Sage grouse population dynamics:

Using vital rates and lek counts to explore management options

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One definition right up front…….Vital Rate

any demographic rate needed to predict how many new birds a hen will contribute to next year's population

Hatching Rate

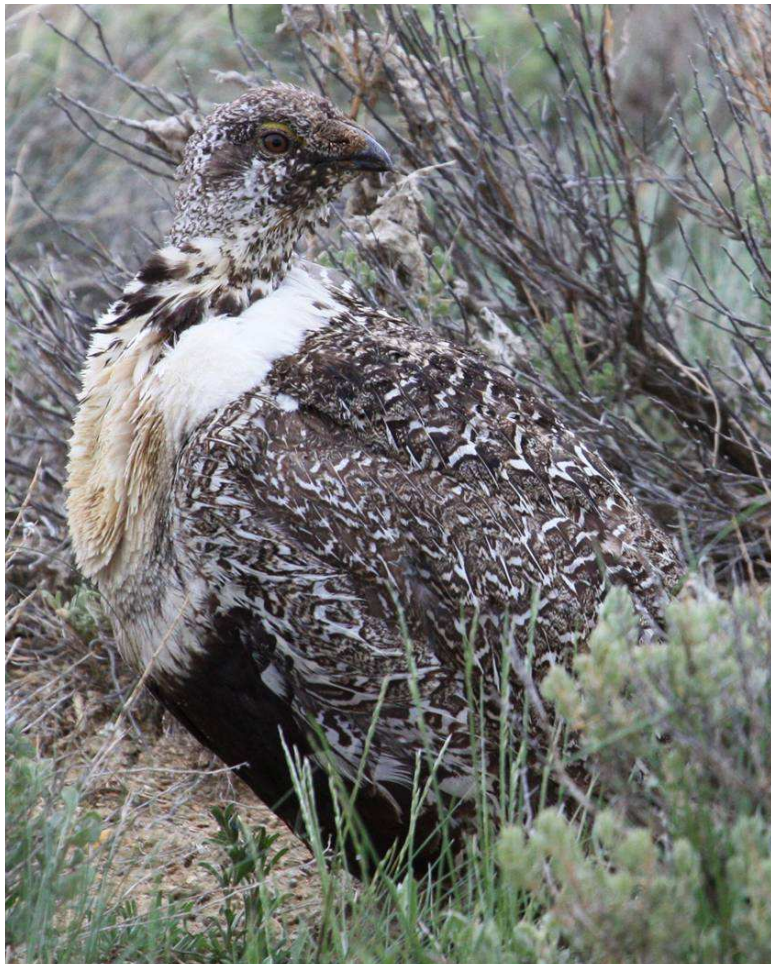
Chick Survival

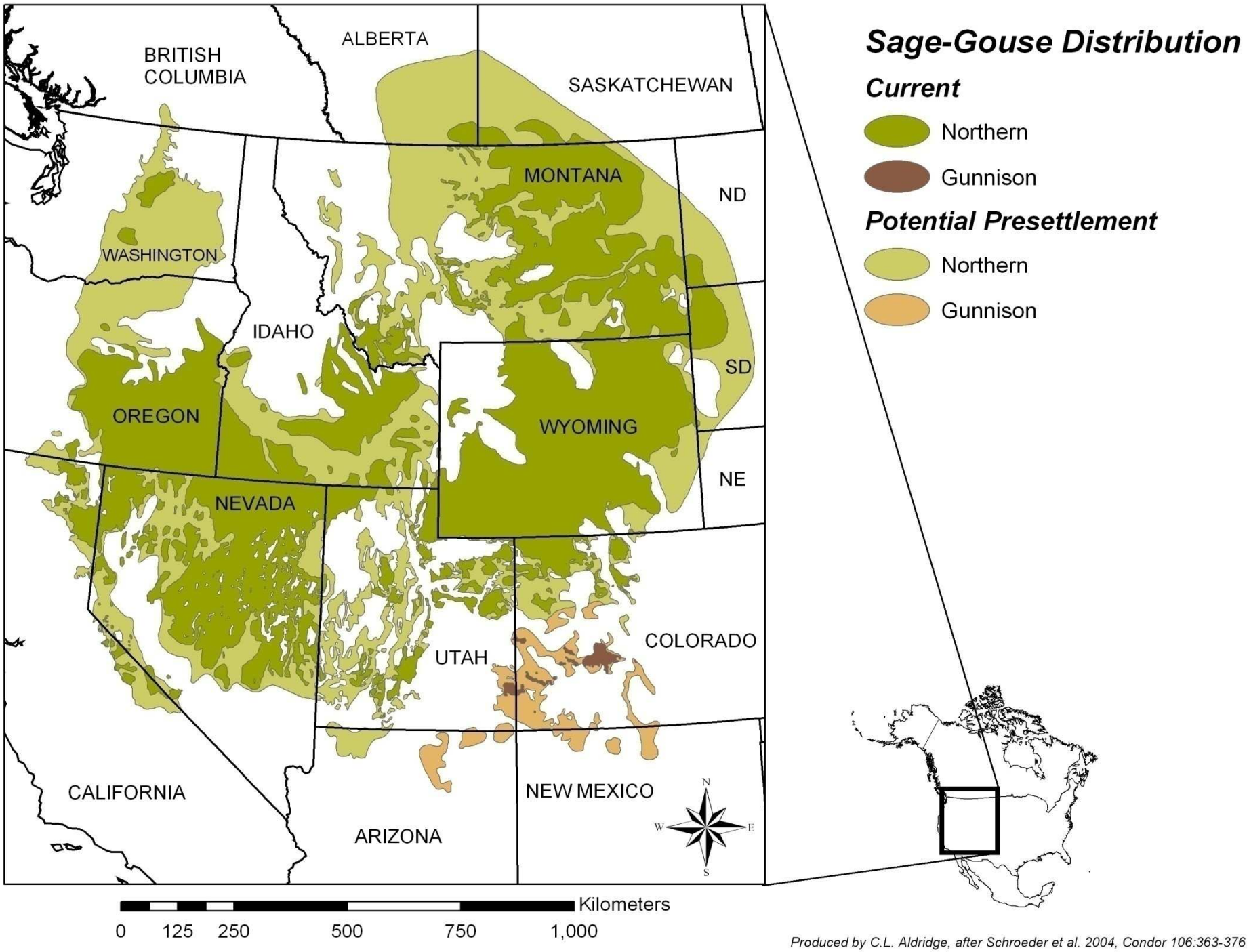
Hen Survival

Clutch Size

Outline

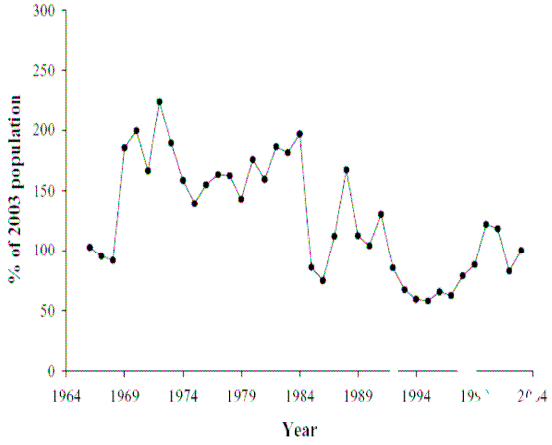
- Population Dynamics
