

# CWD and Conservation

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North American Programs  
Wildlife Conservation Society



# Outline



Photo courtesy of  
Colorado Division of Wildlife

# Outline

- **Conservation means different things**
- **Distribution & density**



Photo courtesy of  
Colorado Division of Wildlife

# Outline

- **Conservation means different things**
- **Distribution & density**



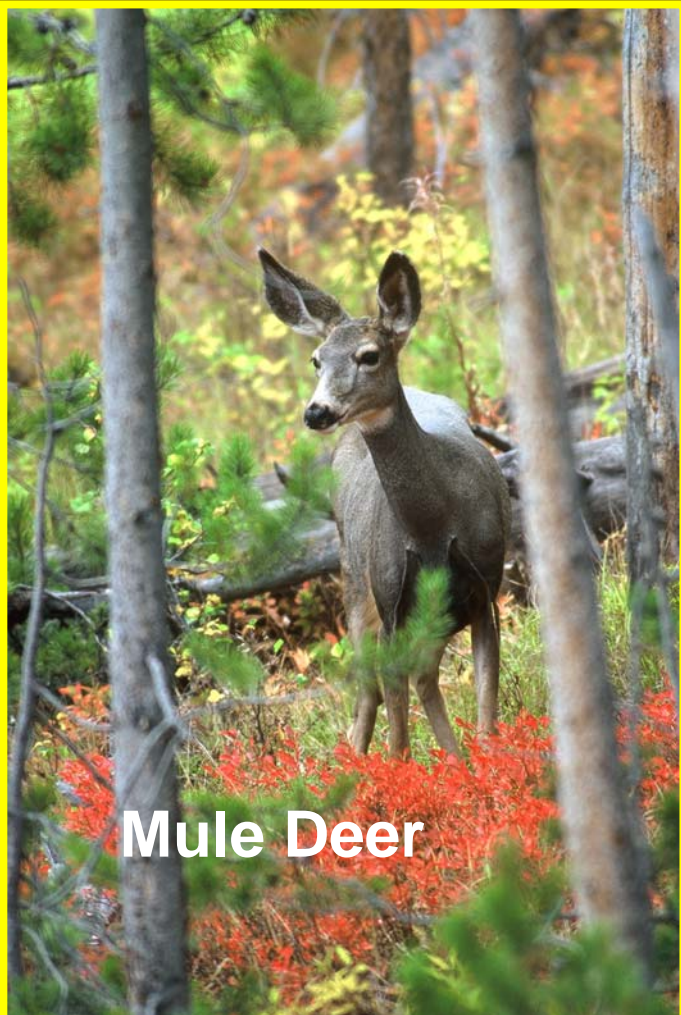
- **Unintended effects of good will**
- **Consequences**
  - **species**
  - **ecosystems**

Photo courtesy of  
Colorado Division of Wildlife



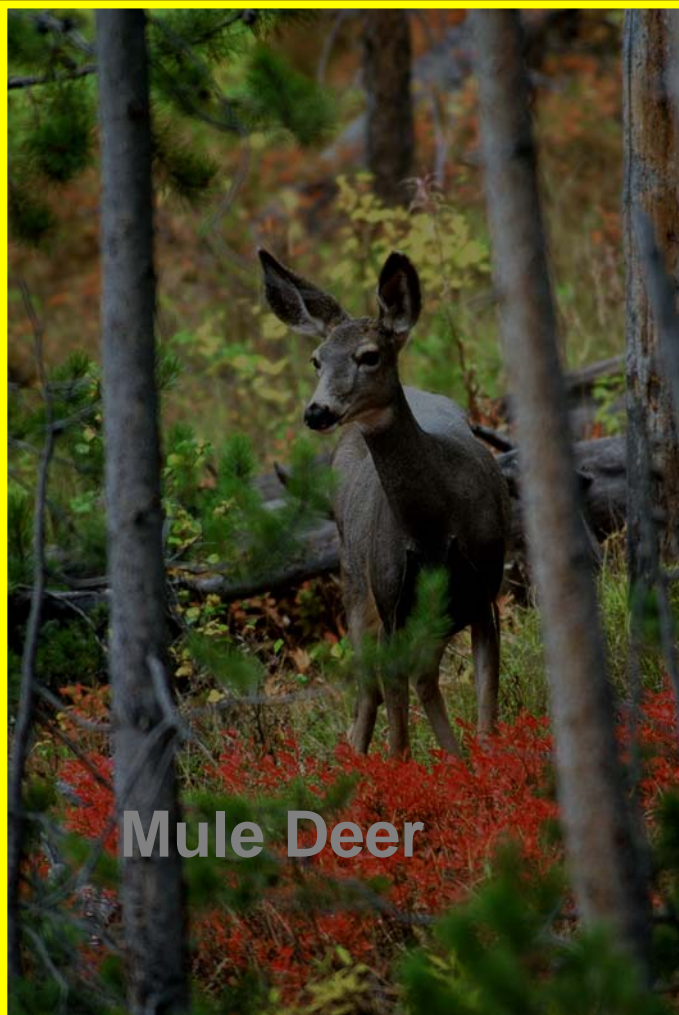
# *Major Wild Species with CWD*

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**Mule Deer**

# Major Wild Species with CWD





# Major Wild Species with CWD

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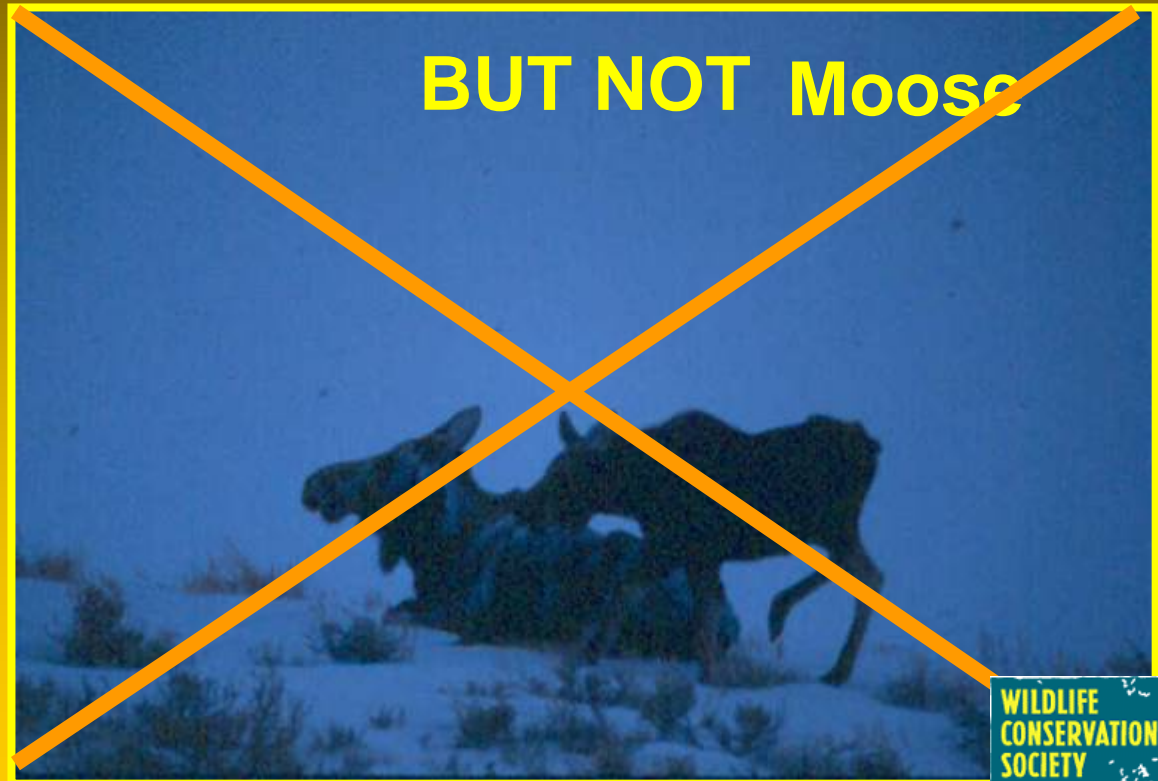
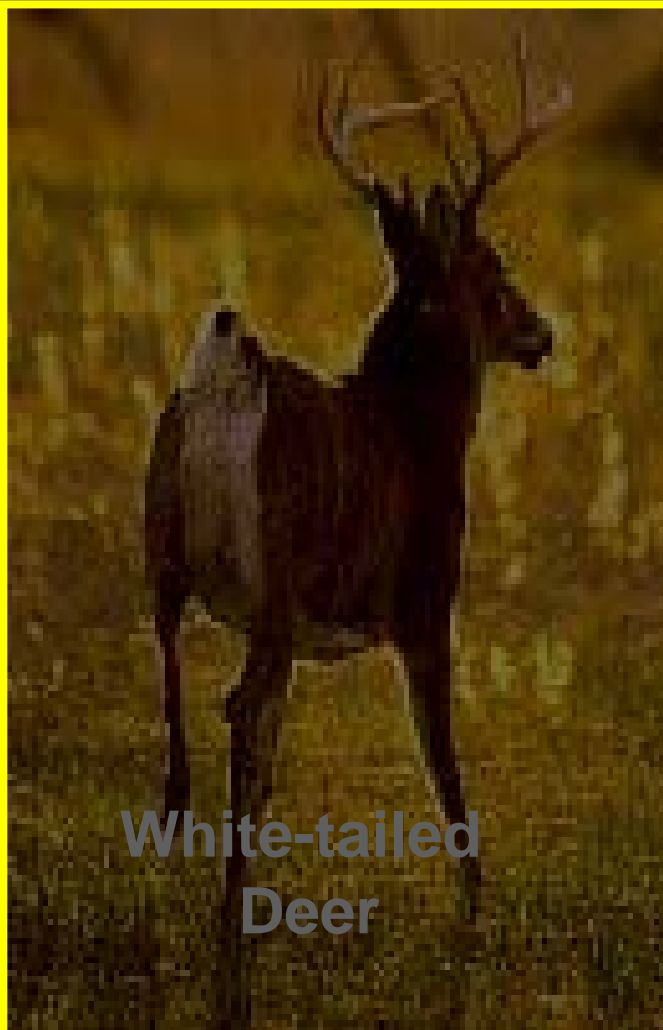
White-tailed  
Deer



