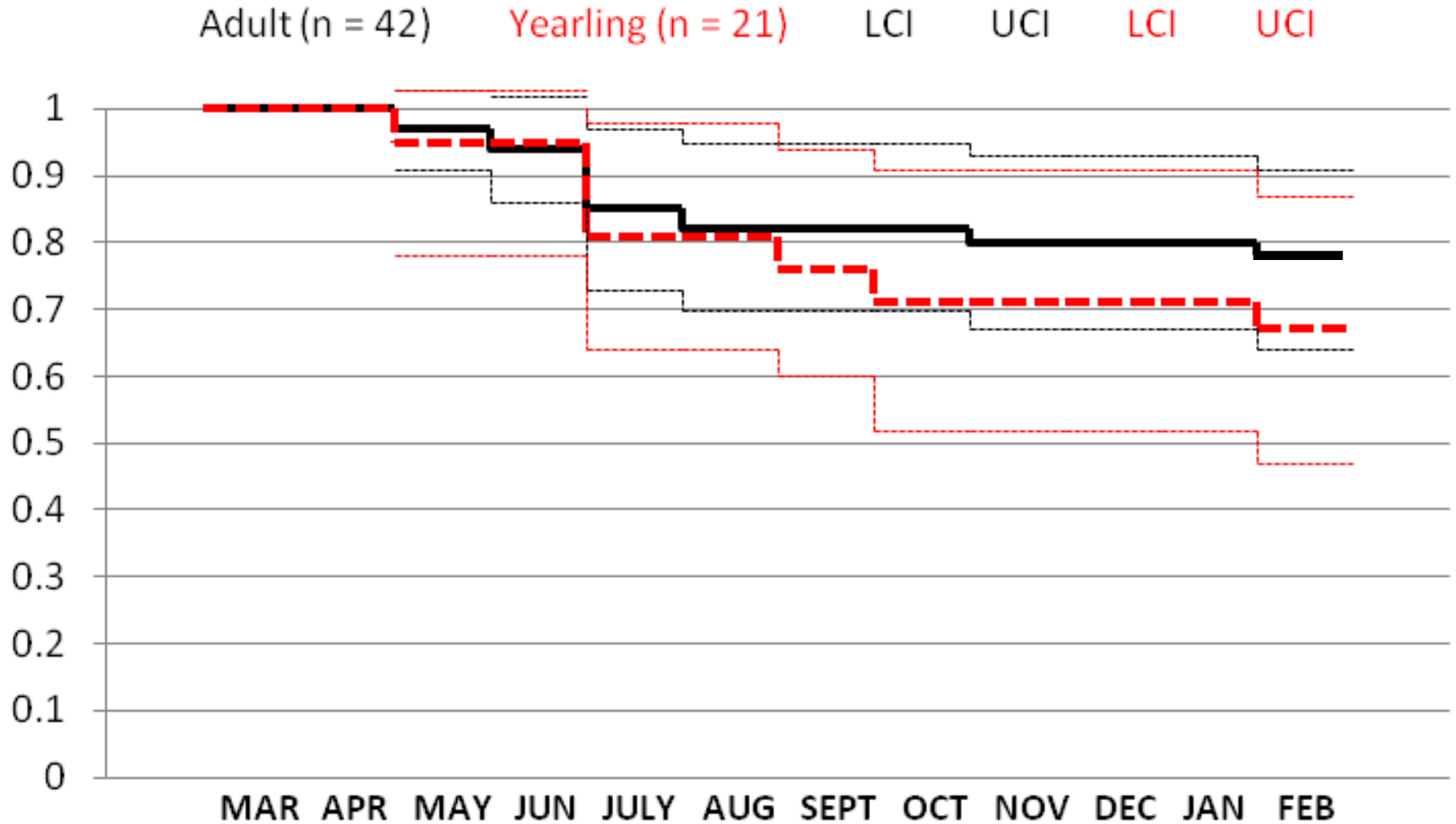
Monthly Mortality

n = 320



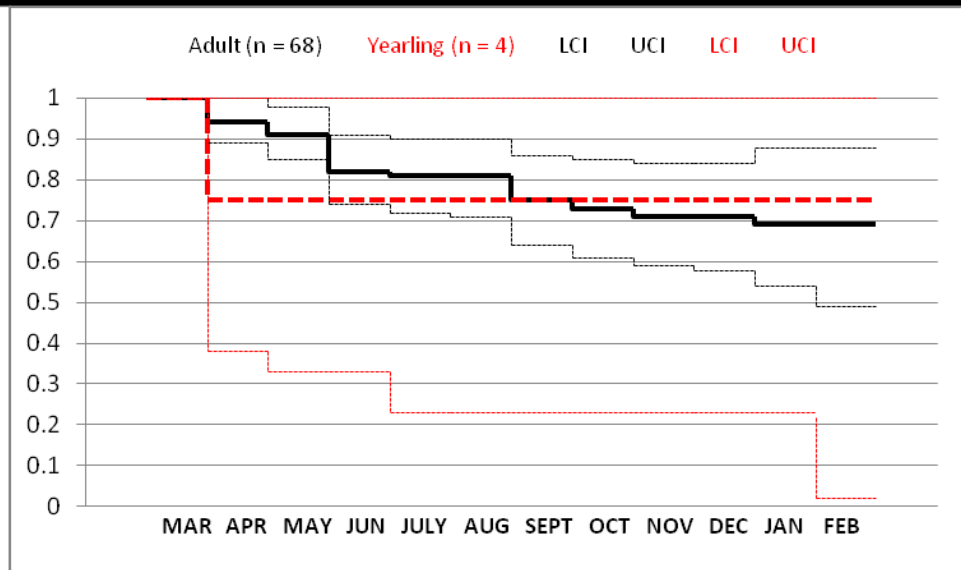
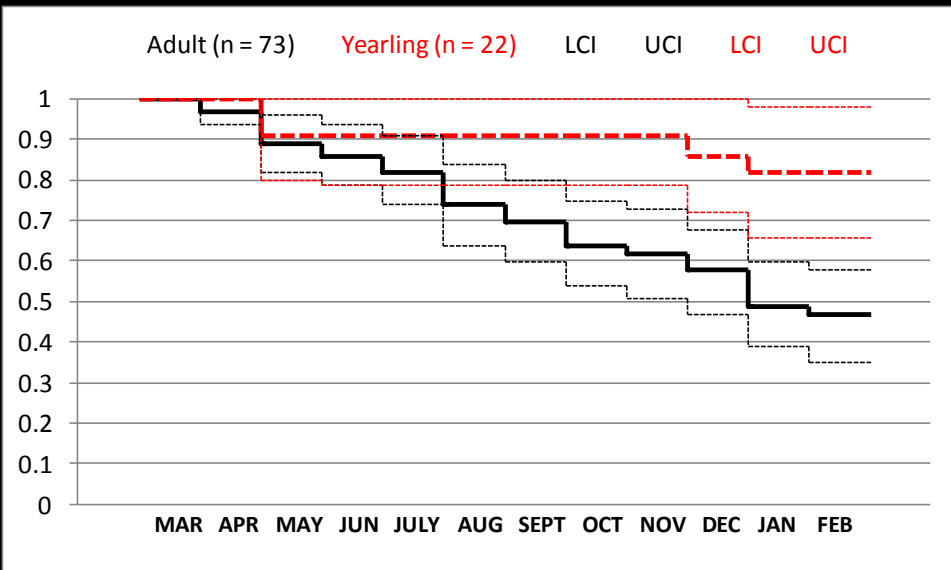
Demography

Female Annual Survival (Central Moffat Co.)

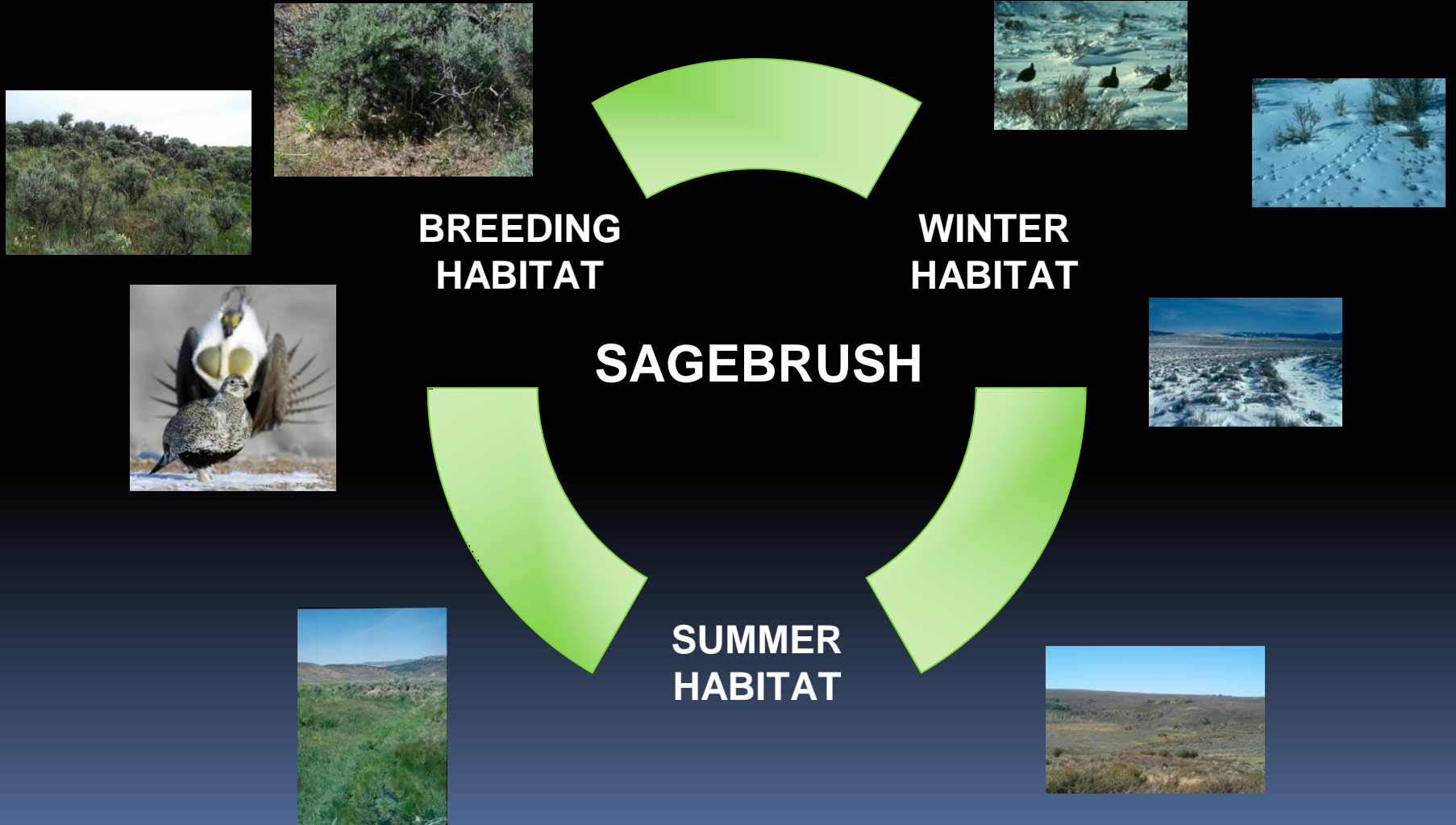


Demography

Female Annual Survival (North Park)