- Threats to populations
- Need to prioritize management actions to maintain populations
- How to prioritize management actions based on vital rates
- An example of how grazing can enhance populations in healthy landscapes
- Why we have to use lek based approaches in disturbed landscapes

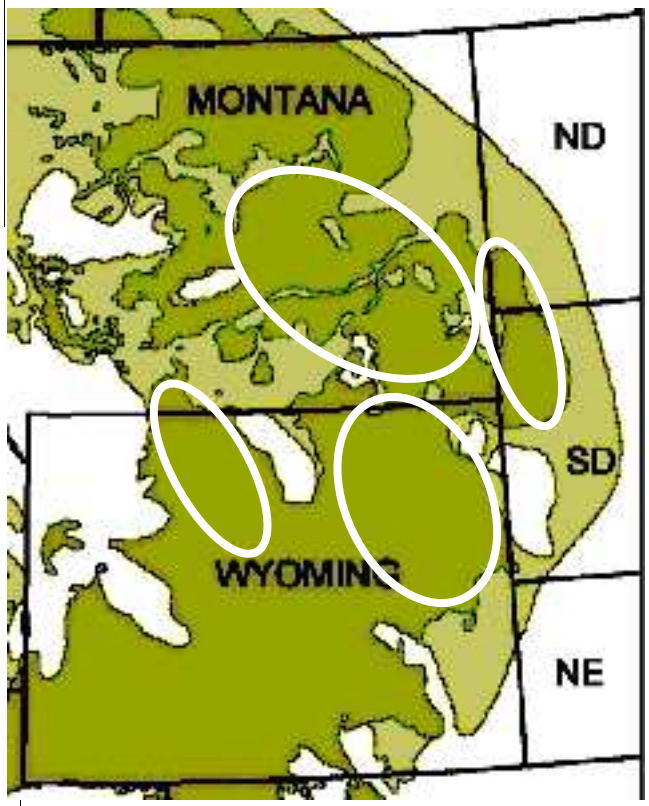


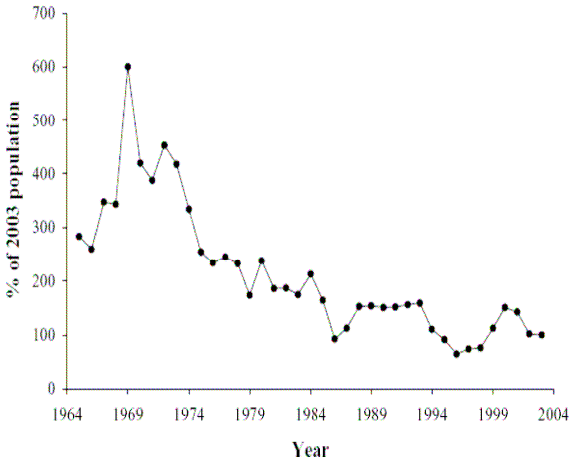


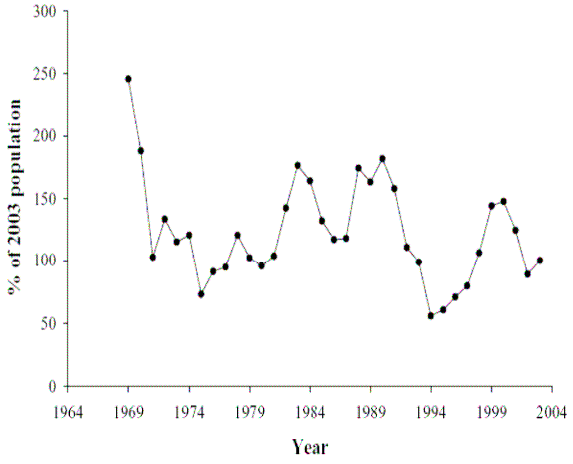
Produced by C.L. Aldridge, after Schroeder et al. 2004, Condor 106:363-376