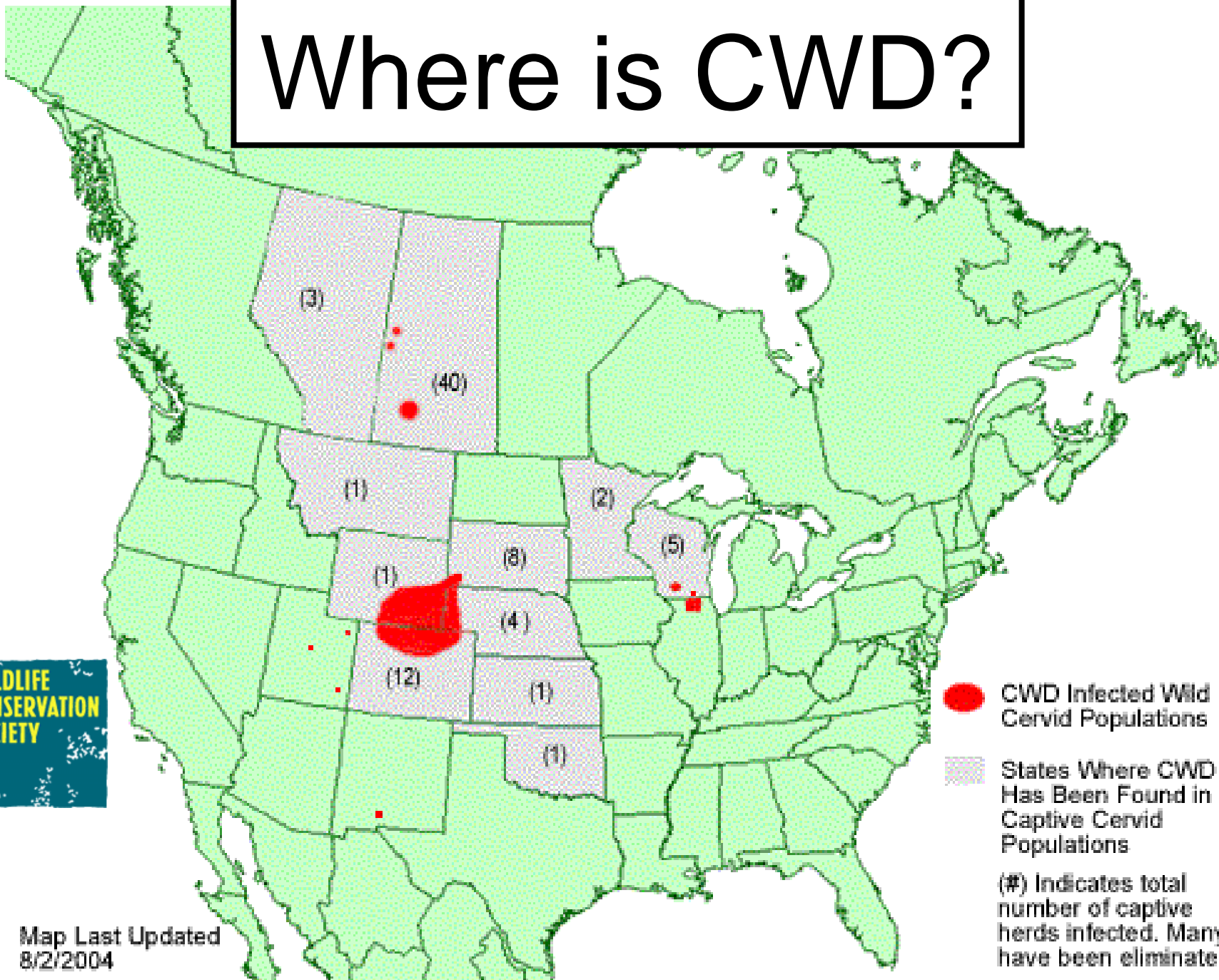
Elk

# Major Wild Species with CWD

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# Where is CWD?

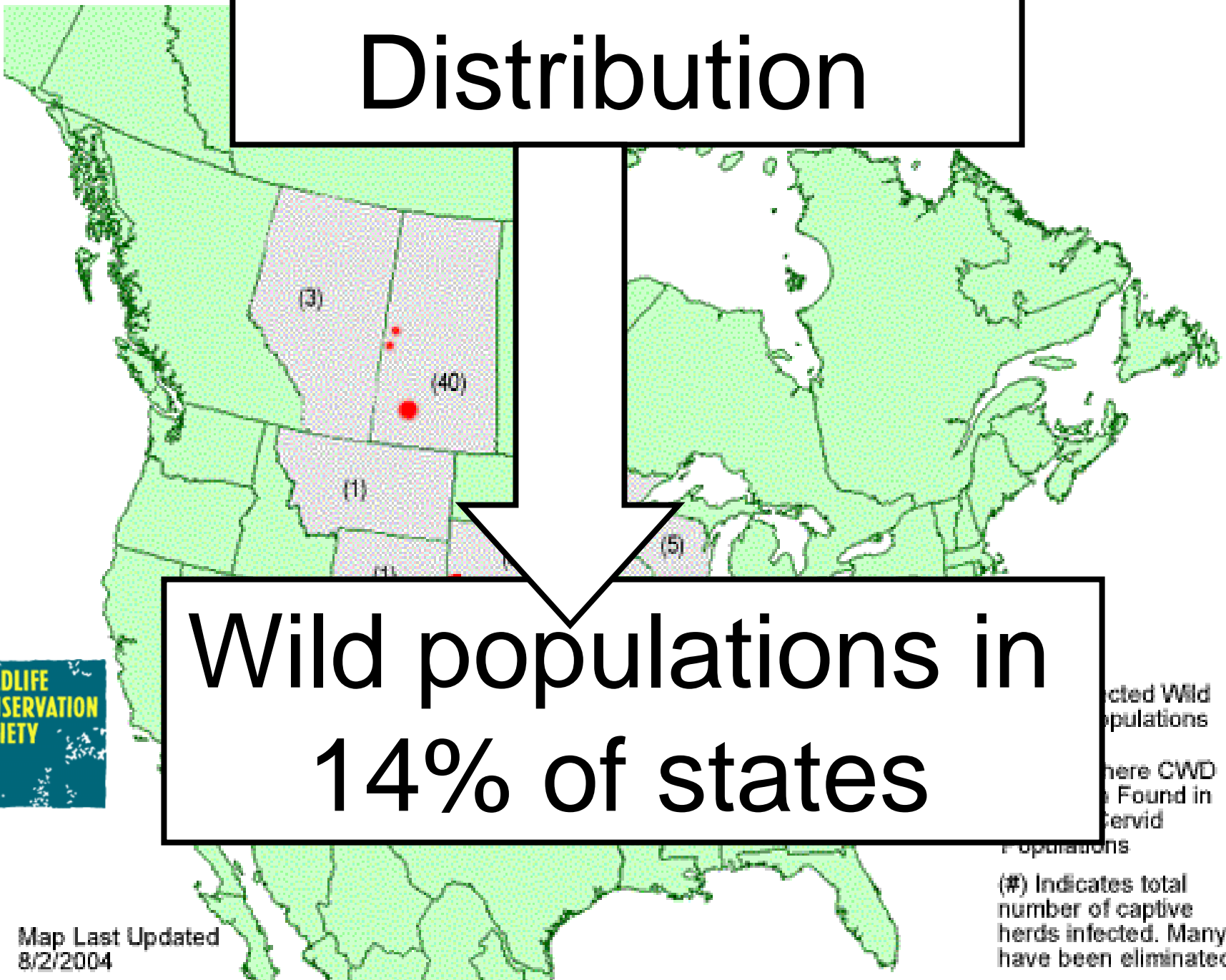


Map Last Updated  
8/2/2004

- CWD Infected Wild Cervid Populations
- States Where CWD Has Been Found in Captive Cervid Populations
- (#) Indicates total number of captive herds infected. Many have been eliminated.



# Distribution



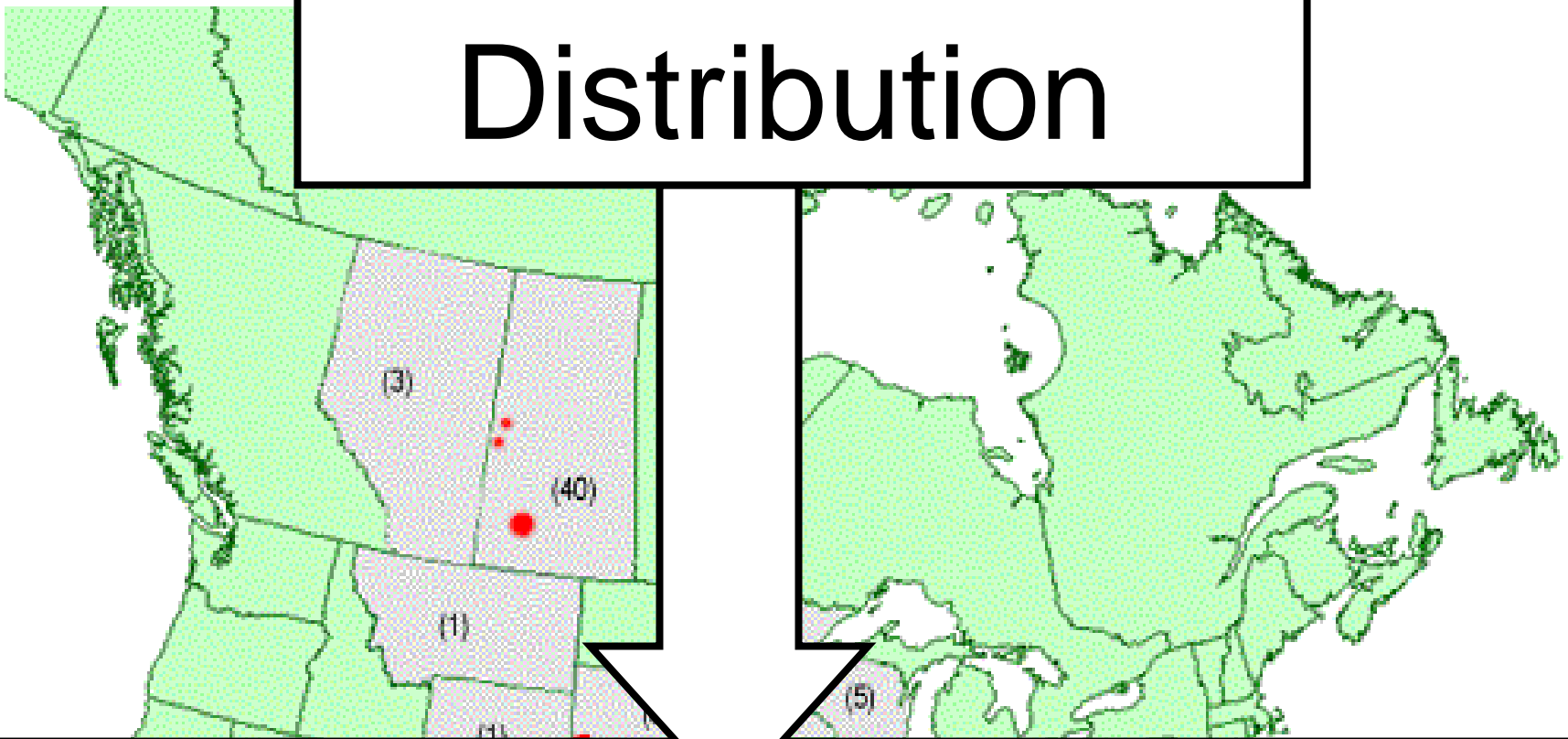
Wild populations in  
14% of states



Map Last Updated  
8/2/2004

ected Wild  
populations  
here CWD  
Found in  
Cervid  
Populations  
(#) Indicates total  
number of captive  
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# Distribution