Sage-Grouse Seasonal Habitat



Sage-Grouse Seasonal Habitat



EBRUSH



Sage-Grouse Seasonal Habitat



**SUMMER
HABITAT**

Sage-Grouse Seasonal Habitat

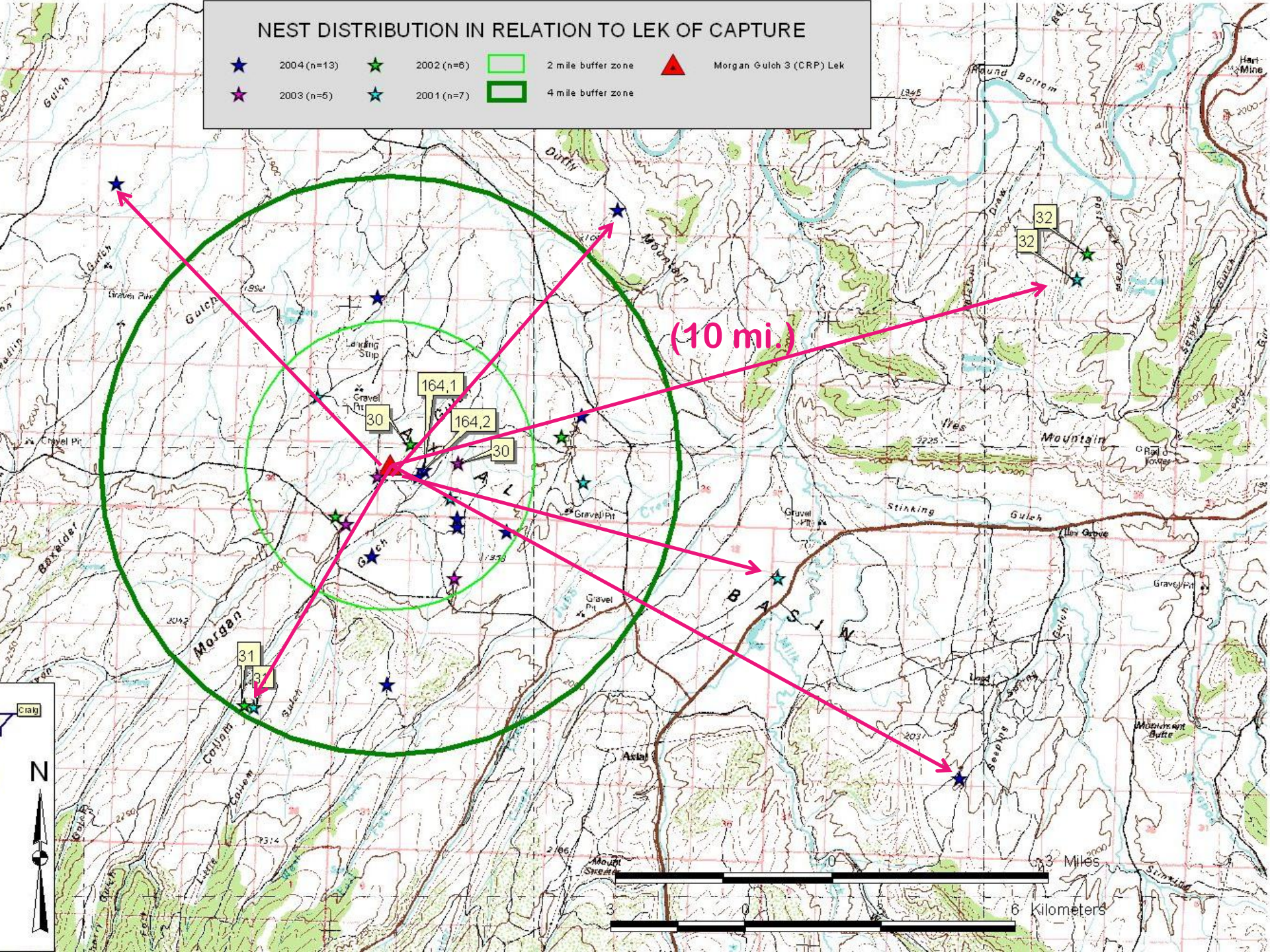


GEBR



NEST DISTRIBUTION IN RELATION TO LEK OF CAPTURE

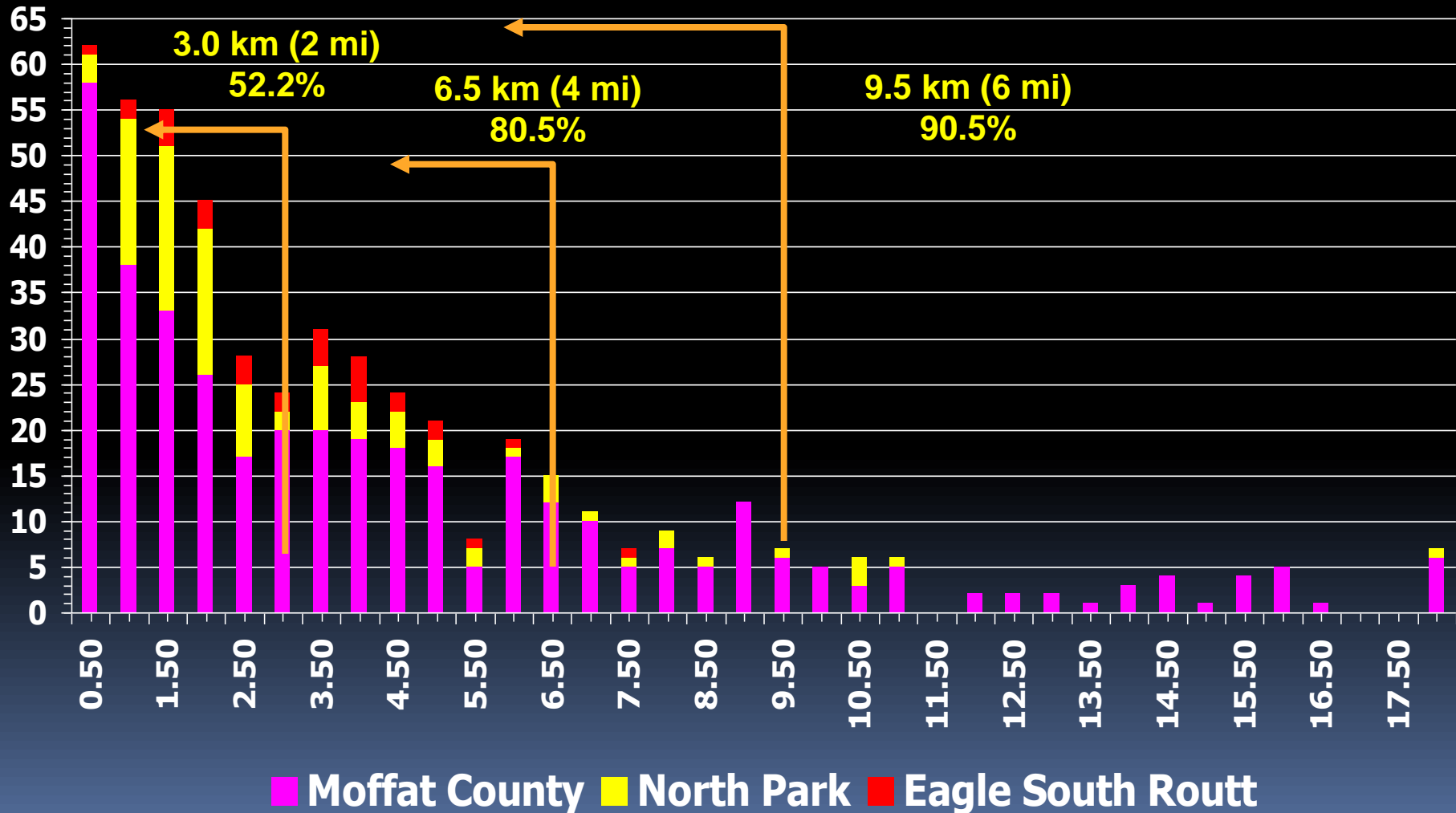
- ★ 2004 (n=13) ★ 2002 (n=6) □ 2 mile buffer zone ▲ Morgan Gulch 3 (CRP) Lek
- ★ 2003 (n=5) ★ 2001 (n=7) □ 4 mile buffer zone



(10 mi.)

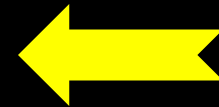


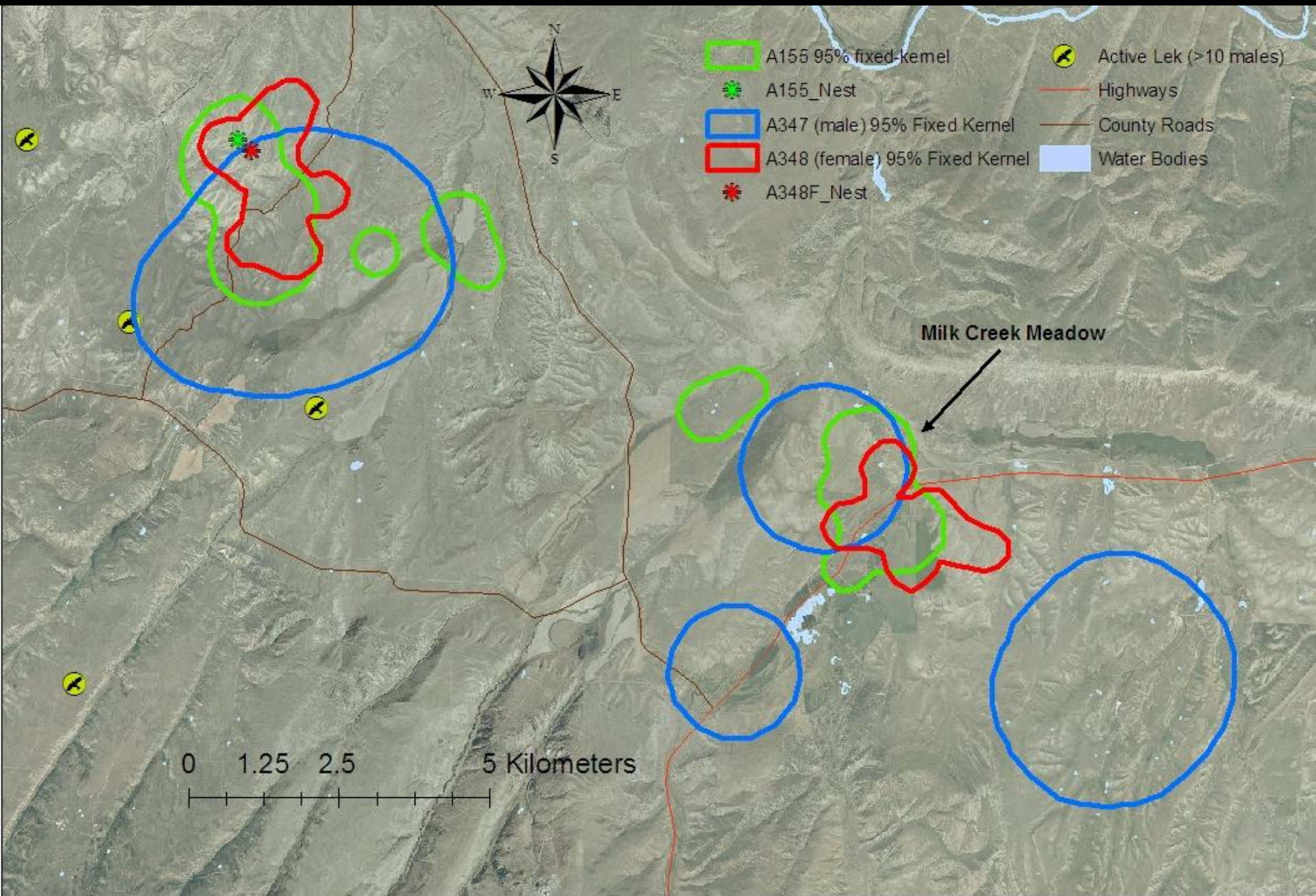
Greater Sage-Grouse Lek of Capture to Nest Distribution 1978 – 2005 (n = 518)



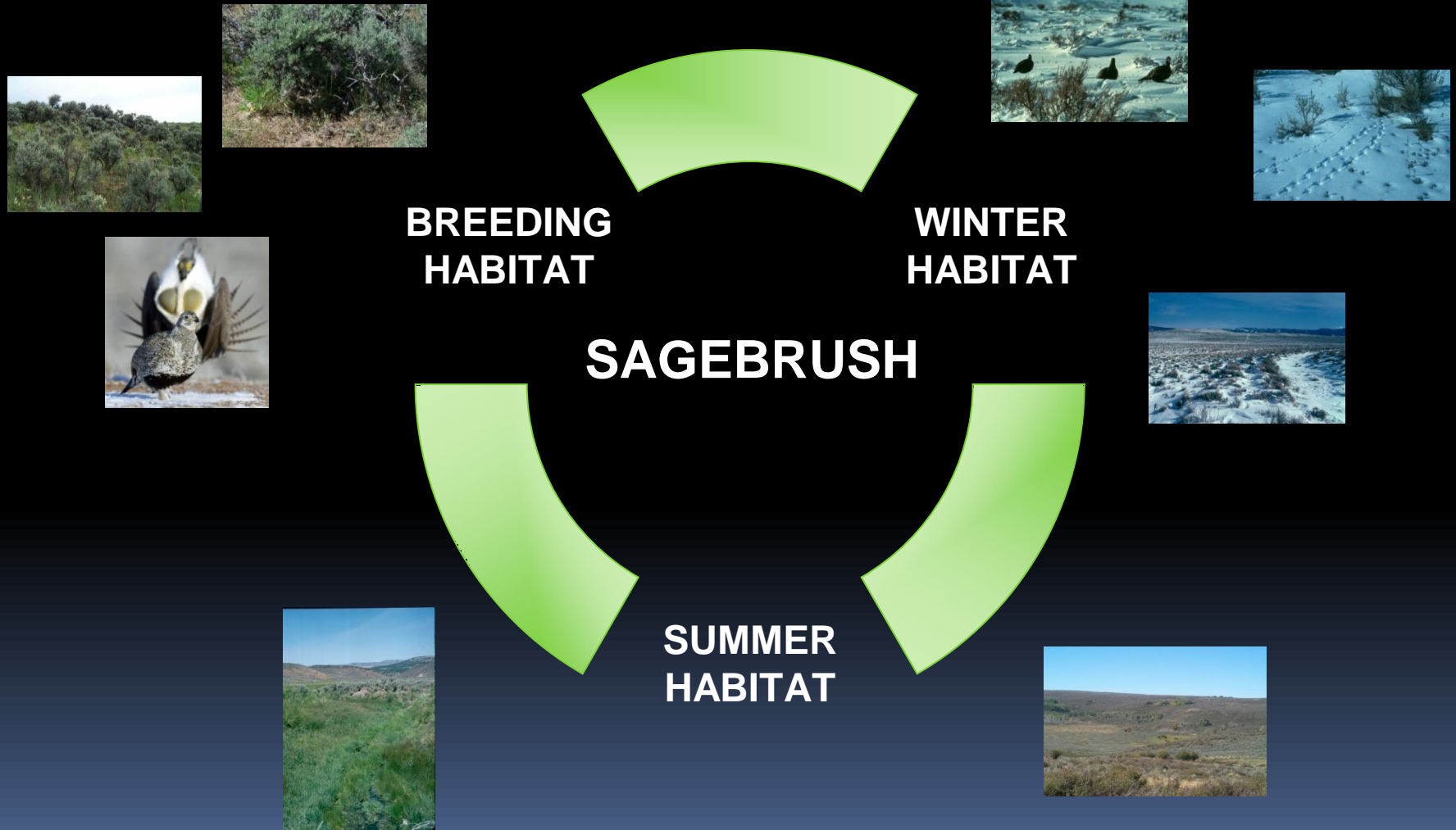
NEST SITE FIDELITY

Generational Breeding Habitat Fidelity
Mother and Daughter





Sage-Grouse Seasonal Habitat



Scale of Habitat Selection

(Johnson 1980)