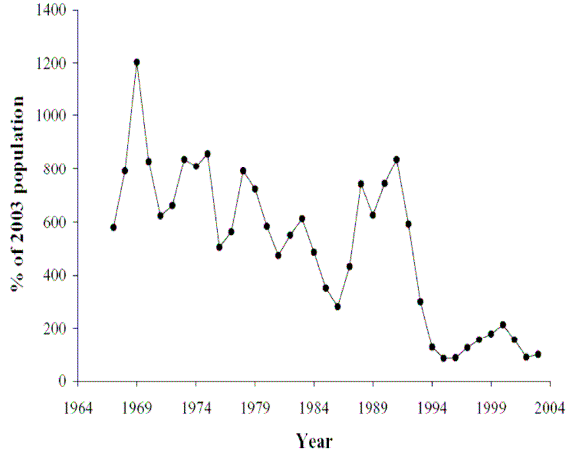
Population Indices



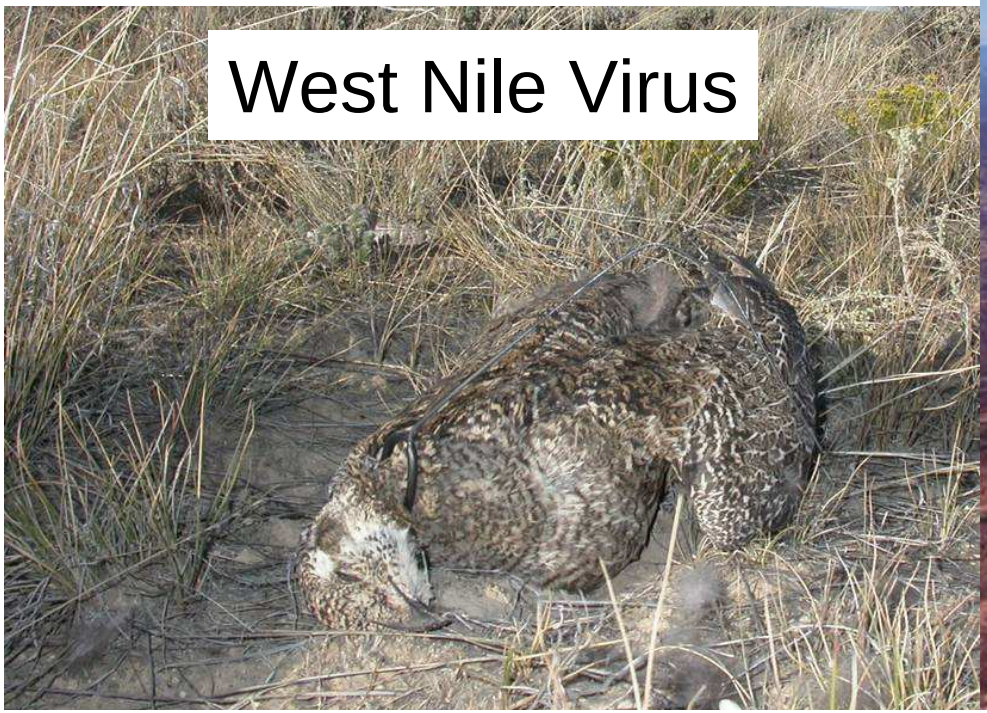








Threats to Sage Grouse



Grazing: may be harmful or beneficial

Need to prioritize management actions

to reduce impacts to populations

What science do we need to link habitat management to population growth or decline?

To link habitat management to sage grouse populations, we need to……..

1) Quantify how changes in vital rates affect population growth

2) Quantify how the relationships between vital rates and population growth vary through space and time