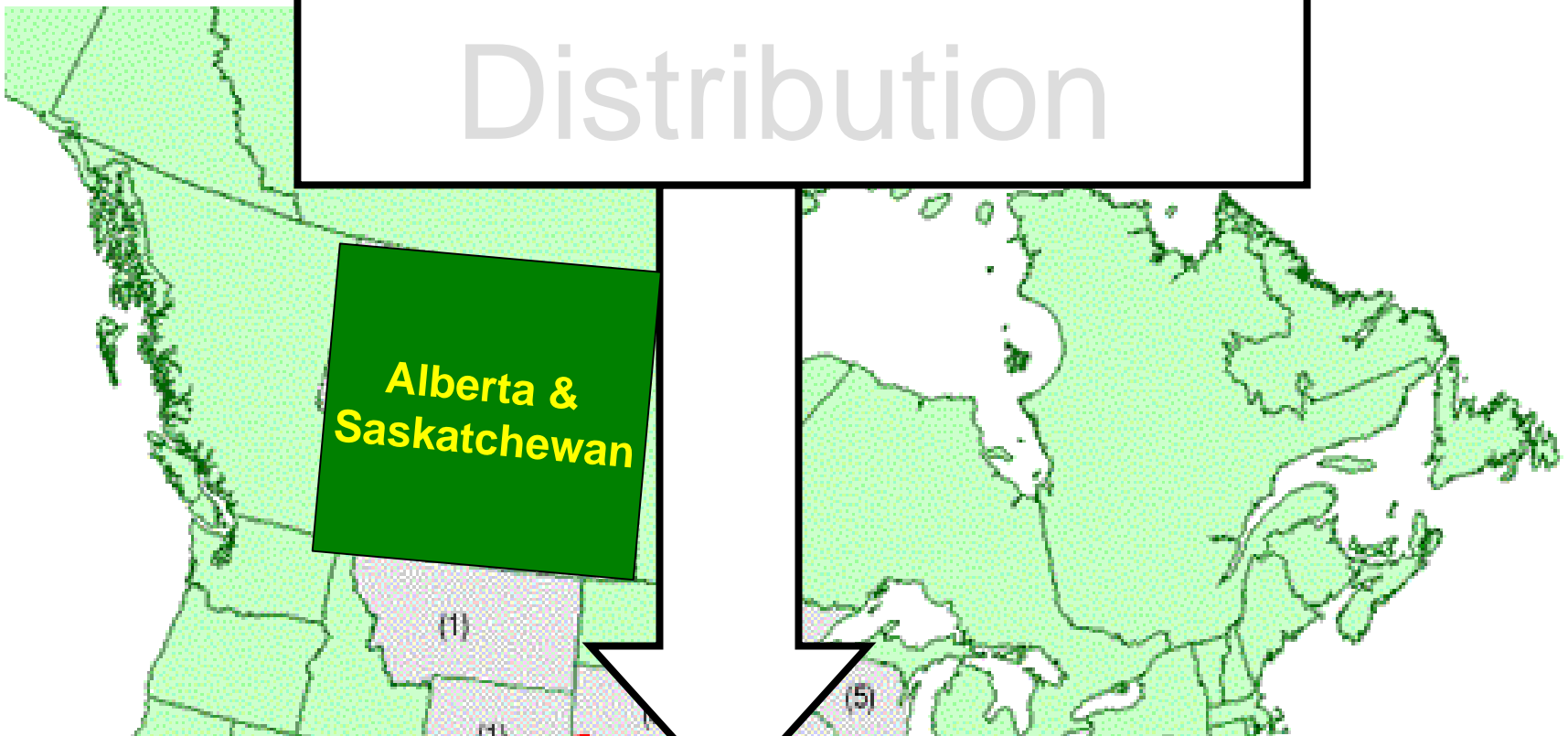


Captive & Wild populations in  
22% of states

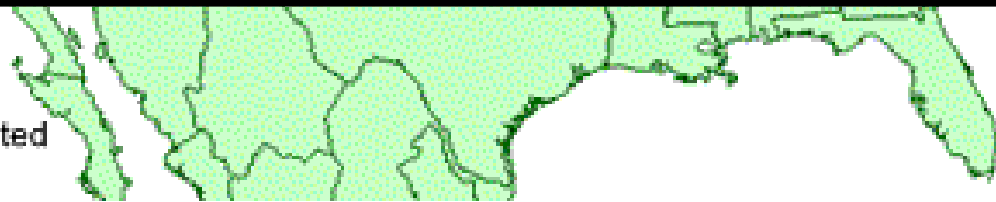
Map Last Updated  
8/2/2004

Populations  
(#) Indicates total  
number of captive  
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# Distribution