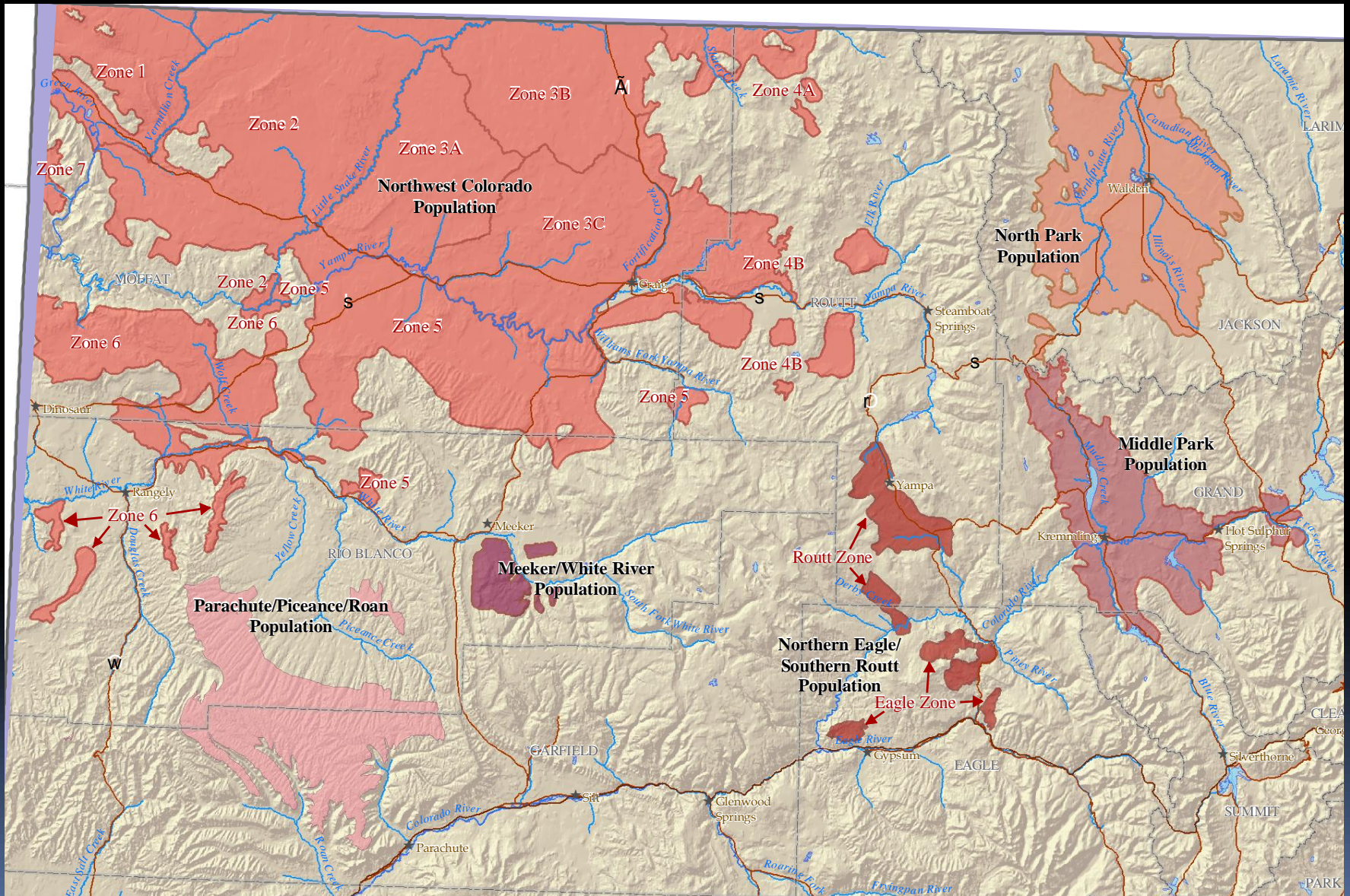
- **1st Order**
 - **Geographical range of the population of interest**
- **2nd Order**
 - **Home range of individuals or subpopulations of interest (e.g. lek area or lek complex)**
- **3rd Order**
 - **Seasonal habitats within the home range**
- **4th Order**
 - **Structural or quality and quantity of food or cover**

Scale of Habitat Selection

(Johnson 1980)

- **1st Order**
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 - Structural or quality and quantity of food or cover

1st Order Selection

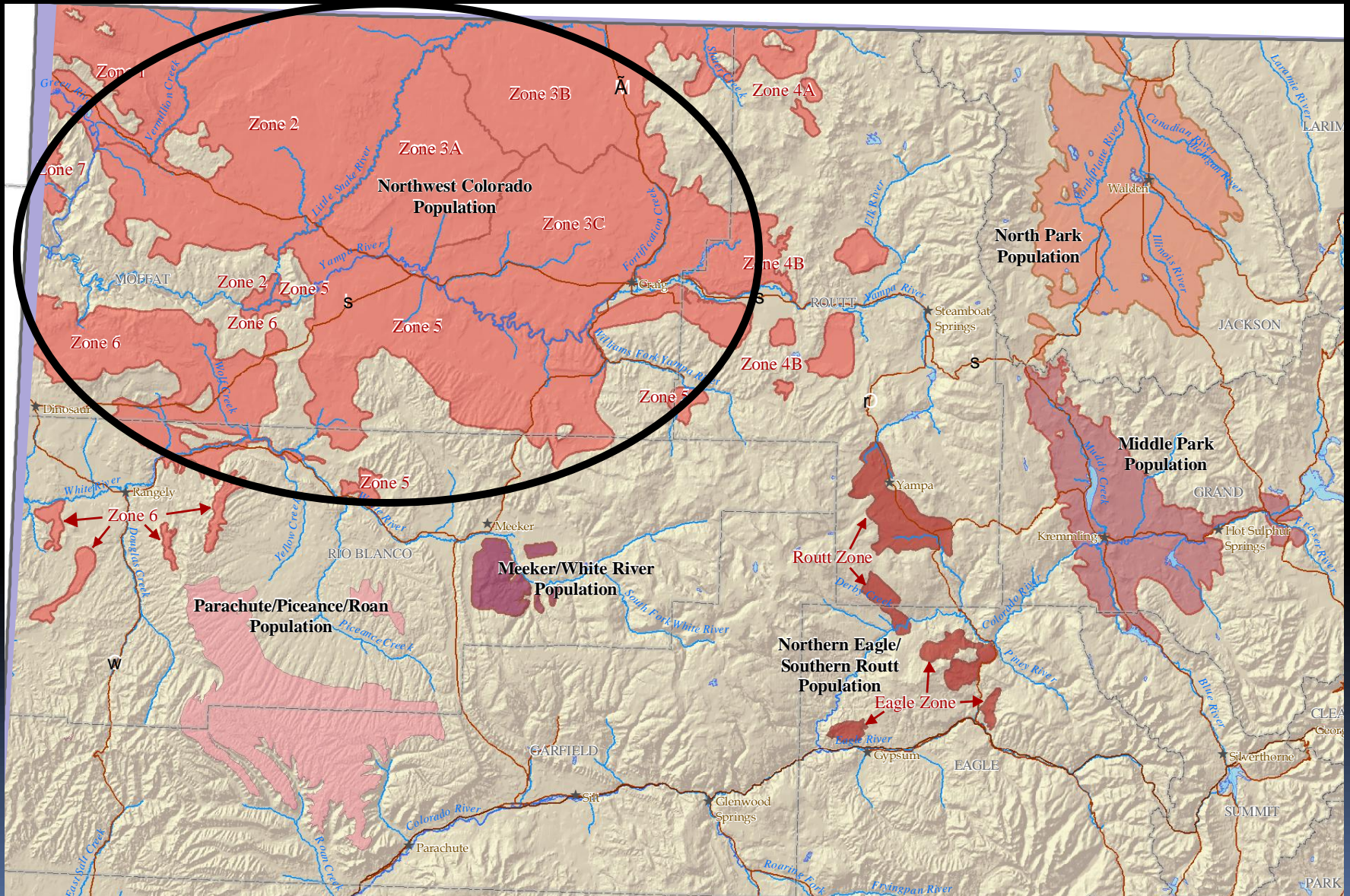


Scale of Habitat Selection

(Johnson 1980)

- 1st Order
 - Geographical range of the population of interest
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 - Seasonal habitats within the home range
- 4th Order
 - Structural or quality and quantity of food or cover

2nd Order Selection



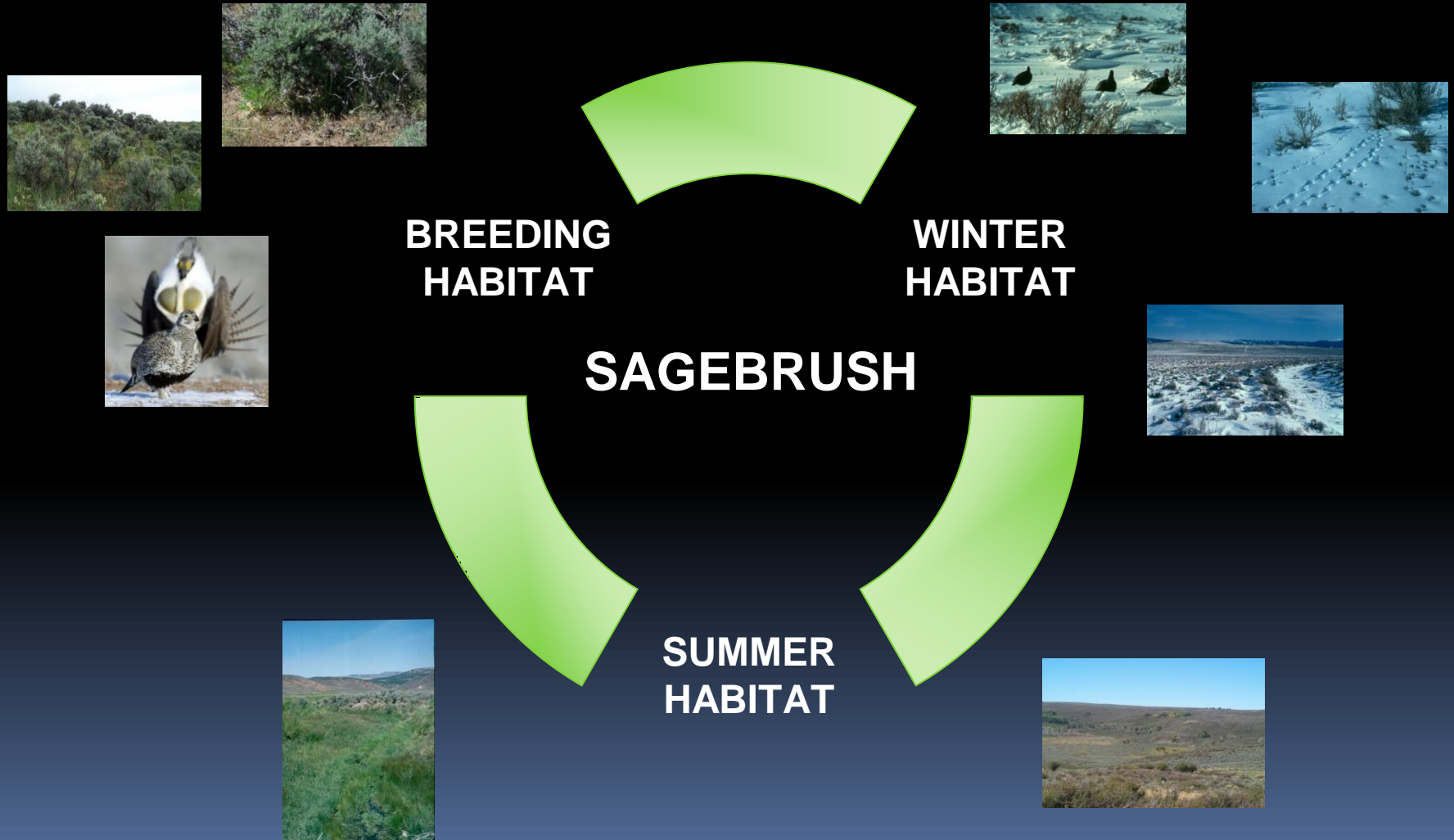
Scale of Habitat Selection

(Johnson 1980)

- 1st Order
 - Geographical range of the population of interest
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- 4th Order
 - Structural or quality and quantity of food or cover