3) Quantify how much our management actions can change vital rates

Creating the Database

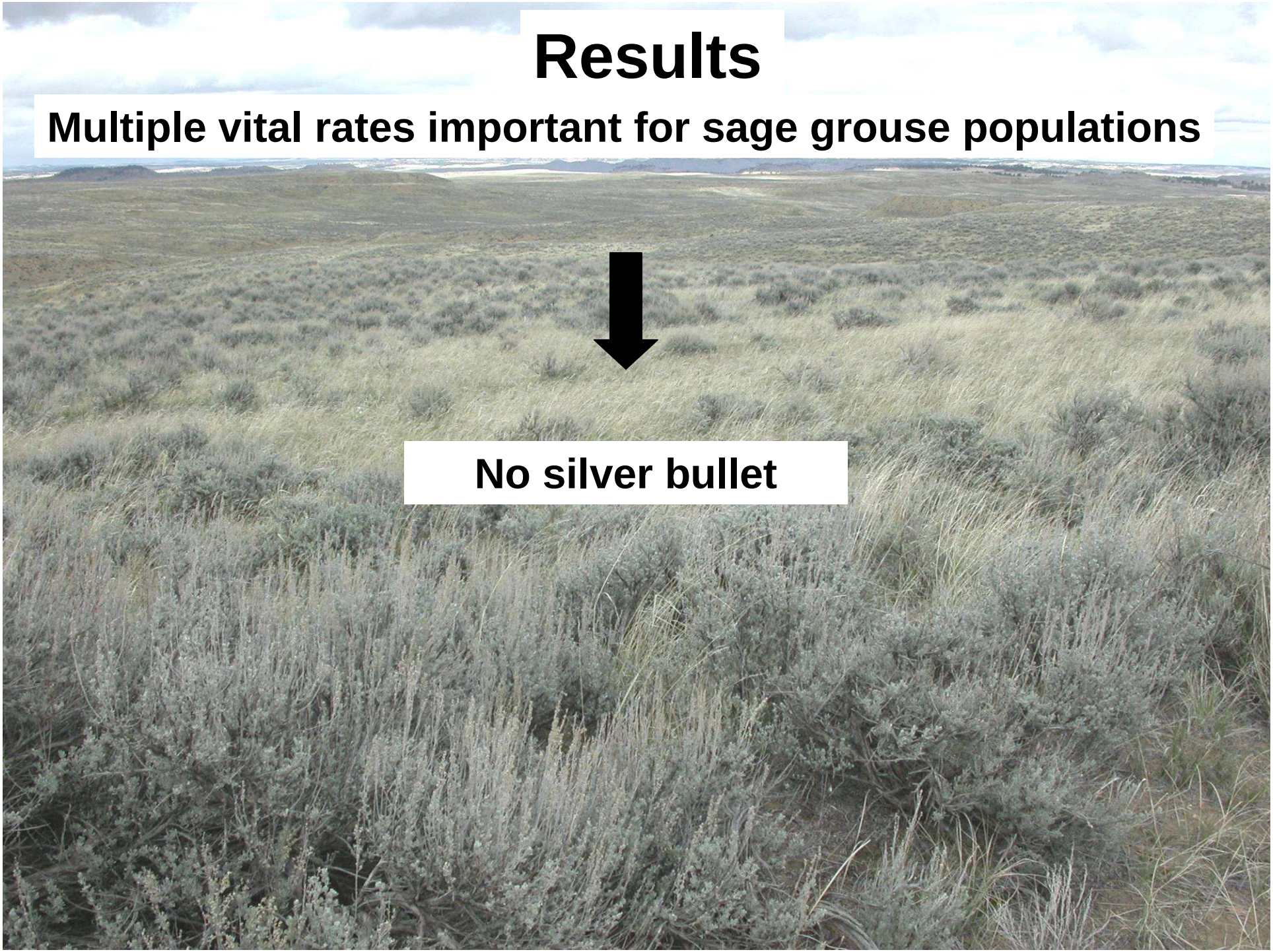
Reviewed vital rate estimates, range-wide from 1938-2008