Map Last Updated  
8/2/2004



# Today's talk

Conservation

=

# Today's talk

Conservation

=

- Animals
- Plants
- Ecosystems
- People
- People + Animals



# Today's talk

**Conservation = People + Animals**

- Plants
- Ecosystems
- People
- People + Animals

**Conservation = People + Animals**

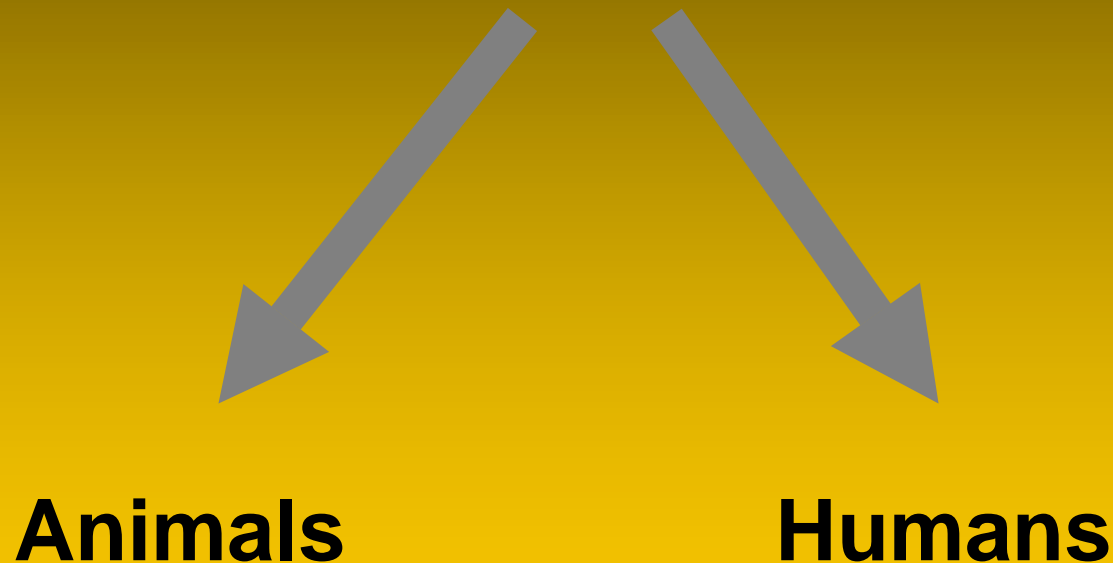
**Ecological Consequences of CWD**



**Animals**

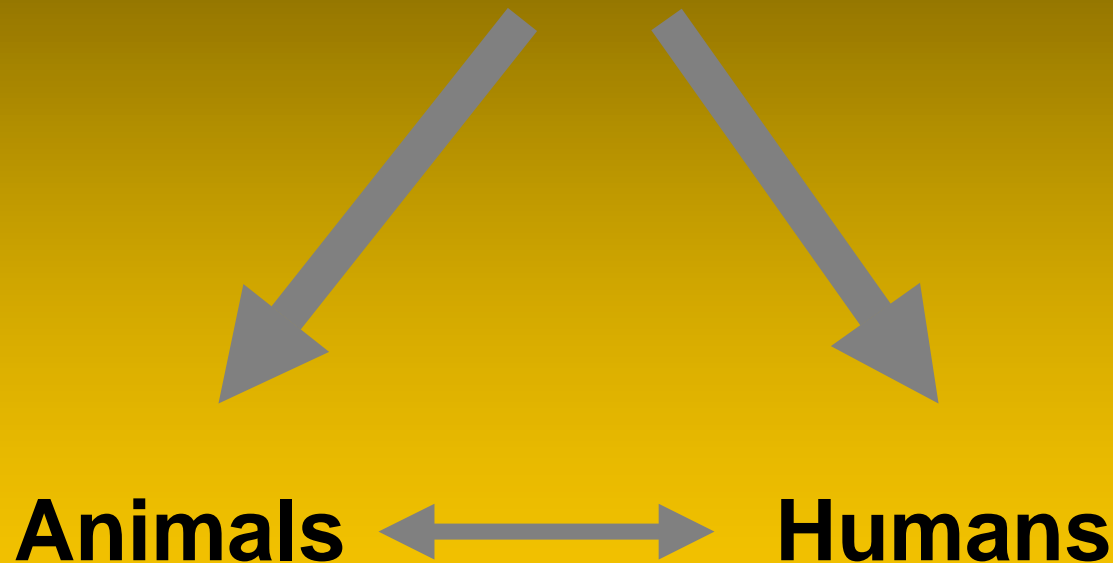
# Conservation = People + Animals

## Ecological Consequences of CWD

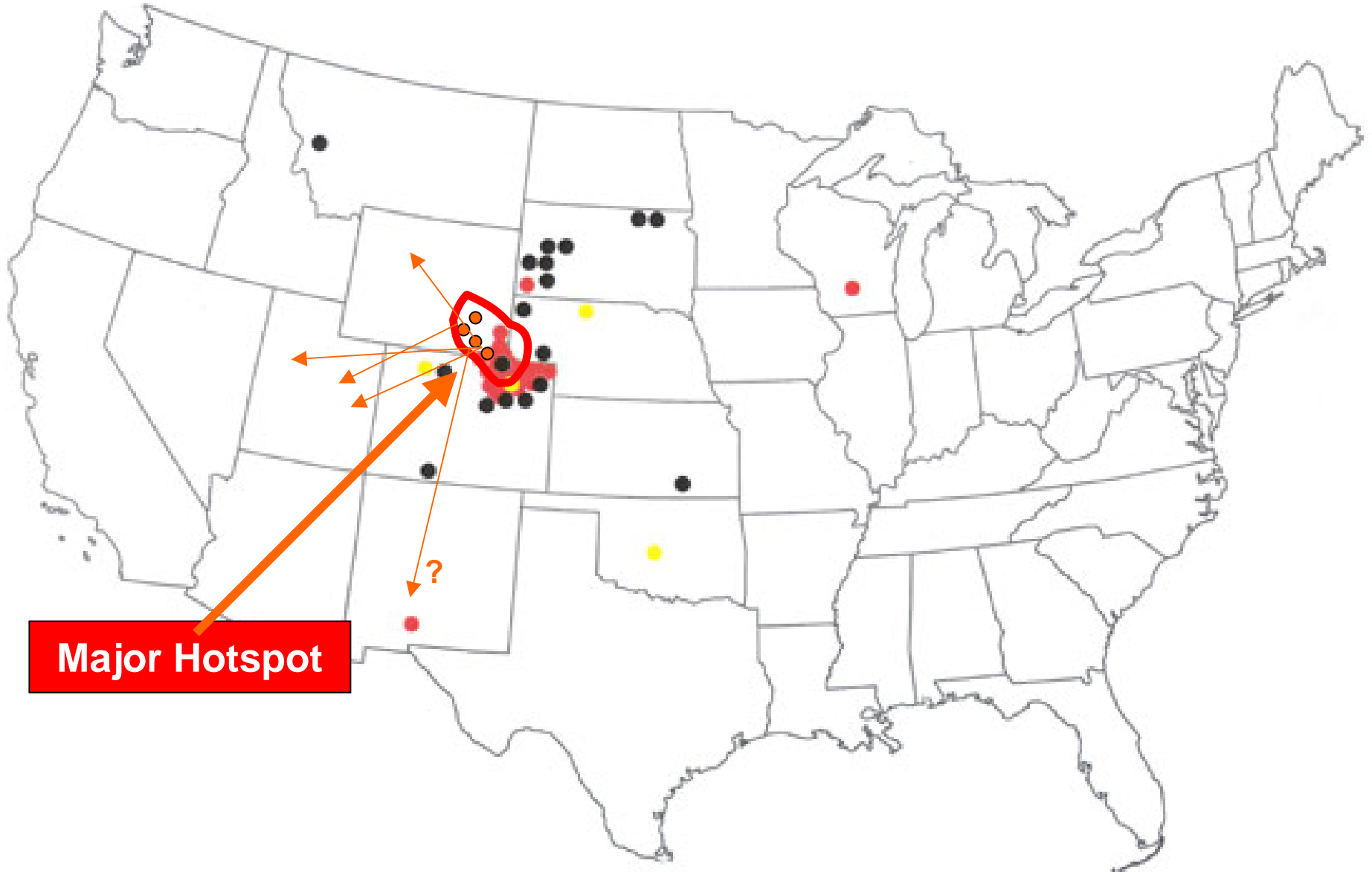


# Conservation = People + Animals

## Ecological Consequences of CWD



# Distribution

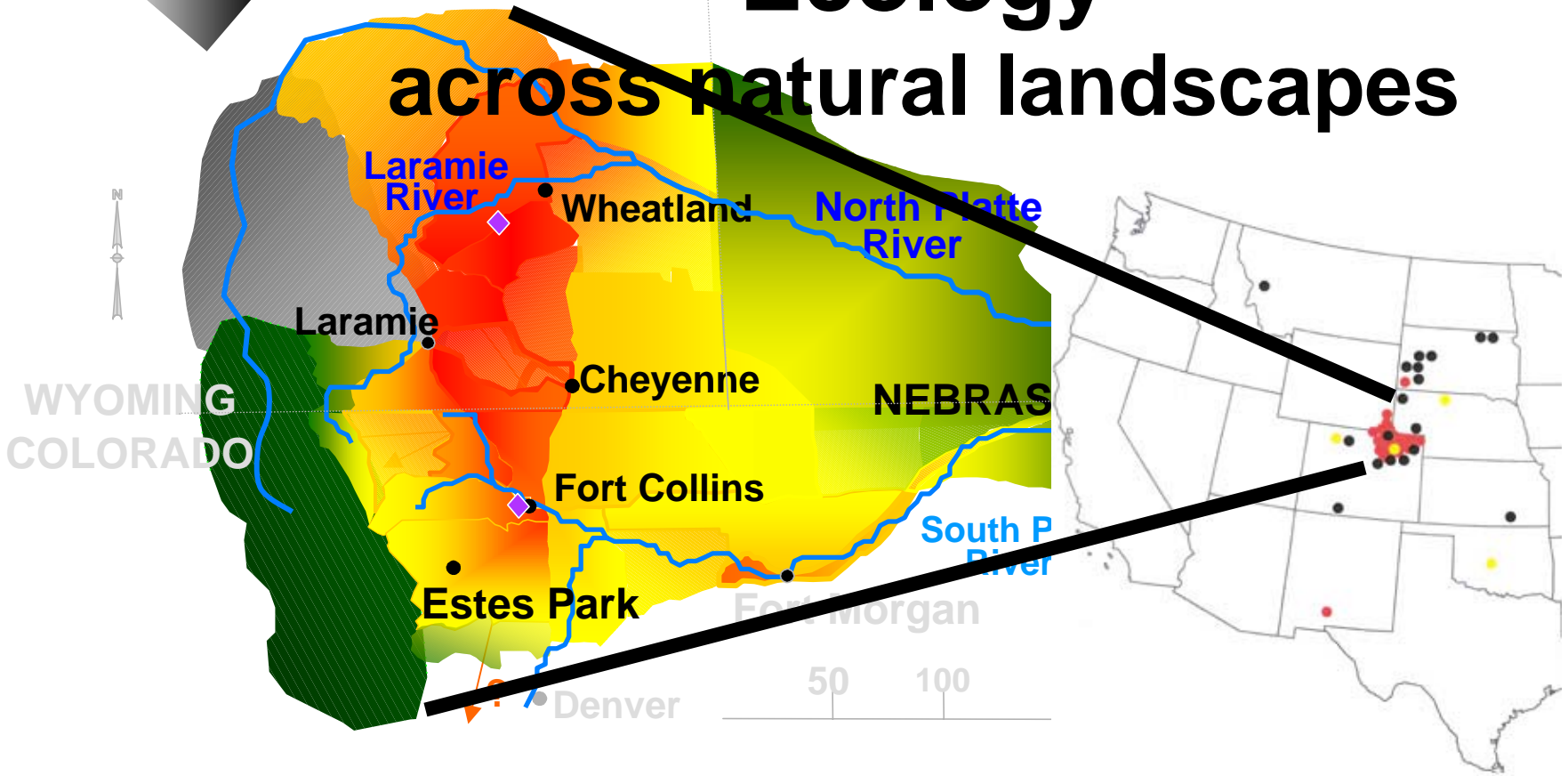


**Major Hotspot**



# Distribution, Density, & Ecology

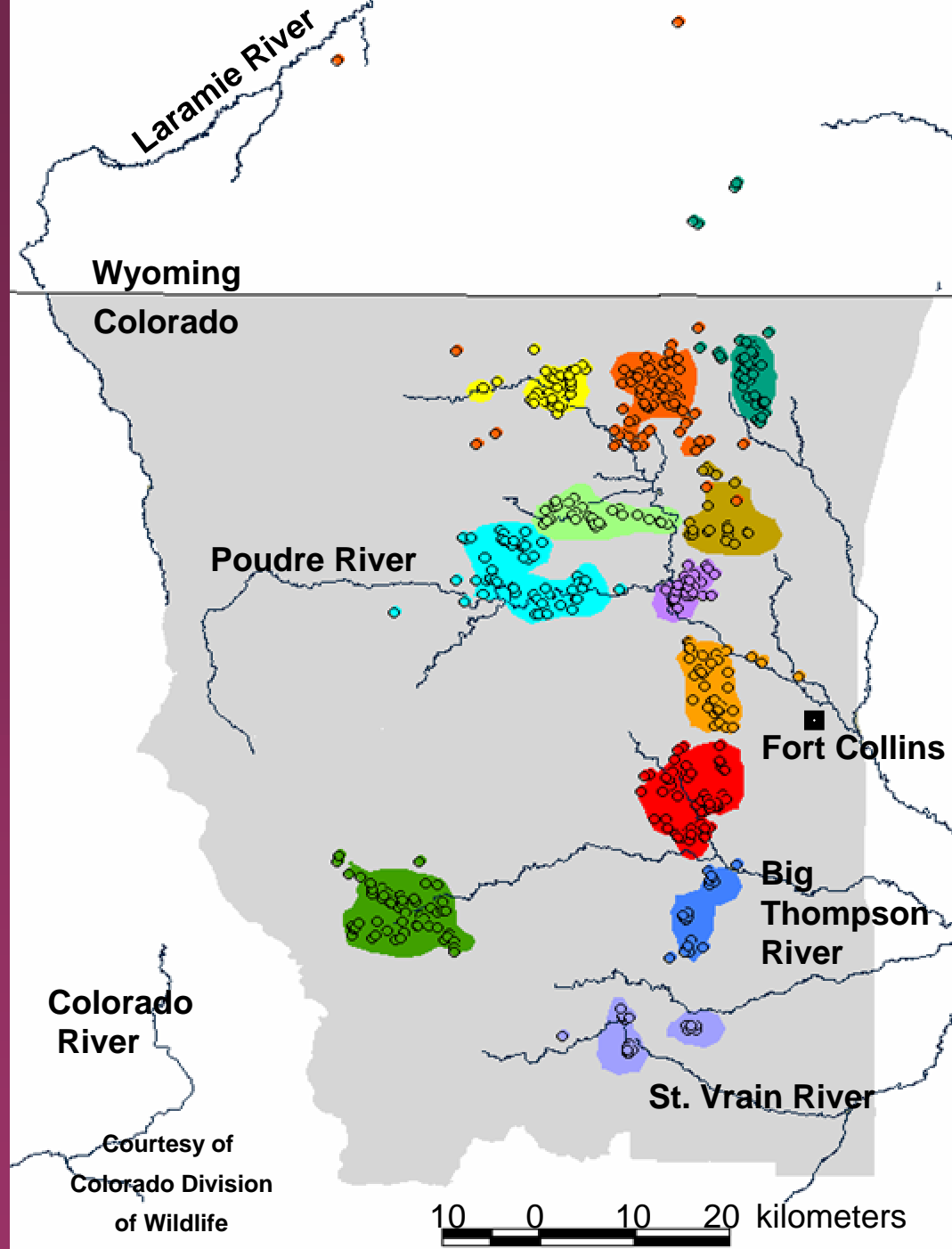
## across natural landscapes



Miller et al., (in Press)  
Colorado Division of Wildlife