Sage-Grouse Habitat Selection

Seasonal (3rd Order) Habitat Configuration

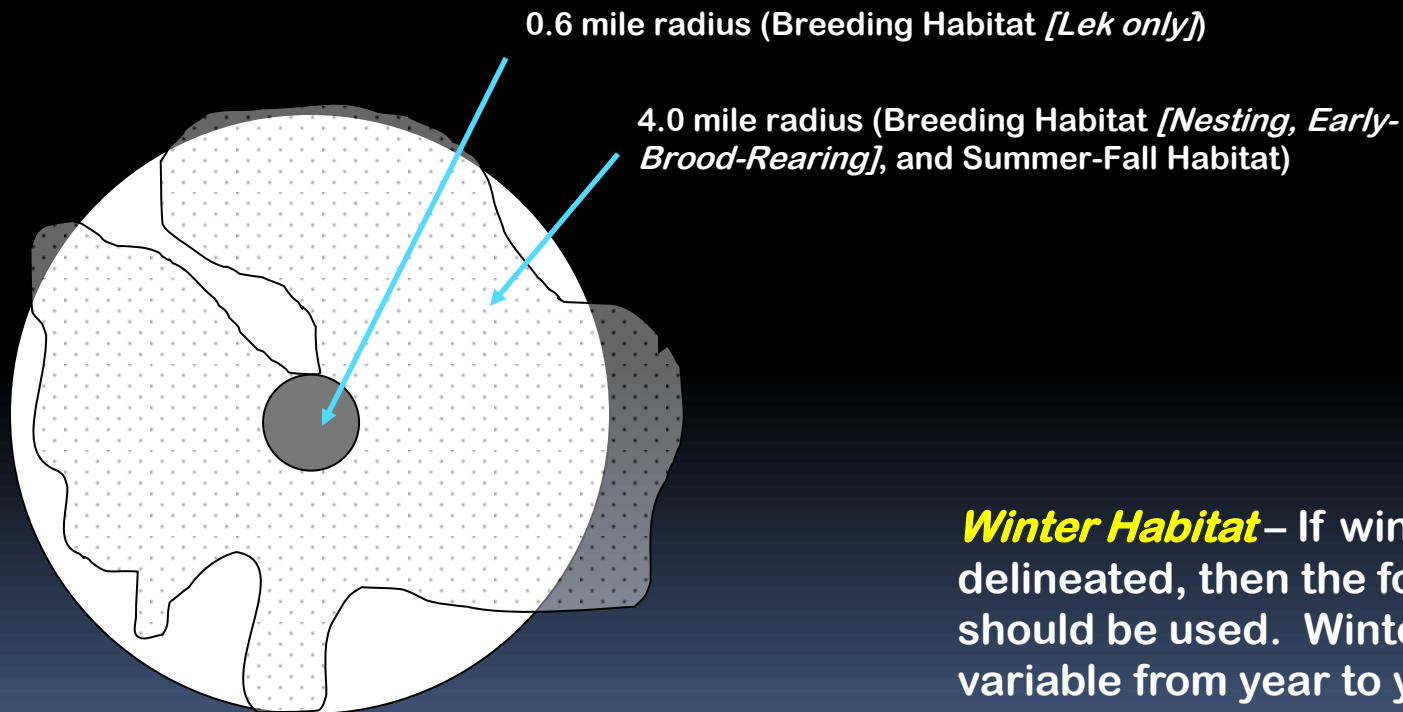


Unmapped Seasonal Habitats

Breeding Habitat and Summer-Fall Habitat - If these seasonal habitats are not mapped and field-validated, they should be designated by 2 concentric circles around active leks (Fig. B-1).

Mapped Seasonal Habitats

If seasonal habitats have been mapped (Fig. B-1), the following guidelines should be followed in, and relative to, the mapped habitat.



Winter Habitat – If winter habitat is not delineated, then the following guidance should be used. Winter habitat is highly variable from year to year, depending upon winter conditions (especially snow depth).

Mapping Seasonal Habitat

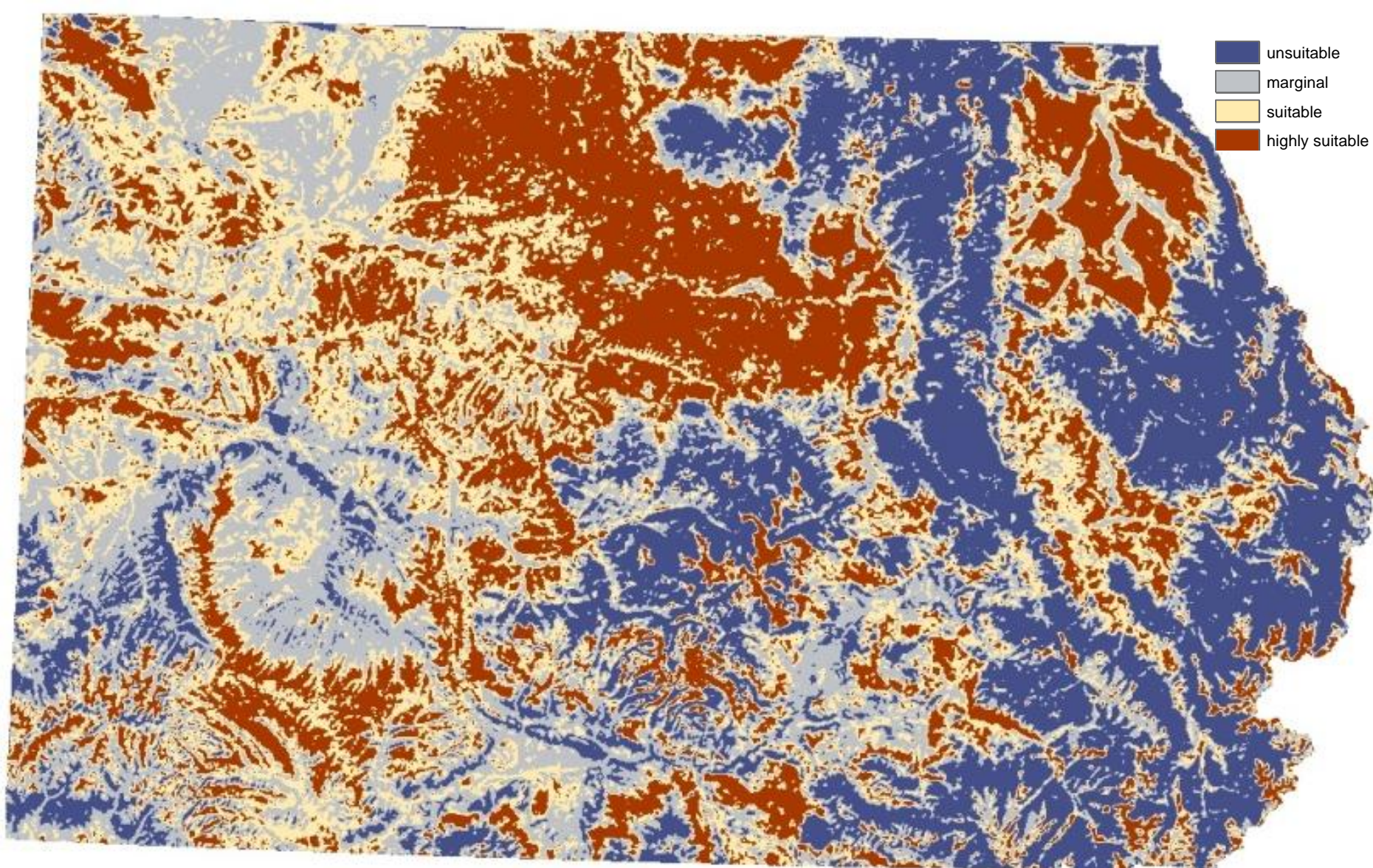
9.1.1.9 Define GrSG seasonal habitats **and map them into the GIS database.**

Incorporate GIS modeling techniques such as slope and aspect, observational data, and habitat assessment data into the seasonal habitat definitions.