67 studies provided estimates of at least one vital rate

33 studies provided estimates we could use

Results

Multiple vital rates important for sage grouse populations



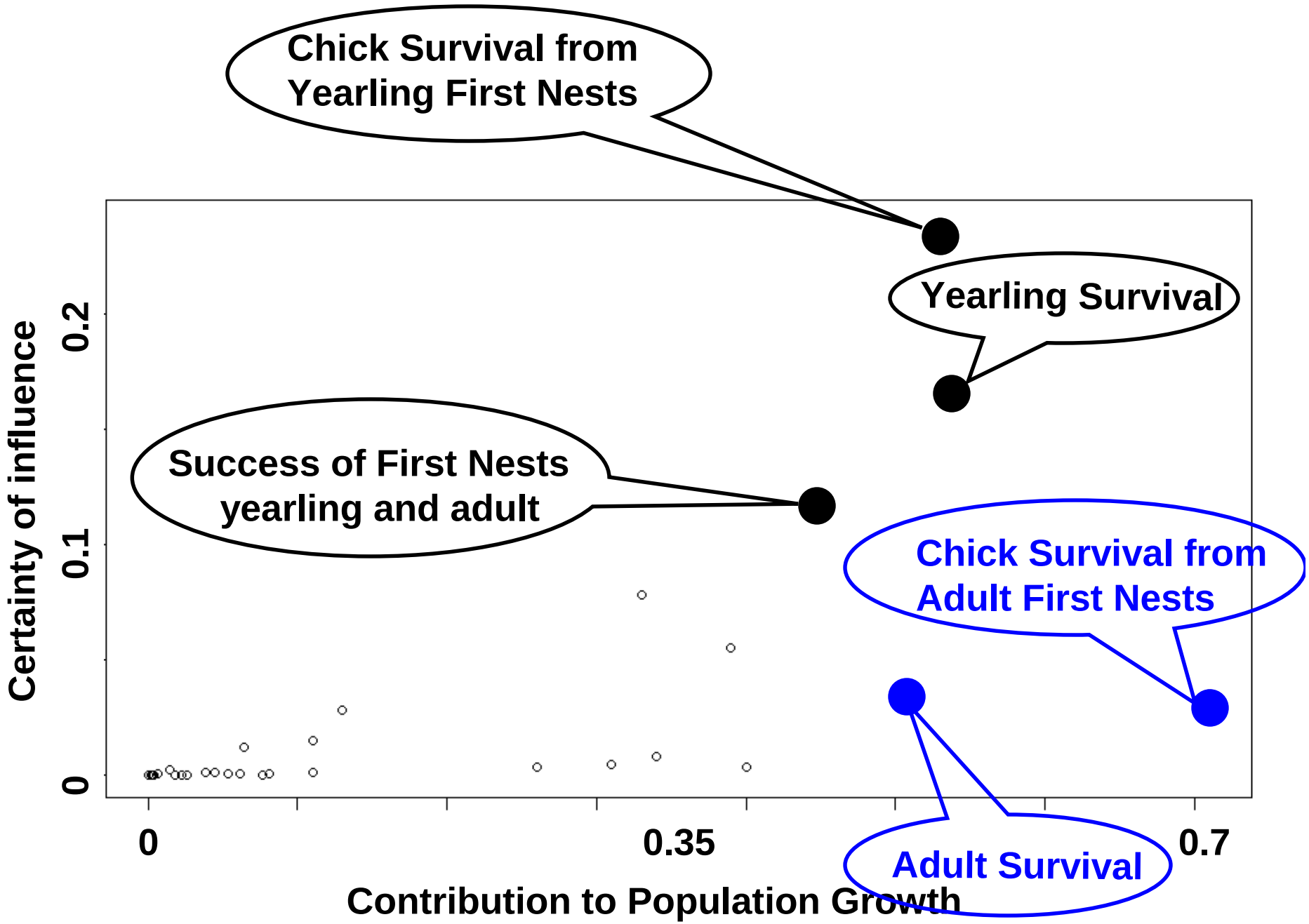
No silver bullet

Which vital rates contribute most to population growth?

Survival of Chicks from first nests

Hen survival

Success of First Nests


Chick Survival from
Yearling First Nests
Yearling Survival
Success of First Nests
yearling and adult
Chick Survival from
Adult First Nests
Adult Survival
Certainty of influence
0
0.1
0.2
0
0.35
0.7
Contribution to Population Growth

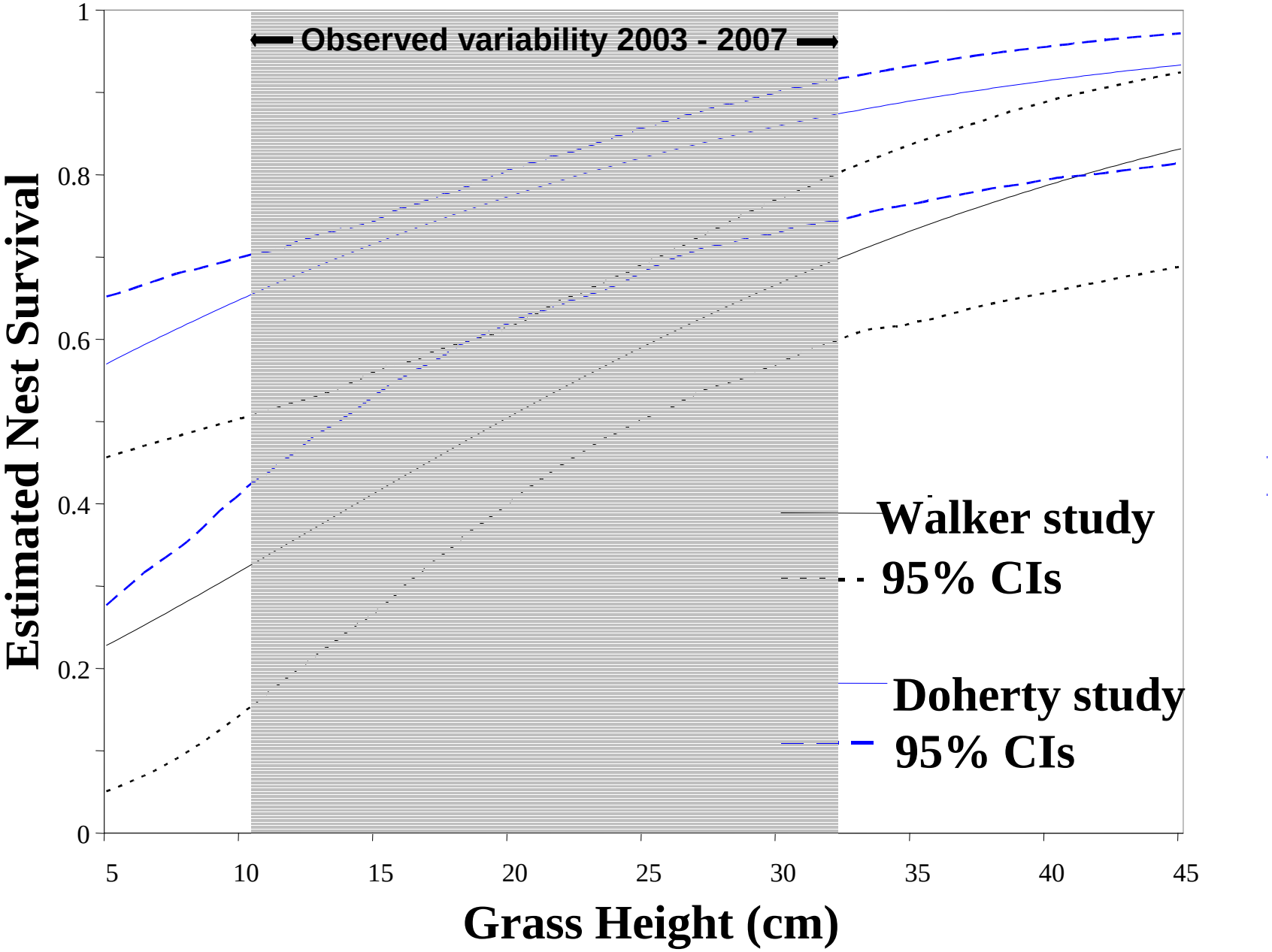
What type of populations do our data represent?