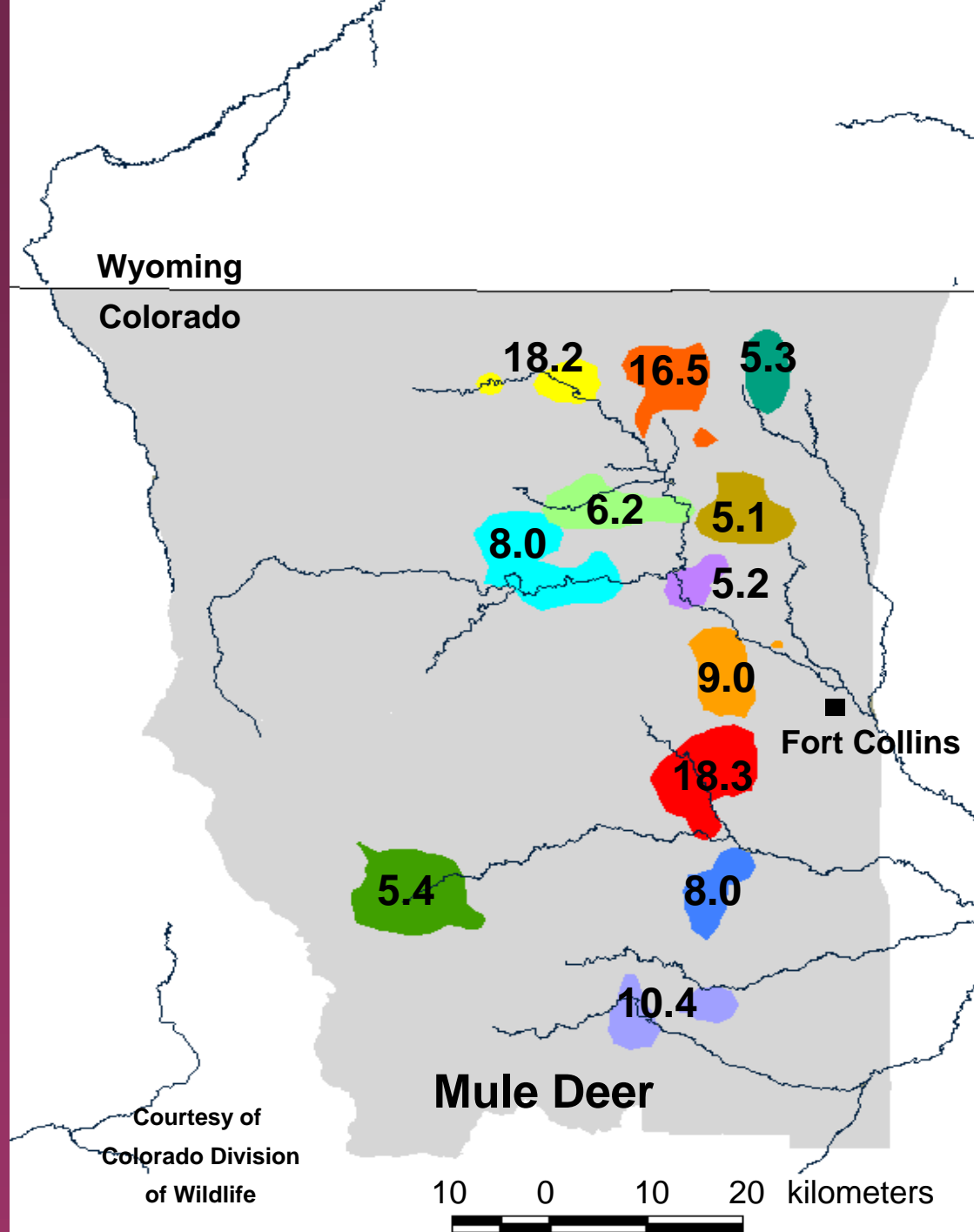
# Population Units

- Radio-collared animals to determine winter areas
- Hunter Kills to facilitate increase in sample for prevalence screening



# CWD Prevalence

- 5 -18%

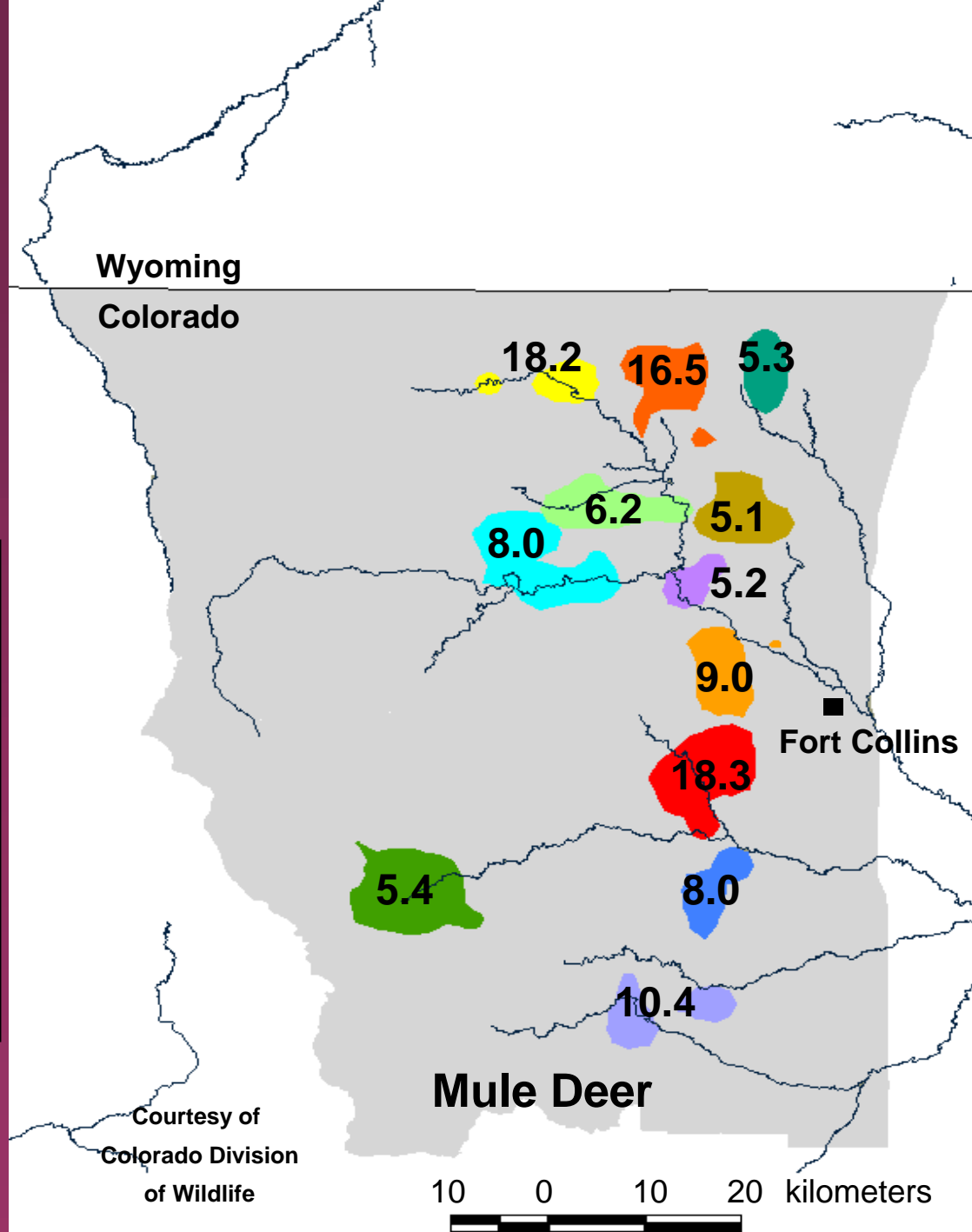


# CWD Prevalence

- 5 -18%

	<u>Males</u>	<u>Females</u>
<b>ELK</b>	1-2	1
<b>M Deer</b>	11	7
<b>WT Deer</b>	~ 14 *	

\* n < 10





**So – what is the  
relationship among  
ecology, density,  
and prevalence ?**

Miller et al., (in Press)  
Colorado Division of Wildlife



**Little is known about factors removing infected animals in the wild...but**



Little is known about factors removing infected animals in the wild...but



Predators





Courtesy  
Brian Miller

# Ecologically Redundant ?



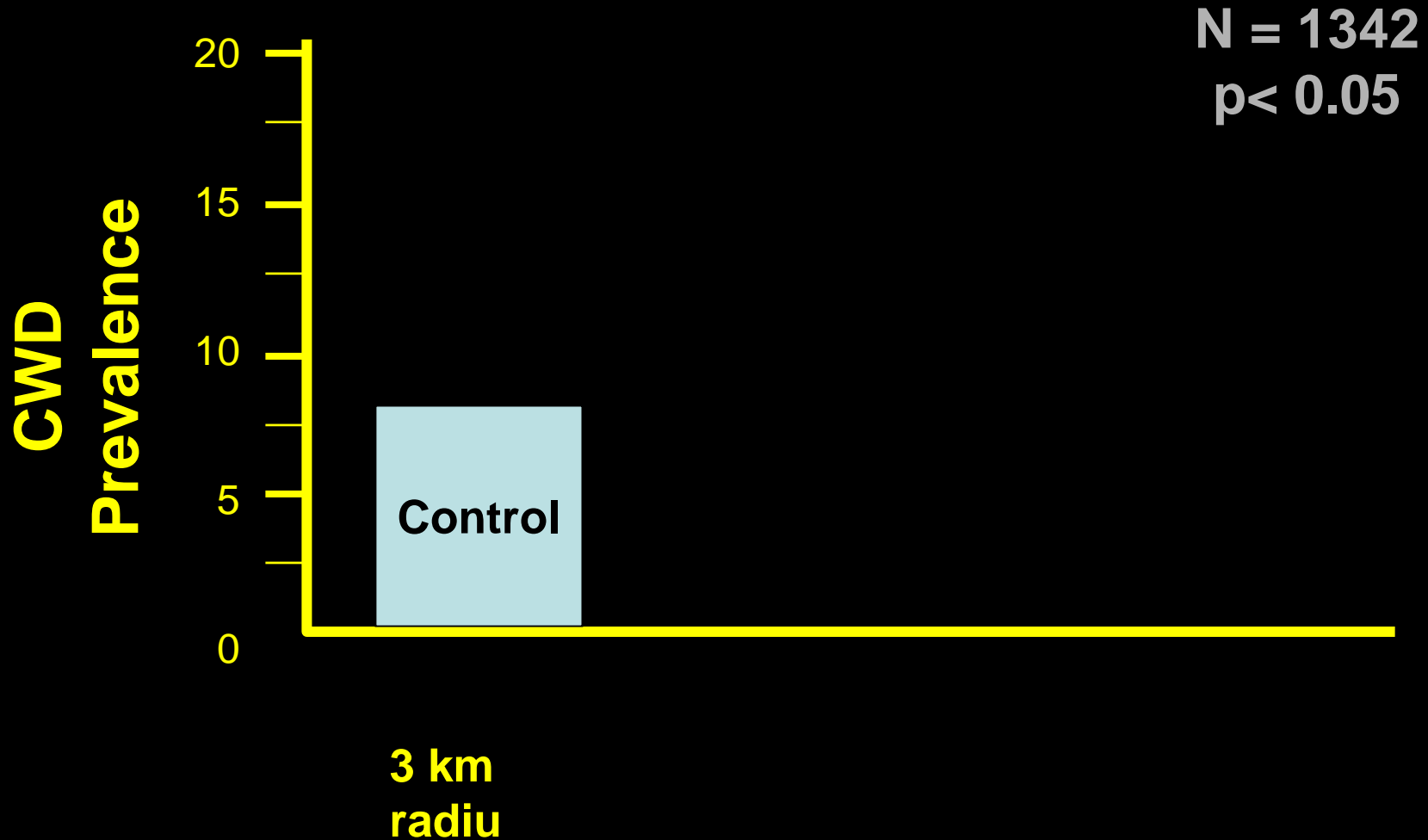
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**Predators**