9.1.1.10 Evaluate the **amount and spatial arrangement of GrSG habitat** in Colorado.

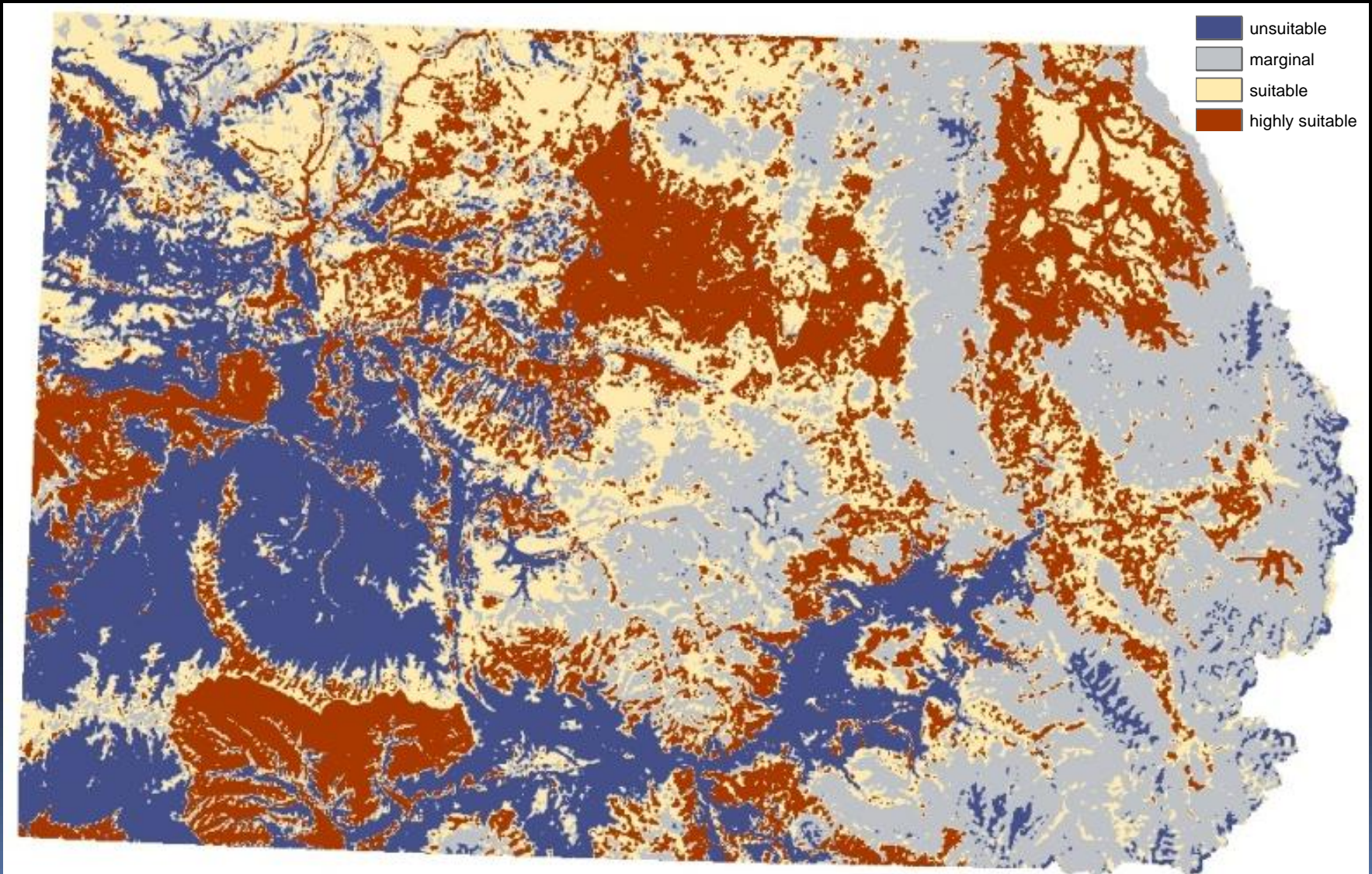
Sage-Grouse Habitat Selection

Seasonal (3rd Order) Breeding Habitat



Sage-Grouse Habitat Selection

Seasonal (3rd Order) Summer Habitat

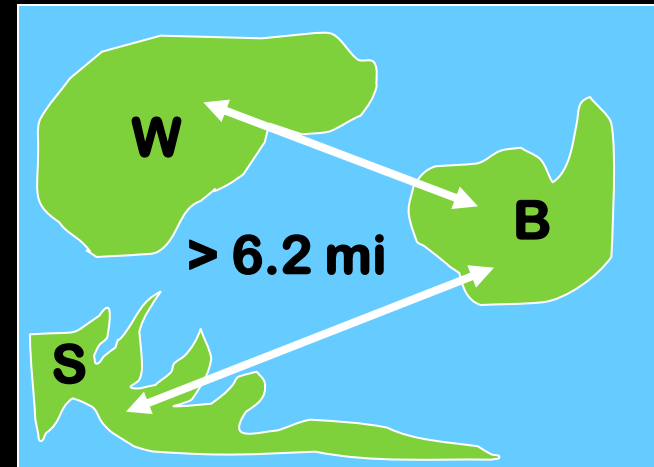


3rd ORDER SEASONAL HABITAT CONFIGURATION

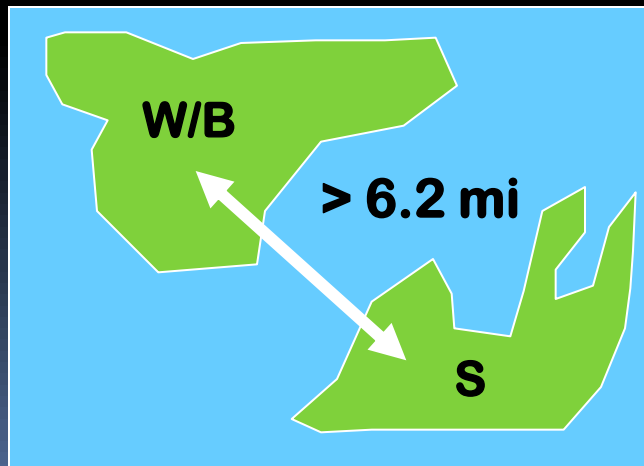
NONMIGRATORY



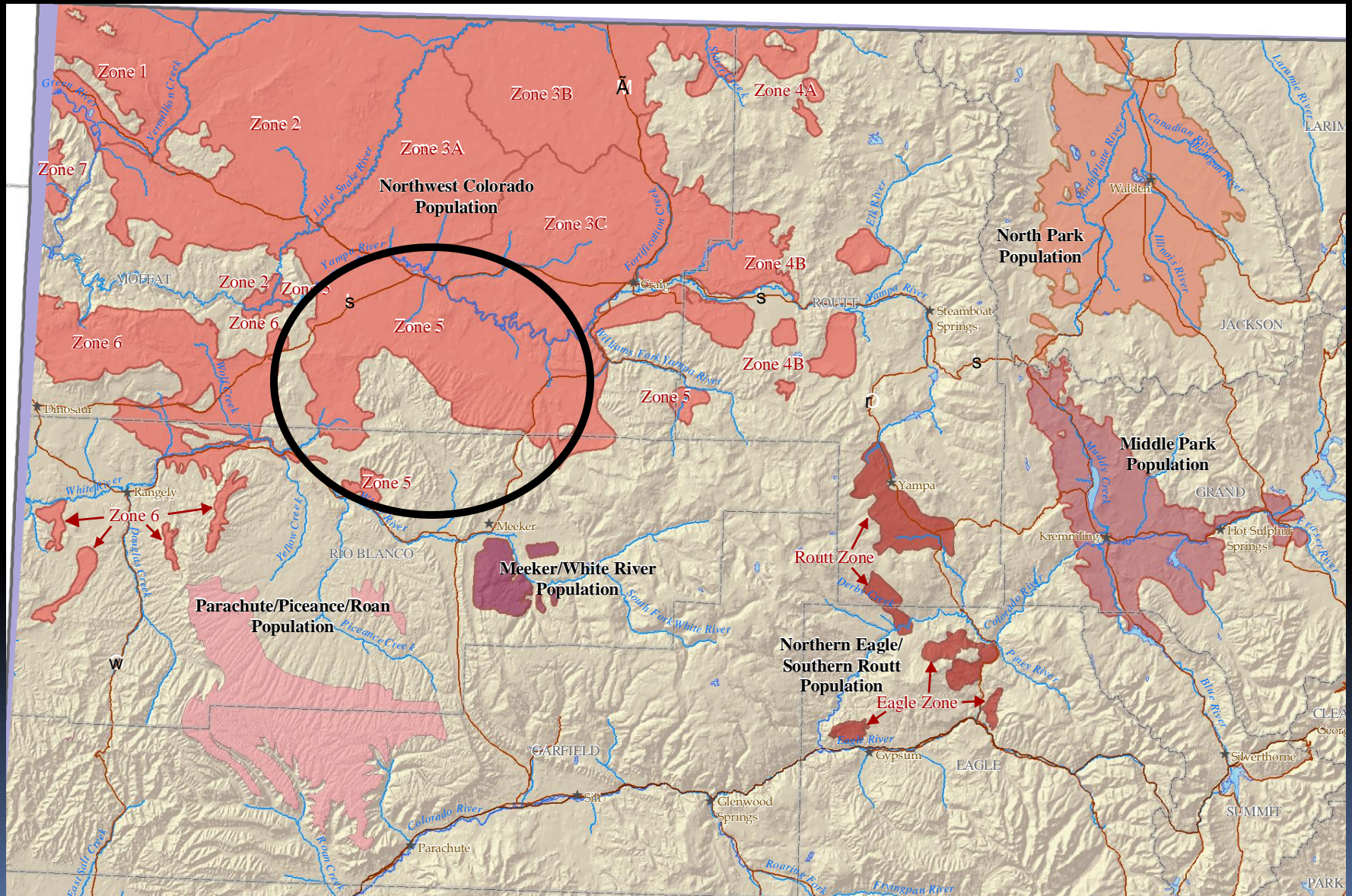
2-STAGE MIGRATORY



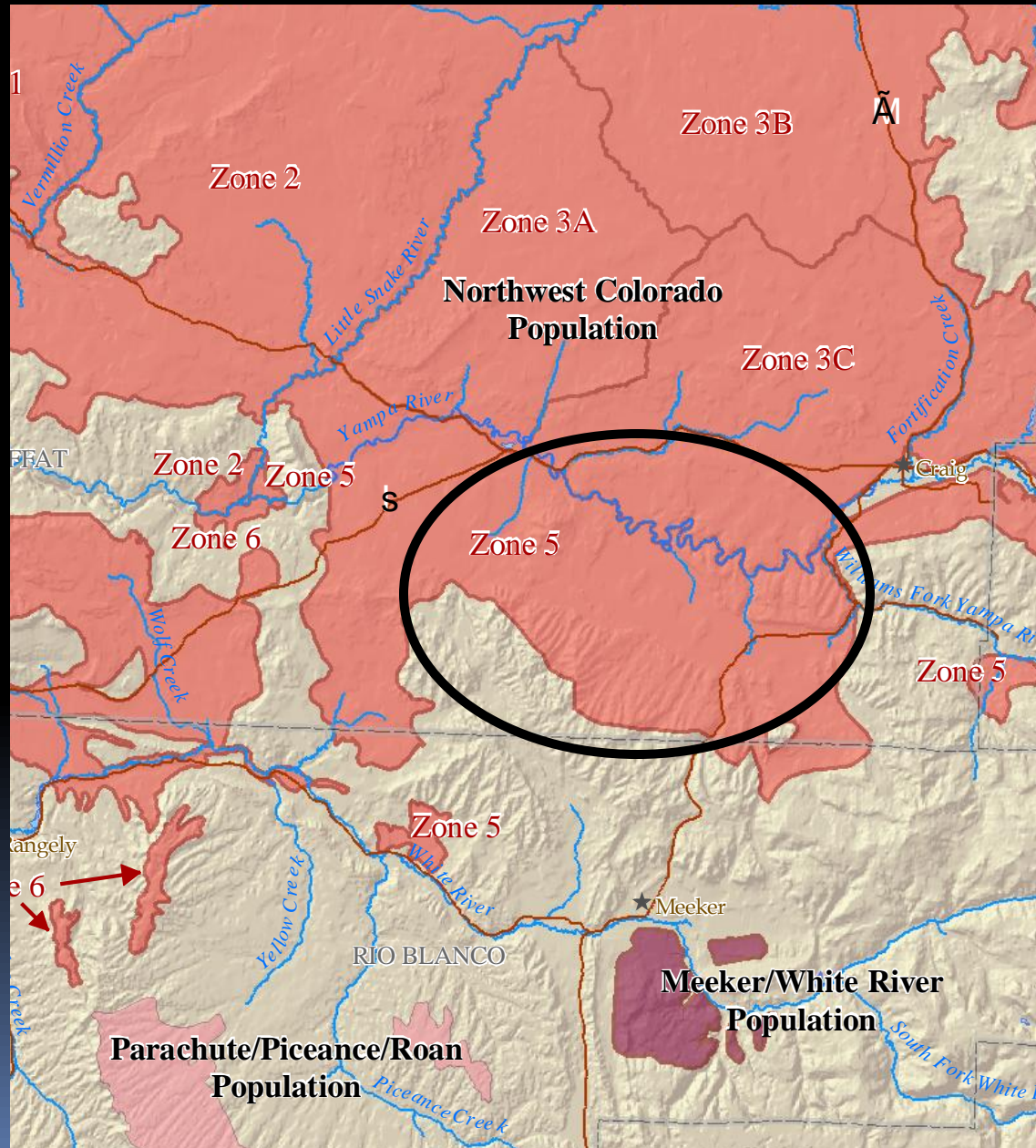
1 STAGE MIGRATORY



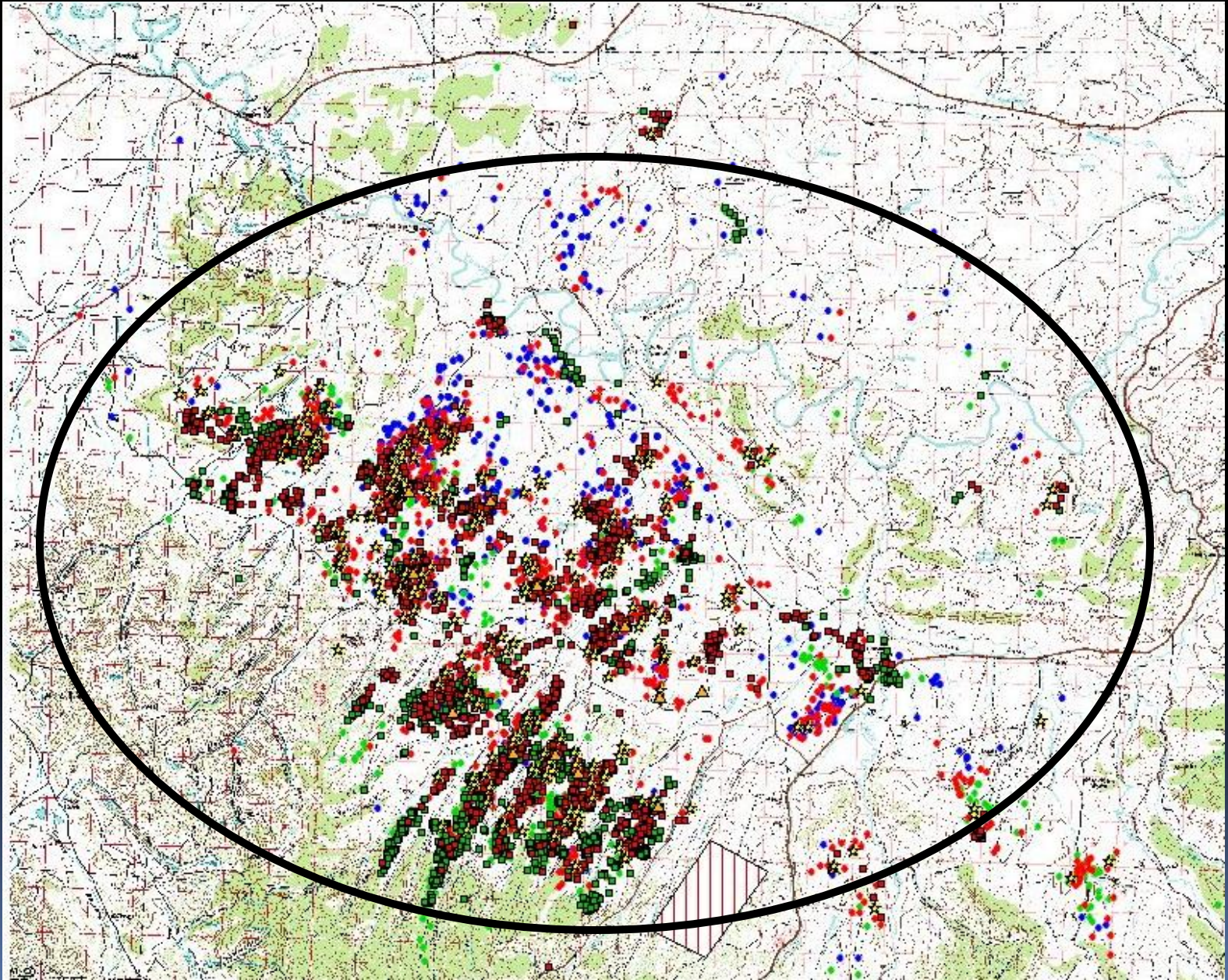
3rd Order Selection



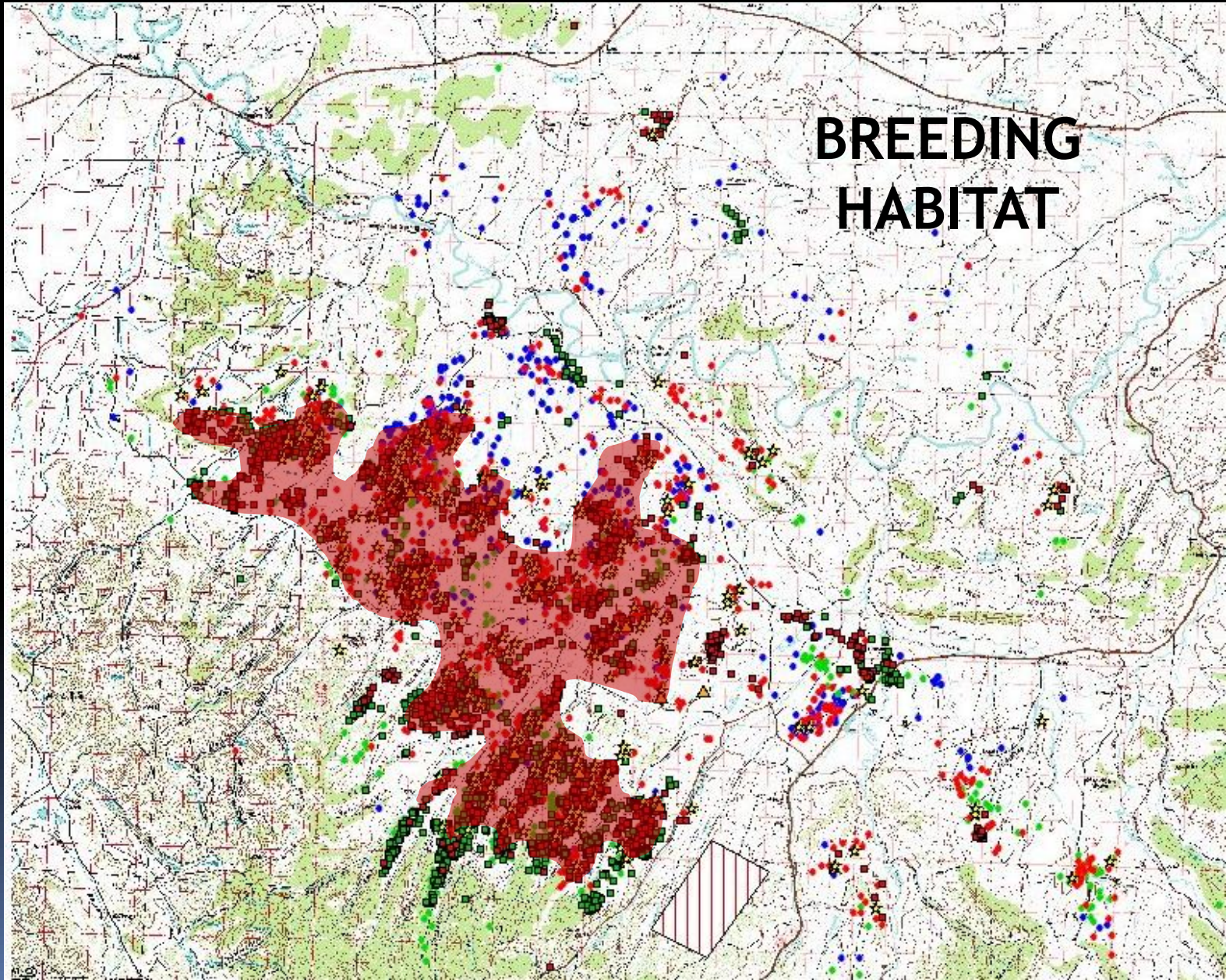
3rd Order Selection