VERY HEALTHY sage grouse populations

97% stable or increasing

30% average annual increase

Example application: how to use grazing to enhance already healthy sage grouse populations


Observed variability 2003 - 2007
Estimated Nest Survival
1
0.8
0.6
0.4
0.2
0
5
10
15
20
25
30
35
40
45
Grass Height (cm)
Walker study
95% CIs
Doherty study
95% CIs

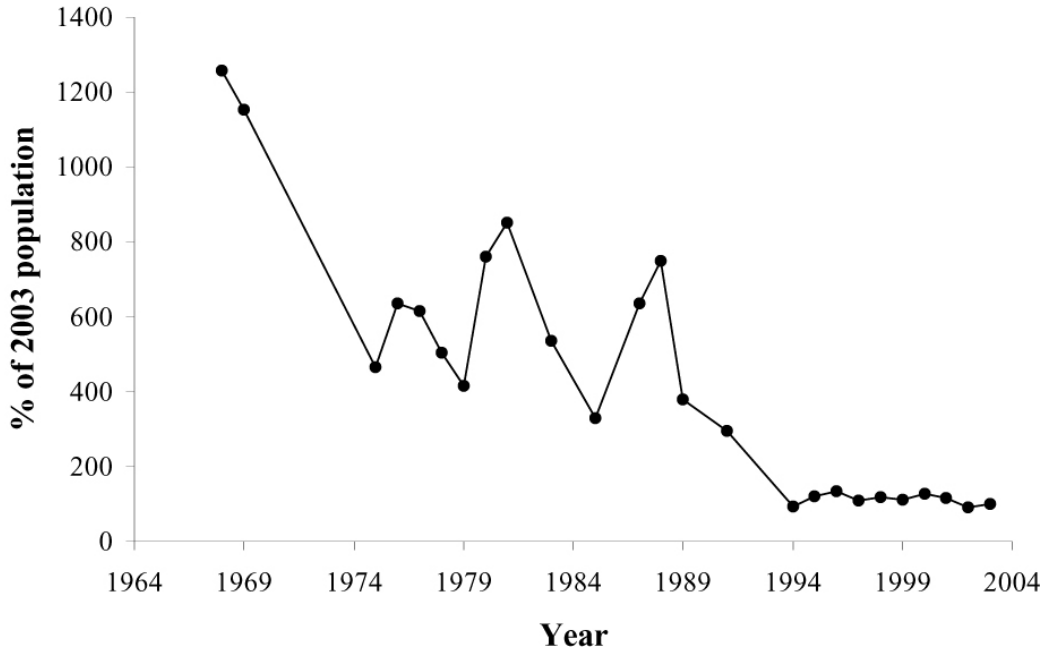
5 cm increase in grass height

8% increase in nest success

Population growth increases from 28% a year to 37% a year

Why are vital rate analyses predicting 30% annual rates of increase when lek counts show large population declines?