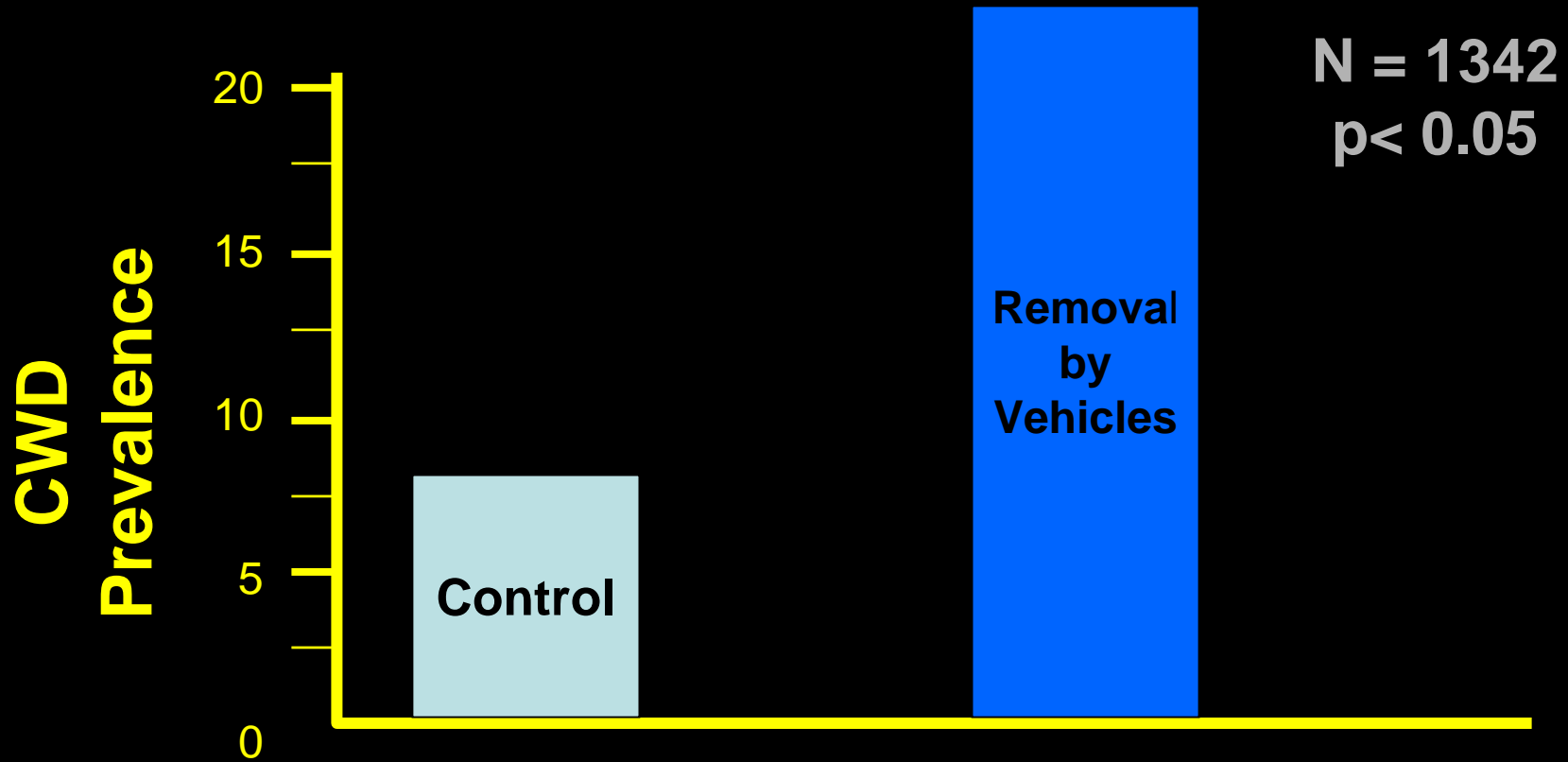
**Vehicles**

# Removal of Infected Animals





# Removal of Infected Animals

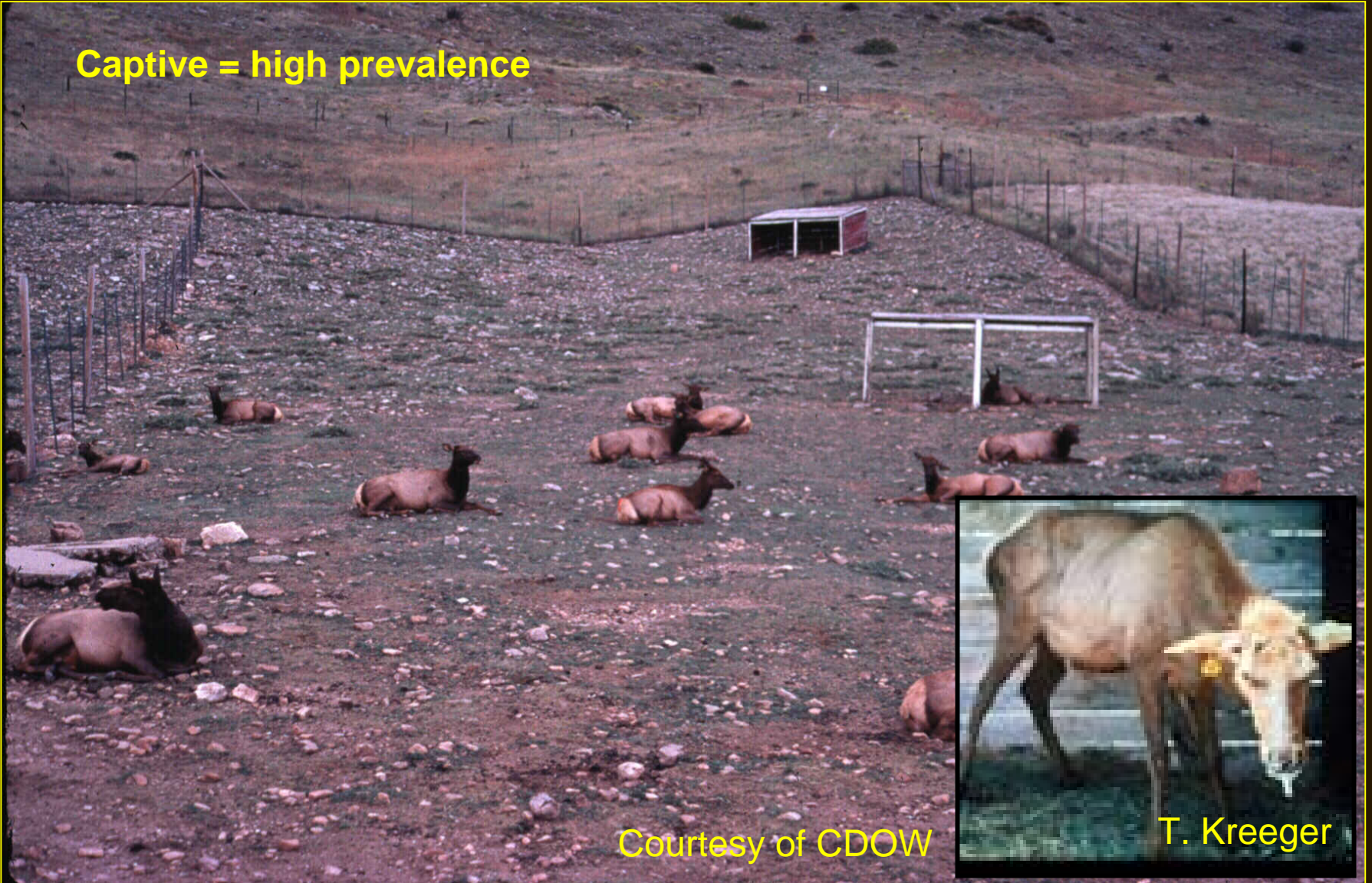


3 km  
radius



# What about density?

Captive = high prevalence



Courtesy of CDOW



T. Kreeger



# Association between captive settings and field densities less clear

Captive = high prevalence



Courtesy of CDOW



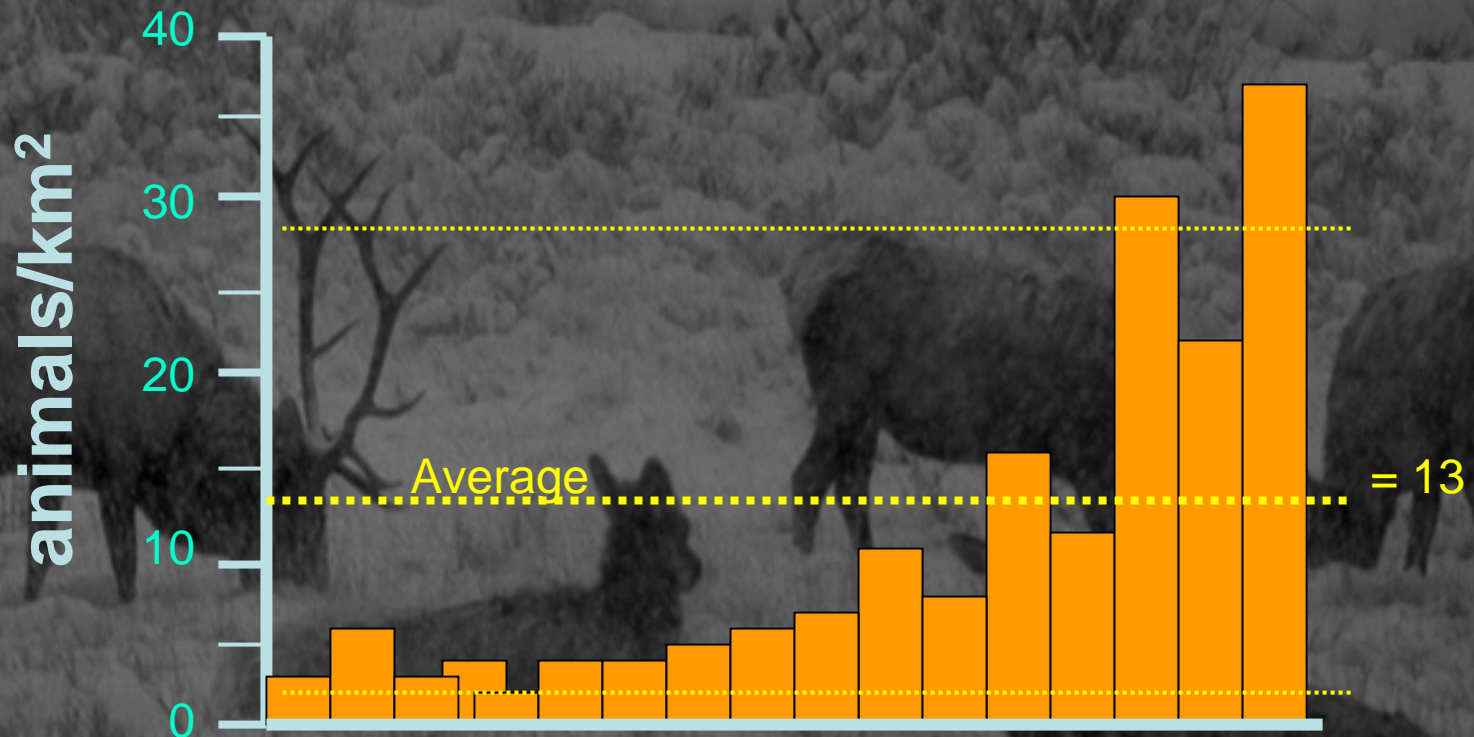
T. Kreeger



# Elk Densities\* during Winter

(17 Sites – Wyoming, Colorado, South Dakota

Montana, Arizona, U. K., Scotland)