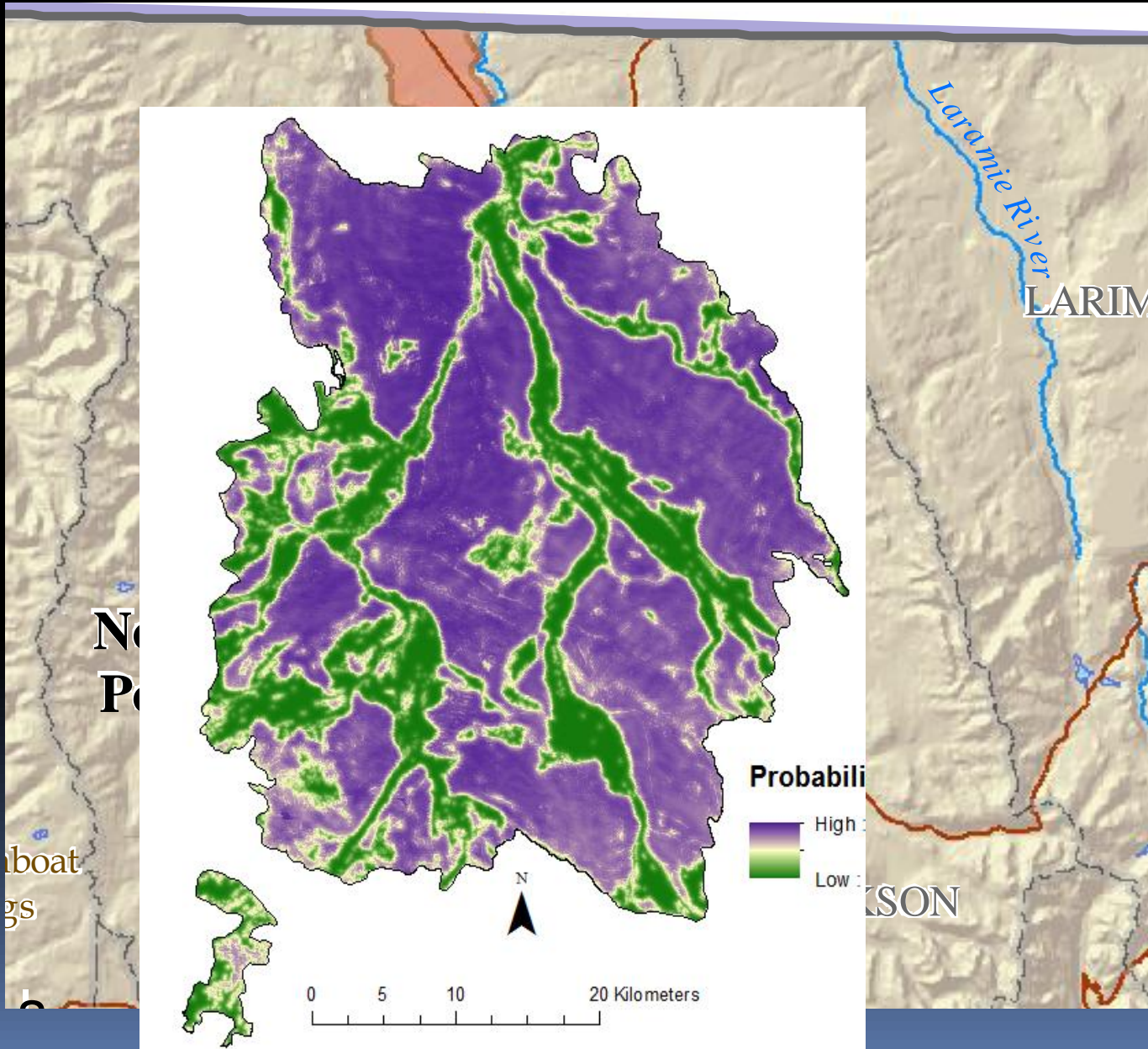


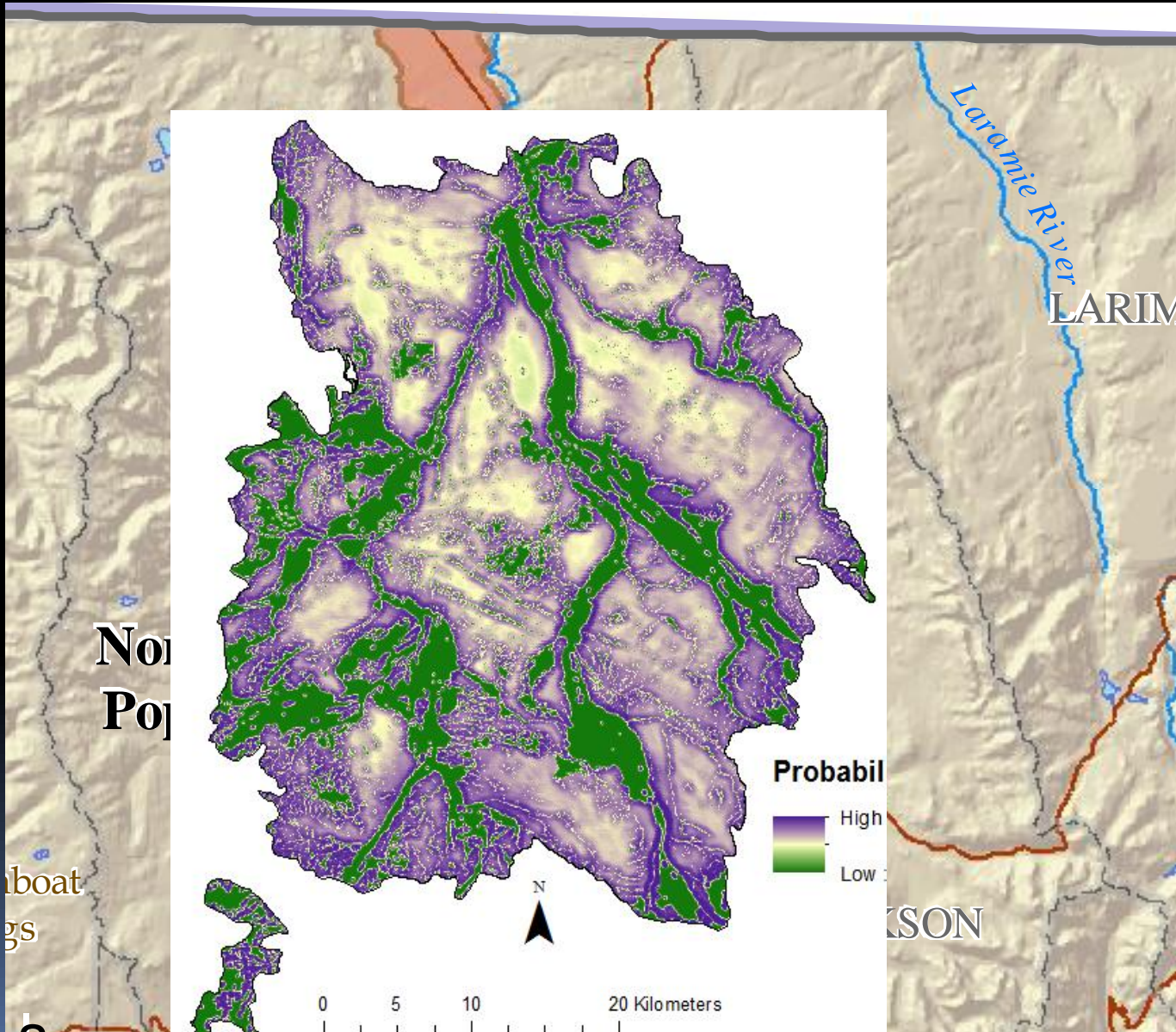
3rd Order Selection

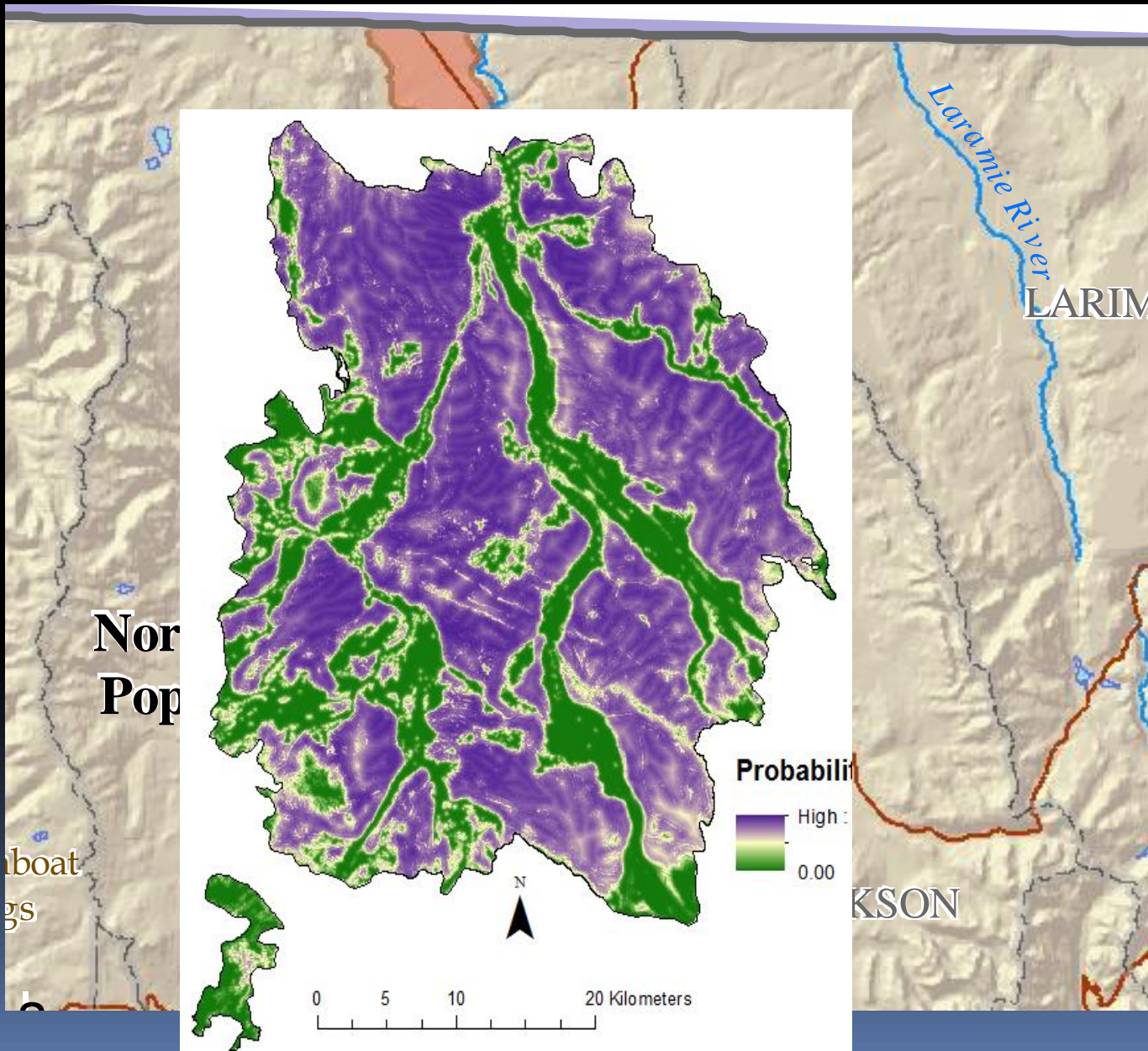


3rd Order Selection









Sage-Grouse Habitat Selection

Seasonal (4th Order) Habitat

- 1st Order
 - Geographical range of the population of interest
- 2nd Order
 - Home range of individuals or subpopulations of interest (e.g. lek area or lek complex)
- 3rd Order
 - Seasonal habitats within the home range
- 4th Order
 - **Structural or quality and quantity of food or cover**

4th Order Selection

Birds select habitat based on horizontal and vertical structure as well as floristic composition