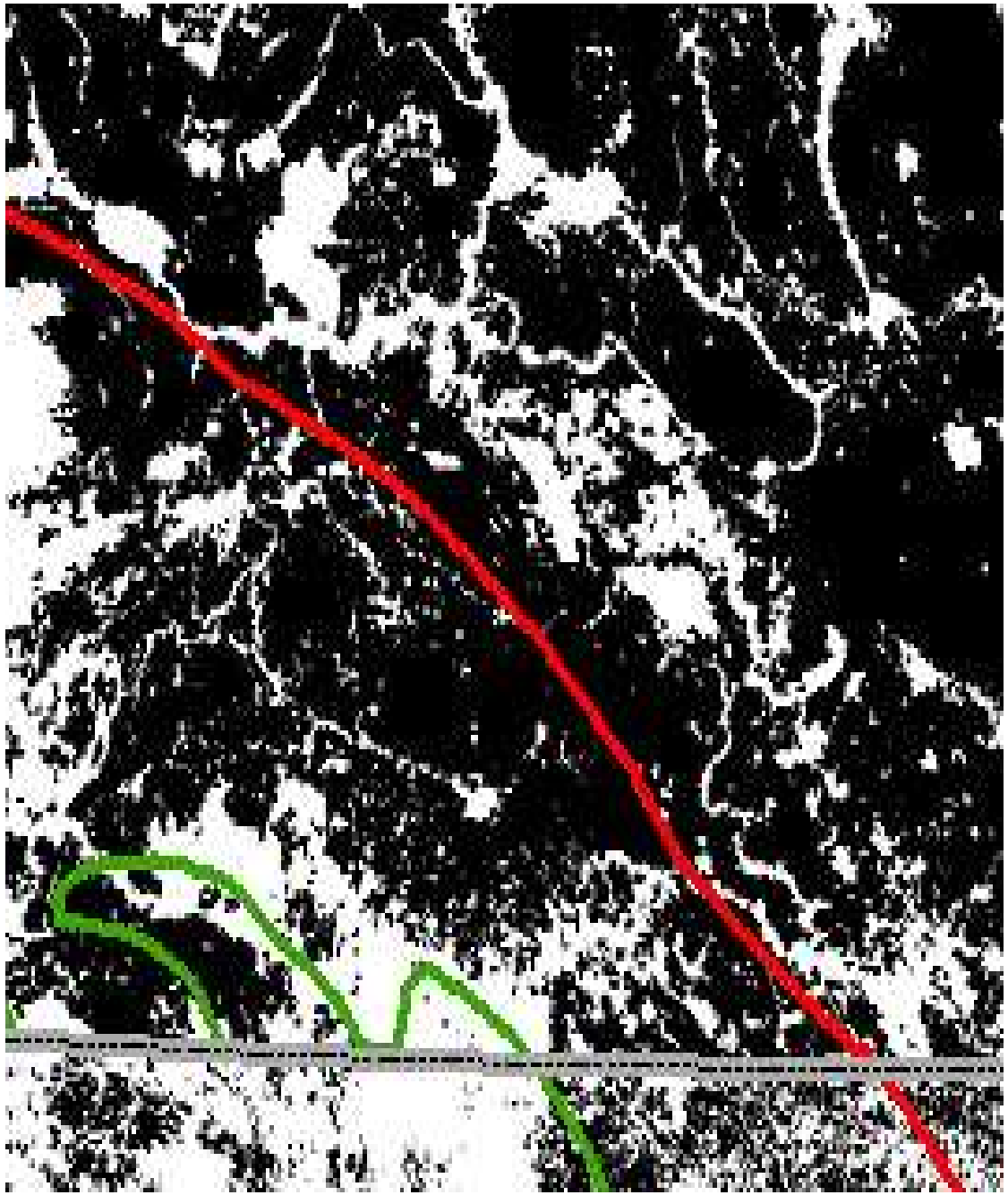
Fig. A5.7. Change in the population index for AB/SK/MT subpopulation, 1968-2003.