(source:  
Berger, in press)

\* unconfined

# Let's change dimensions

animals/km<sup>2</sup>

210  
180  
150  
120  
90  
60  
30  
0

Average

= 13

WILDLIFE  
CONSERVATION  
SOCIETY

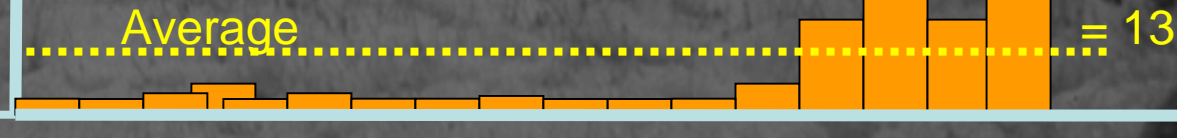


# Densities in captivity



animals/km<sup>2</sup>

210  
180  
150  
120  
90  
60  
30  
0





## Densities in captivity



animals/km<sup>2</sup>

210

180

150

120

**With high densities, our concerns should be exacerbated**

30

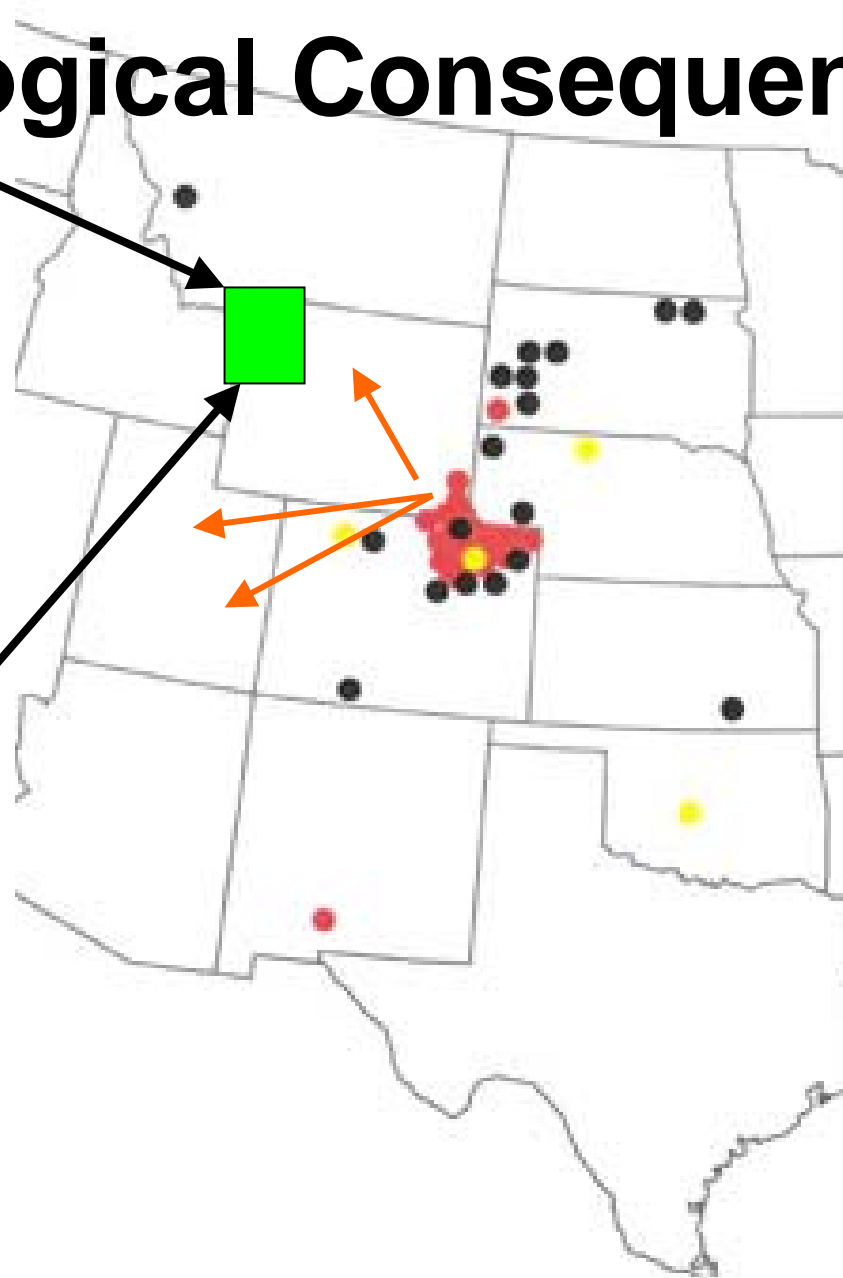
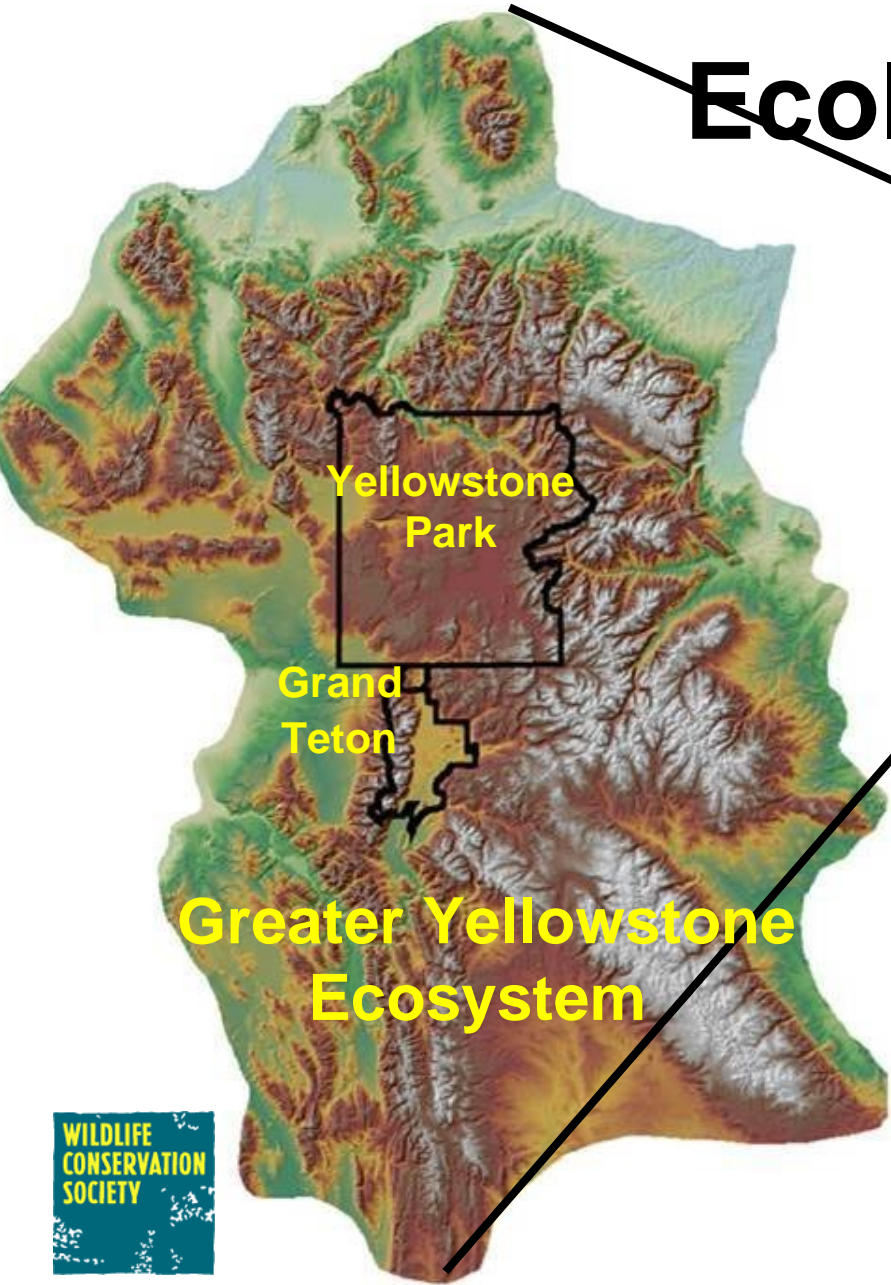
Average