4th Order Selection

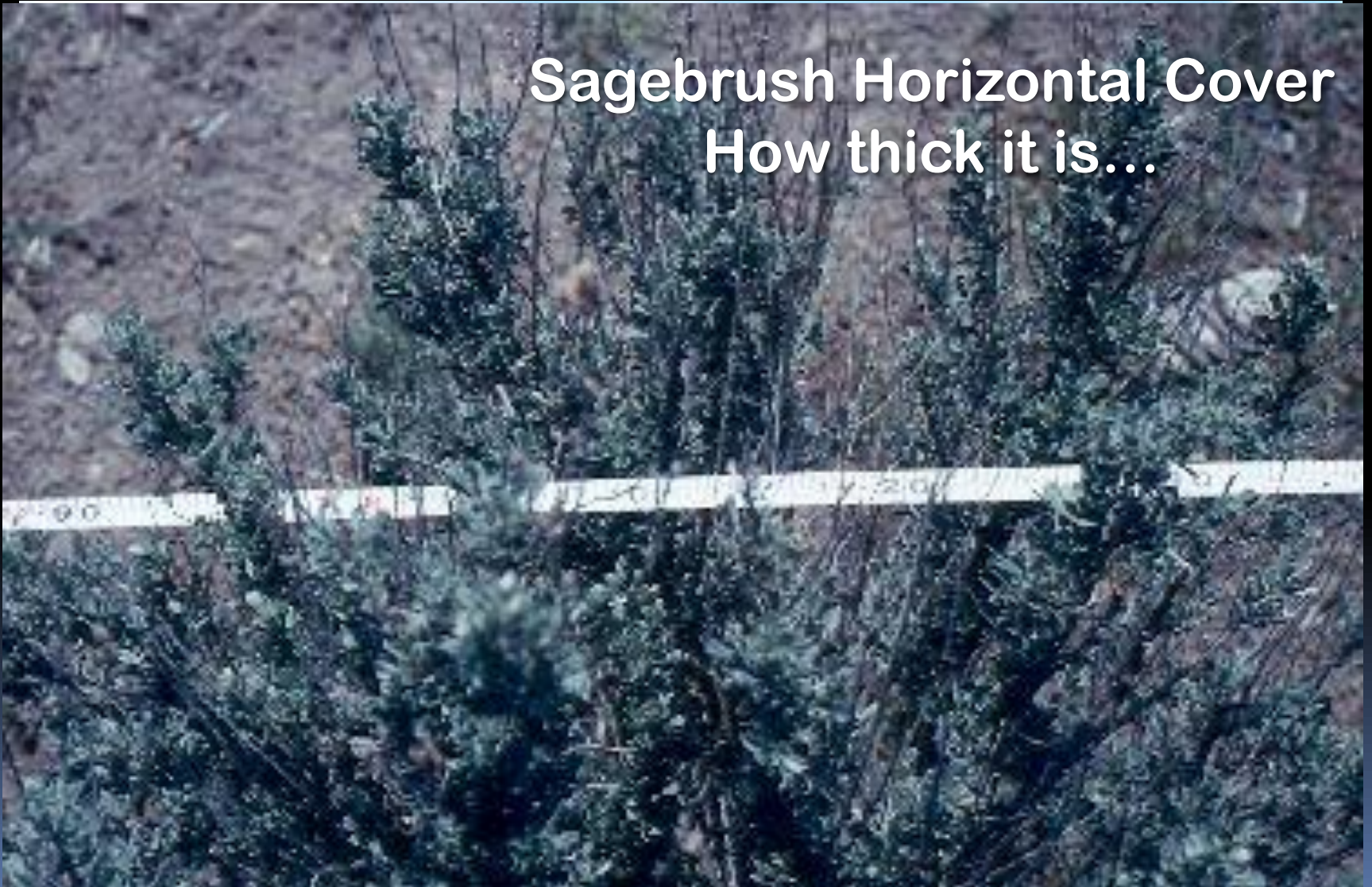
Birds select habitat based on horizontal and vertical structure as well as floristic composition



4th Order Selection

Sagebrush...What is Measured?

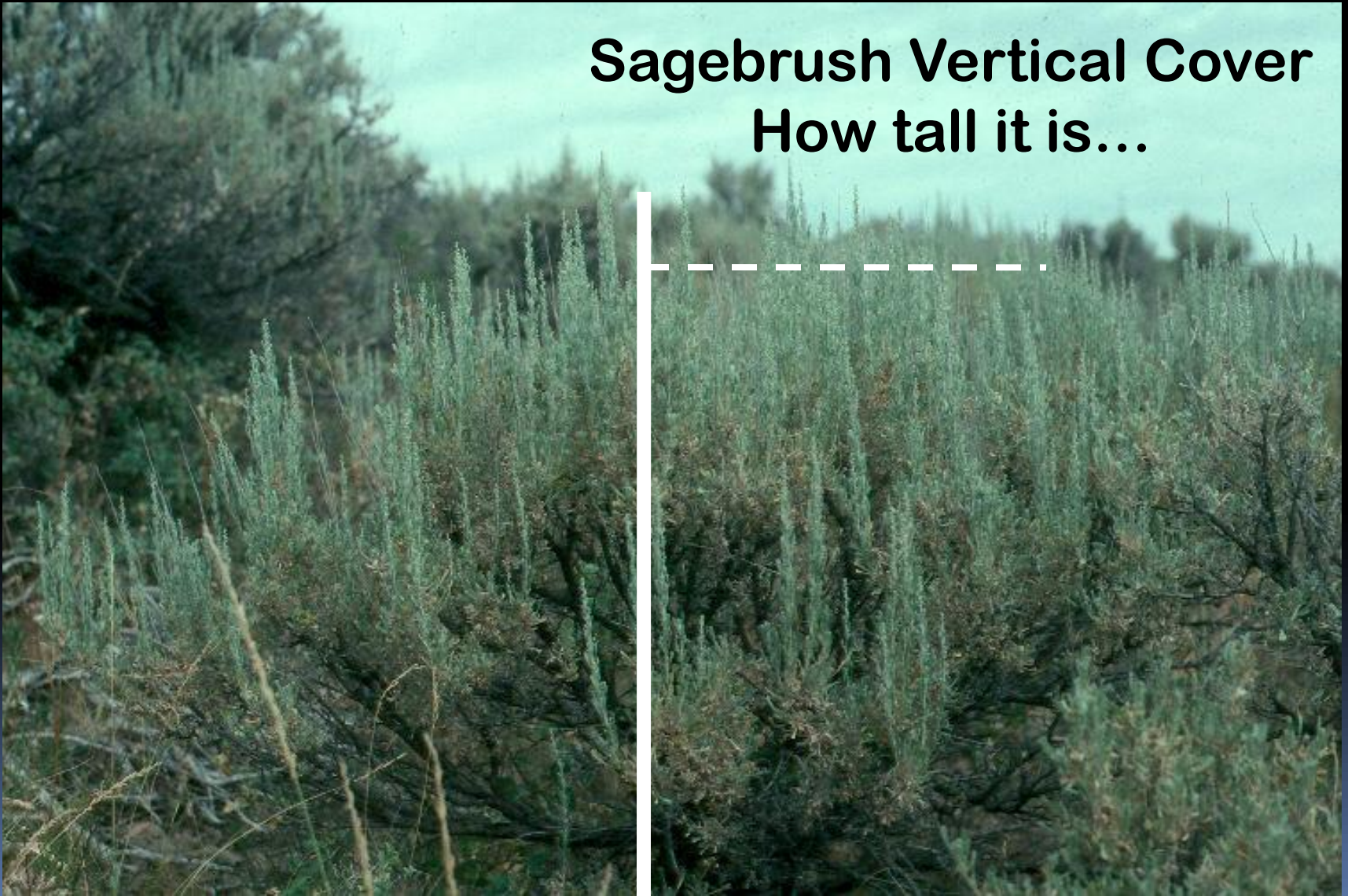
Sagebrush Horizontal Cover
How thick it is...



4th Order Selection

Sagebrush...What is Measured?

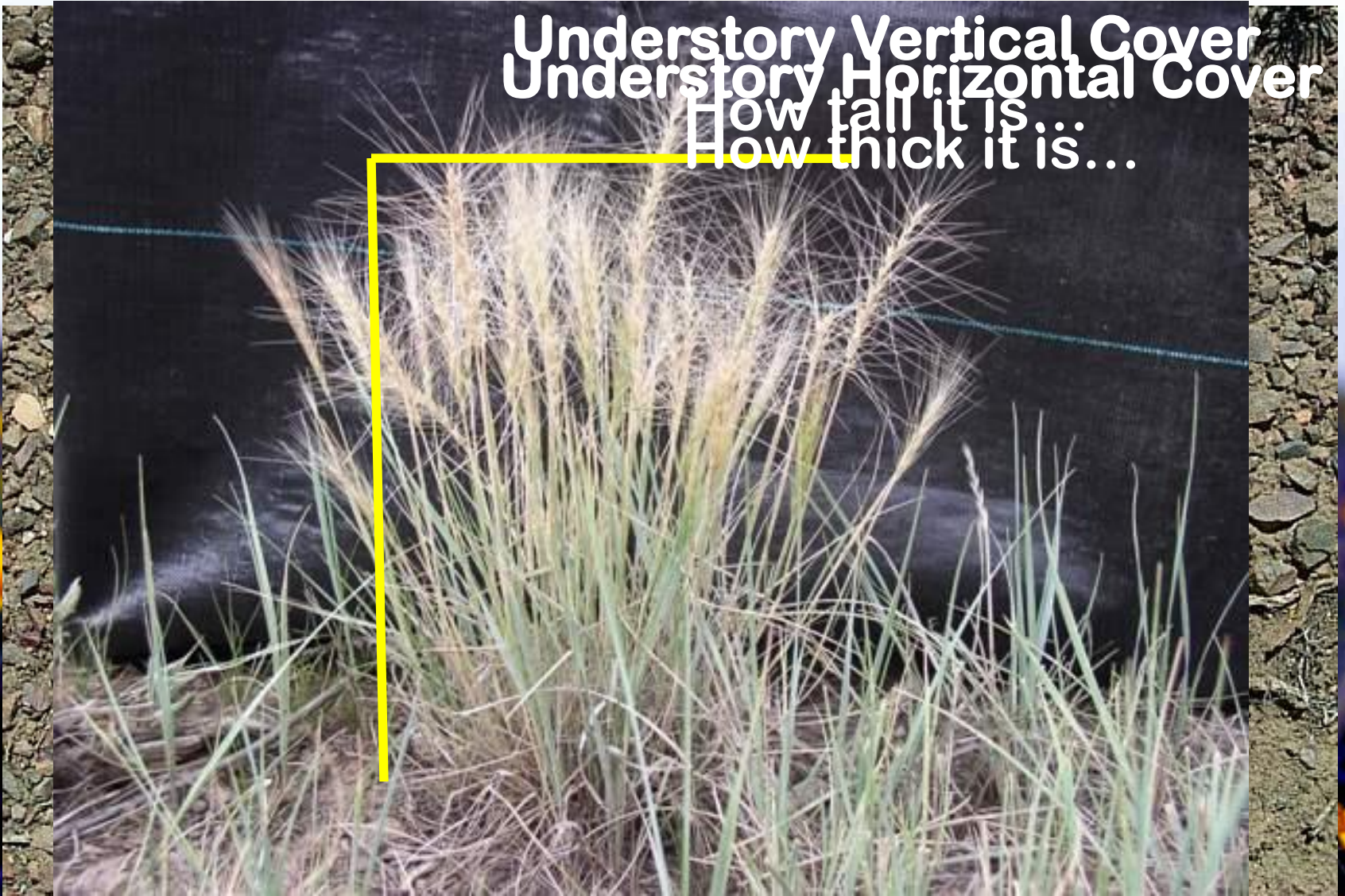
Sagebrush Vertical Cover
How tall it is...



4th Order Selection

Understory...What is Measured?

Understory Vertical Cover
Understory Horizontal Cover
How tall it is
How thick it is...



Habitat Management Guidelines



Sage-Grouse Habitat Guidelines

The History

- Braun et al. (1977)
 - *“Guidelines for Maintenance of Sage Grouse Habitats”*
- Connelly et al. (2000)
 - *“Guidelines to Manage Sage Grouse Populations and Their Habitats”*
- Greater Sage-grouse Steering Committee (2008)
 - *“Colorado Greater Sage-grouse Conservation Plan (Appendix A)”*

Sage-Grouse Habitat Guidelines

The History

Which Guidelines Or
Recommendations Should We Use?

NATIONAL?

LOCAL?

Sage-Grouse Habitat Guidelines

The History

- ~~Braun et al. (1977)~~
 - ~~“Guidelines for Maintenance of Sage Grouse Habitats”~~
- Connelly et al. (2000)
 - *“Guidelines to Manage Sage Grouse Populations and Their Habitats”*
- Greater Sage-grouse Steering Committee (2008)
 - *“Colorado Greater Sage-grouse Conservation Plan (Appendix A)”*

Sage-Grouse Habitat Guidelines

Connelly et al. (2000)



Sage-Grouse Habitat Guidelines

Connelly et al. (2000:975)

“Because of gaps in knowledge and regional variation in habitat characteristics, the judgments of local biologists and quantitative data from population and habitat monitoring are necessary to implement the guidelines correctly.”