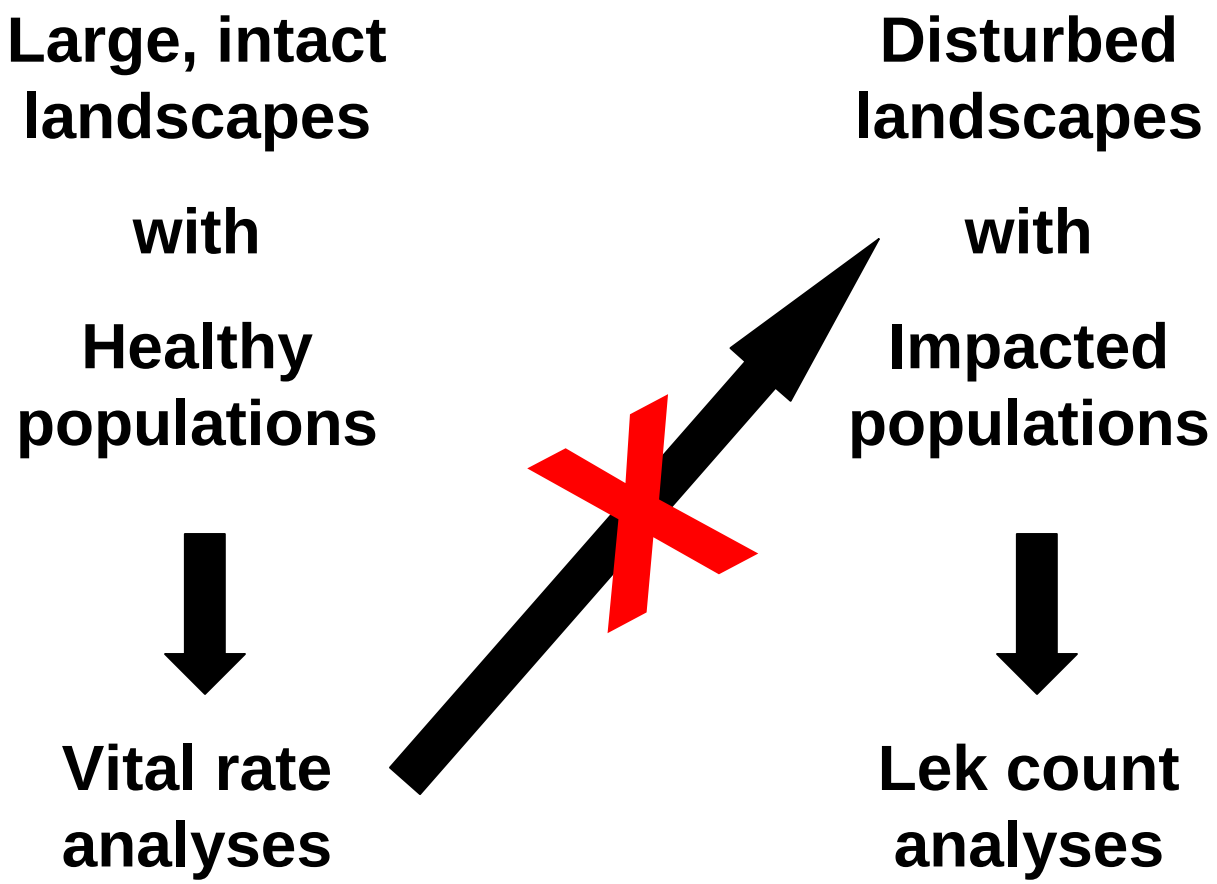


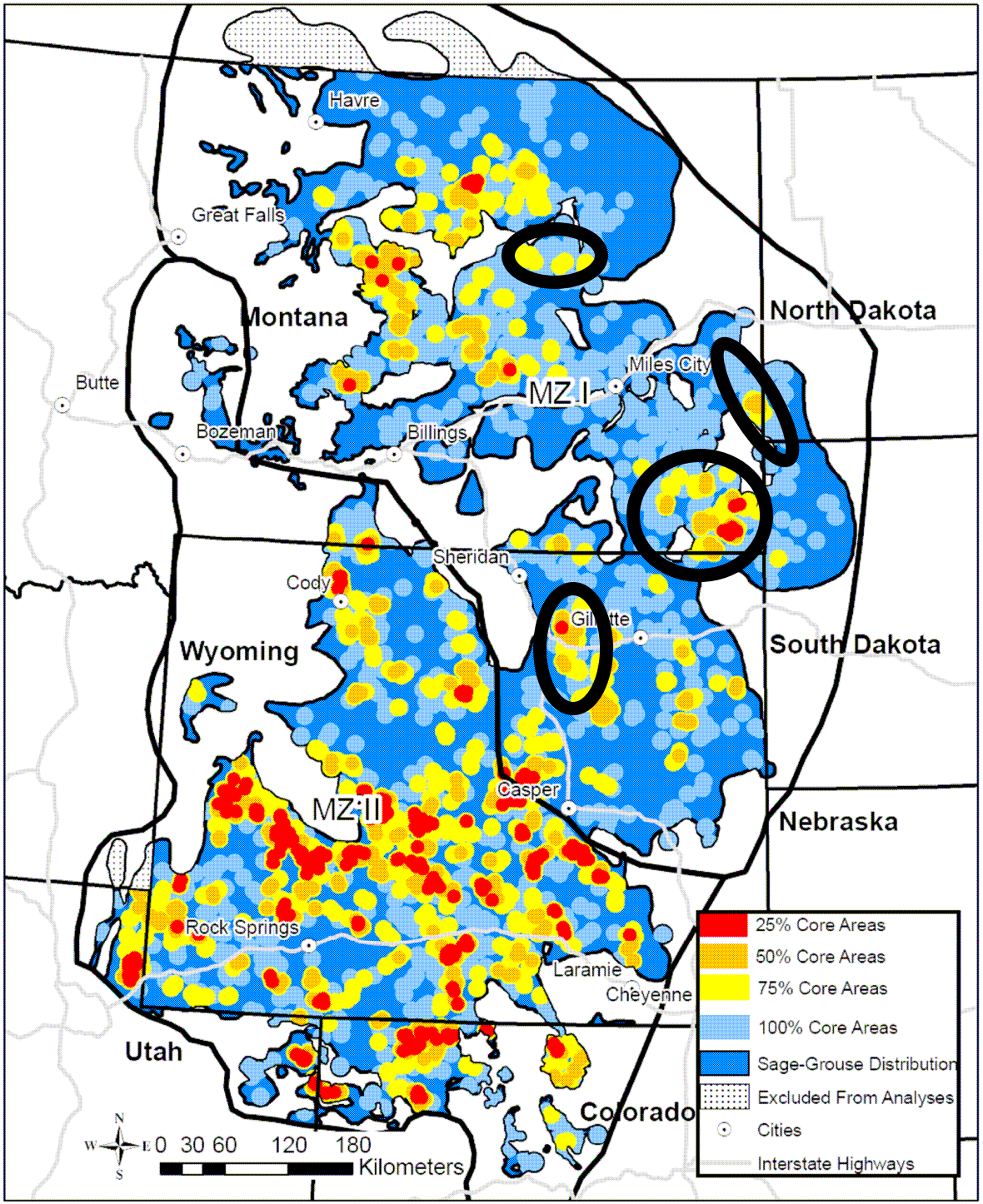
Vital Rates	Range-wide	MRB
Nest Initiation:	20 - 95%	94%
Nest Success:	35 - 70%	53 - 61%
Chick Survival:	13 - 45%	33 - 38%
Winter Survival:	40 - 95%	84 - 92%

We only measure vital rates where we can catch a lot of birds

Milk River Basin




Large, intact landscapes
with
Healthy populations
Vital rate analyses
Disturbed landscapes
with
Impacted populations
Lek count analyses



Linking land use to population growth rate through lek analyses

Know stressors

Don't know how they affect population growth rate

Examine different land use scenarios for 4 key areas using lek based analyses