Sage-Grouse Habitat Guidelines

The History

- ~~Braun et al. (1977)~~
 - ~~*“Guidelines for Maintenance of Sage Grouse Habitats”*~~
- ~~Connelly et al. (2000)~~
 - ~~*“Guidelines to Manage Sage Grouse Populations and Their Habitats”*~~
- Greater Sage-grouse Steering Committee (2008)
 - *“Colorado Greater Sage-grouse Conservation Plan (Appendix A)”*

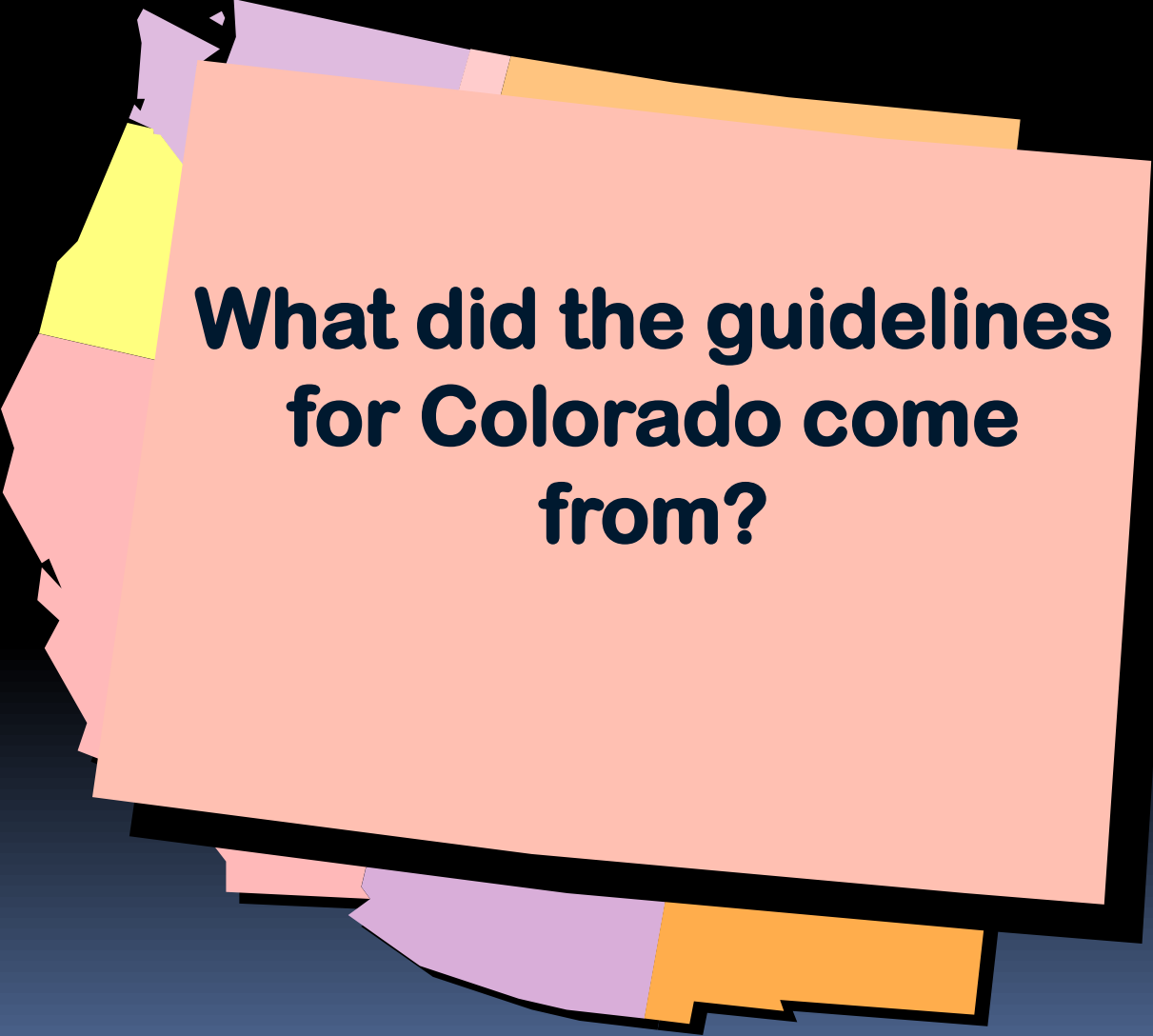
Sage-Grouse Habitat Guidelines

“Other National Guidance”

~~Sage-grouse BLM National Technical Team (2011)~~

“Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving sage-grouse habitat objectives...**If local/state seasonal habitat objectives are not available**, use sage-grouse habitat recommendations from Connelly et al. (2000) and Hagen et al. (2007).”

Sage-Grouse Habitat Guidelines

A stack of several overlapping papers in various colors (yellow, pink, purple, orange) with a black border. The top paper is light pink and contains the text.

**What did the guidelines
for Colorado come
from?**

Colorado Sage-Grouse Habitat Guidelines

“In developing these habitat
guidelines, we summarized *only*
Colorado GRSG habitat use
data...”

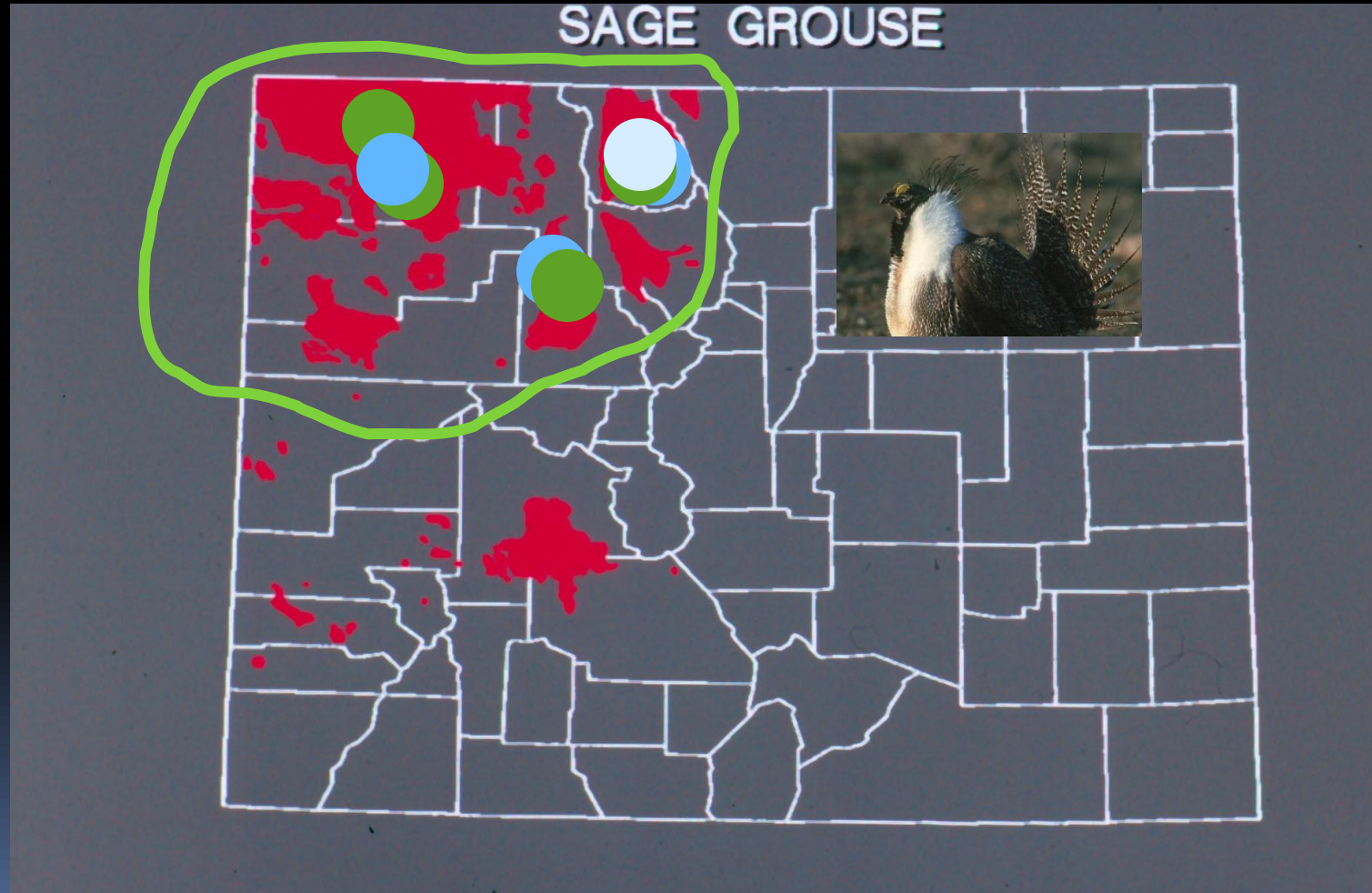
Colorado Sage-Grouse Habitat Guidelines

The vegetation structure guidelines... should be interpreted as minimum standards, and managers should strive to meet the full potential of any given site.”

-Colorado Greater Sage-grouse Conservation Plan (2008:A-4)

Greater Sage-Grouse

Where did CO guidelines come from?



Sage-Grouse Habitat Guidelines

Greater Sage-Grouse State Plan

“These habitat guidelines should be considered **adaptive, and interim in nature**. The guidelines were developed from actual grouse use sites, but should be **considered as guidance and not absolute values**.

Landscapes are diverse; some areas on the landscape will **not meet** these guidelines, some areas will **meet** the guidelines, and some will **exceed** these guidelines. As new information is collected, these guidelines, as well as this plan are **meant to be adaptable**.

Sage-Grouse Habitat Guidelines (Breeding Habitat)



Sage-Grouse Habitat Guidelines (Breeding Habitat)



Sage-Grouse Habitat Guidelines (Breeding Habitat)





Habitat Structural Guidelines

(Breeding)

	Greater Sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	15 - 30	20 - 30
Non-SB Cover (%)	5 - 10	5 - 10
Total Shrub Cover (%)	20 - 40	25 - 40
SB Height (cm)	30 - 60	40 - 60
Grass Cover (%)	10 - 20	20 - 40
Forb Cover (%)	5 - 15	15 - 30
Grass Height (cm)	15 - 20	15 - 25
Forb Height (cm)	5 - 15	10 - 15

Habitat Structural Guidelines

(Breeding)

	Greater Sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	15 - 30	20 - 30
Non-SB Cover (%)	5 - 10	5 - 10
Total Shrub Cover (%)	20 - 40	25 - 40
SB Height (cm)	30 - 60	40 - 60
Grass Cover (%)	10 - 20	20 - 40
Forb Cover (%)	5 - 15	15 - 30
Grass Height (cm)	15 - 20	15 - 25
Forb Height (cm)	5 - 15	10 - 15

Habitat Structural Guidelines

(Breeding)

	Greater Sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	15 - 30	20 - 30
Non-SB Cover (%)	5 - 10	5 - 10
Total Shrub Cover (%)	20 - 40	25 - 40
SB Height (cm)	30 - 60	40 - 60
Grass Cover (%)	10 - 20	20 - 40
Forb Cover (%)	5 - 15	15 - 30
Grass Height (cm)	15 - 20	15 - 25
Forb Height (cm)	5 - 15	10 - 15

Habitat Structural Guidelines

(Breeding)

	Greater Sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	15 - 30	20 - 30
Non-SB Cover (%)	5 - 10	5 - 10
Total Shrub Cover (%)	20 - 40	25 - 40
SB Height (cm)	30 - 60	40 - 60
Grass Cover (%)	10 - 20	20 - 40
Forb Cover (%)	5 - 15	15 - 30
Grass Height (cm)	15 - 20	15 - 25
Forb Height (cm)	5 - 15	10 - 15

Habitat Structural Guidelines

(Breeding-Some New Data)

	Greater Sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	15 - 30	20 - 30
North Park	40 - 45	
PPR		35 - 40
Non-SB Cover (%)	5 - 10	5 - 10
North Park	6 - 9	
PPR		25 - 30

Habitat Structural Guidelines (Summer)



Habitat Structural Guidelines

(Summer)

	Greater sage-grouse	
Vegetation Variable	Arid	Mesic
SB Cover %	10 - 25	10 - 25
Non-SB Cover (%)	5 - 10	5 - 15
Total Shrub Cover (%)	20 - 35	20 - 40
SB Height (cm)	30 - 65	35 - 70
Grass Cover (%)	10 - 30	15 - 40
Forb Cover (%)	5 - 15	10 - 25
Grass Height (cm)	10 - 15	10 - 20
Forb Height (cm)	5 - 15	10 - 15

Habitat Structural Guidelines (Winter)

PPR 2007/08



Habitat Structural Guidelines

(Winter)

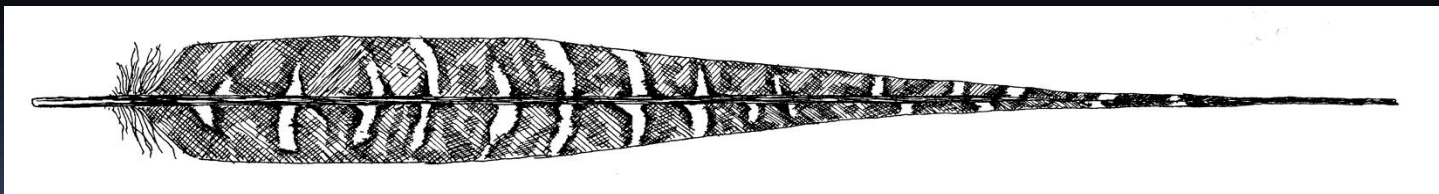
	Greater Sage-grouse	
Variable	Arid	Mesic
SB Cover (%)	20 - 40	25 - 40
SB Height (cm)	20 - 40	25 - 40

Summary

- Sagebrush, sagebrush, sagebrush.
- Three seasons of use: breeding, summer, and winter.
- Grouse select habitat at differing scales.
- Grouse demonstrate seasonal, annual, and generational site fidelity.
- Braun et al. (1977) and Connelly et al. (2000) are not applicable to Colorado because we have better local data.

Summary

- Habitat guidelines are based on bird selection at the 4th order scale and are specific to Colorado.
- Measurements at a local scale for greater sage-grouse habitat may meet, may not meet, or may exceed current guidelines.



QUESTIONS?