= 13

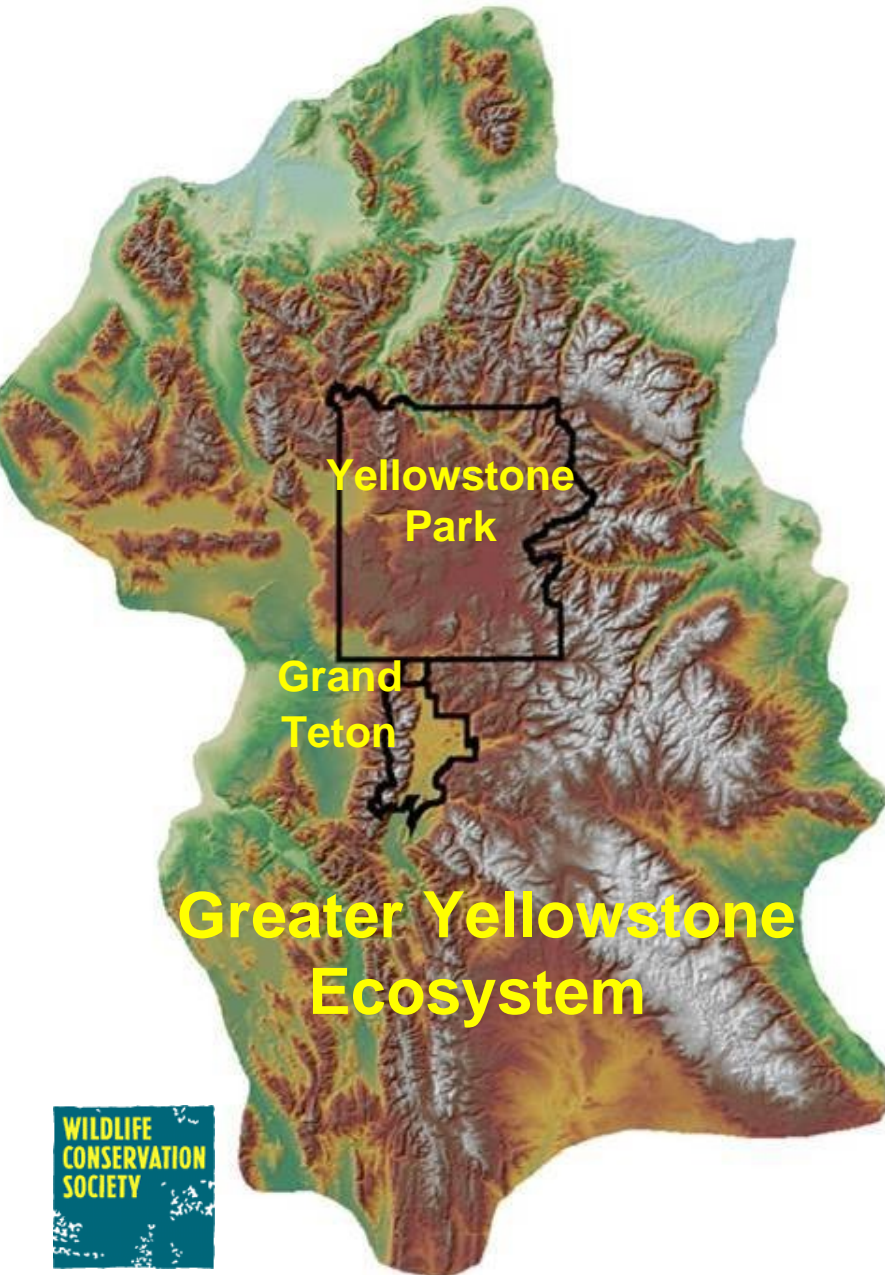
0



# Potential Ecological Consequences



# Background

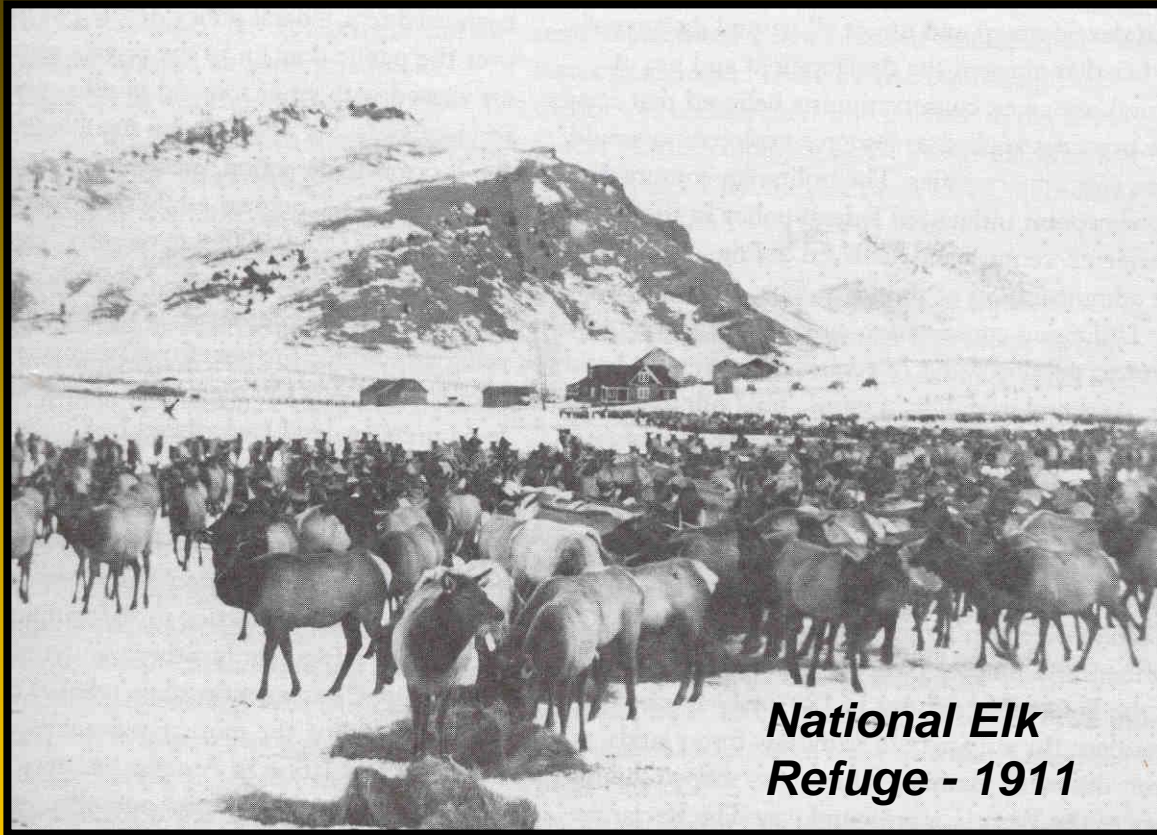


- 60,000 km<sup>2</sup>
- 200,000 ungulates
- T & E carnivores
- economical dependence
  - Viewing
  - Consumption



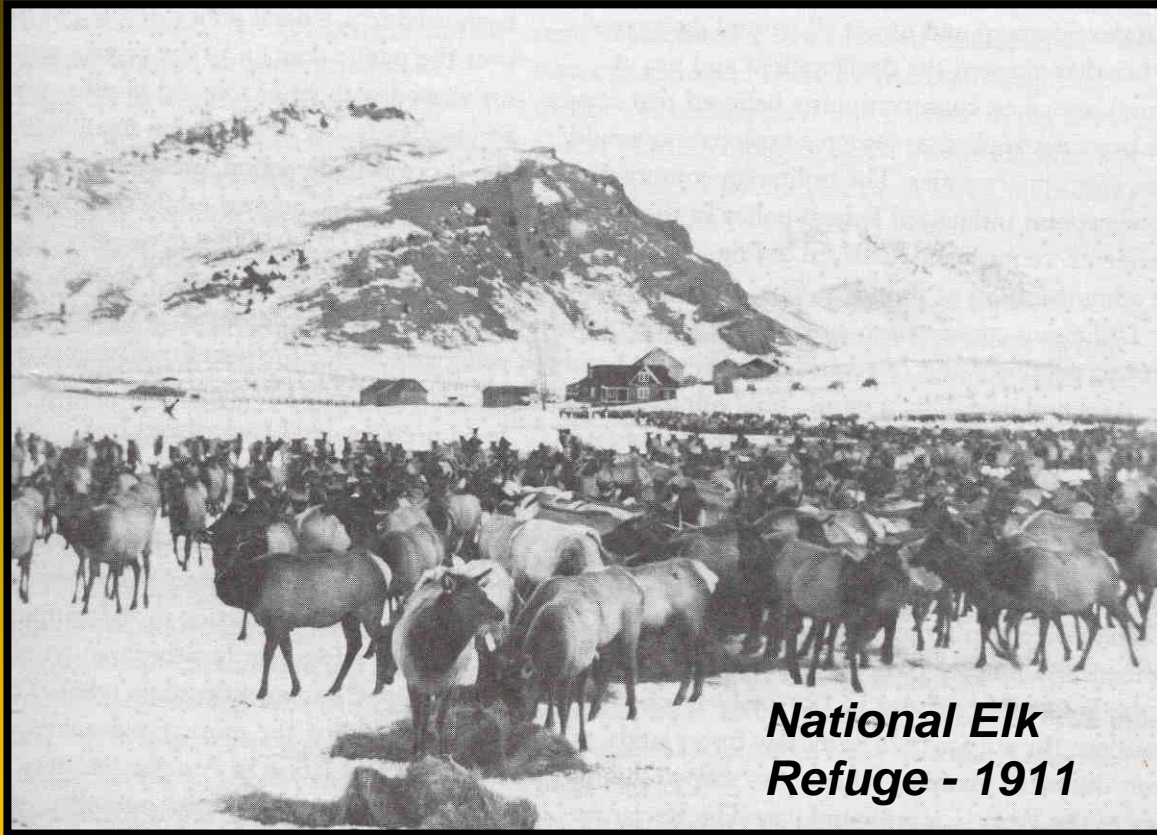
# Unintended Consequences of Good Intentions

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# Unintended Consequences of Good Intentions

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- Humane action
- Artificial feeding to prevent starvation

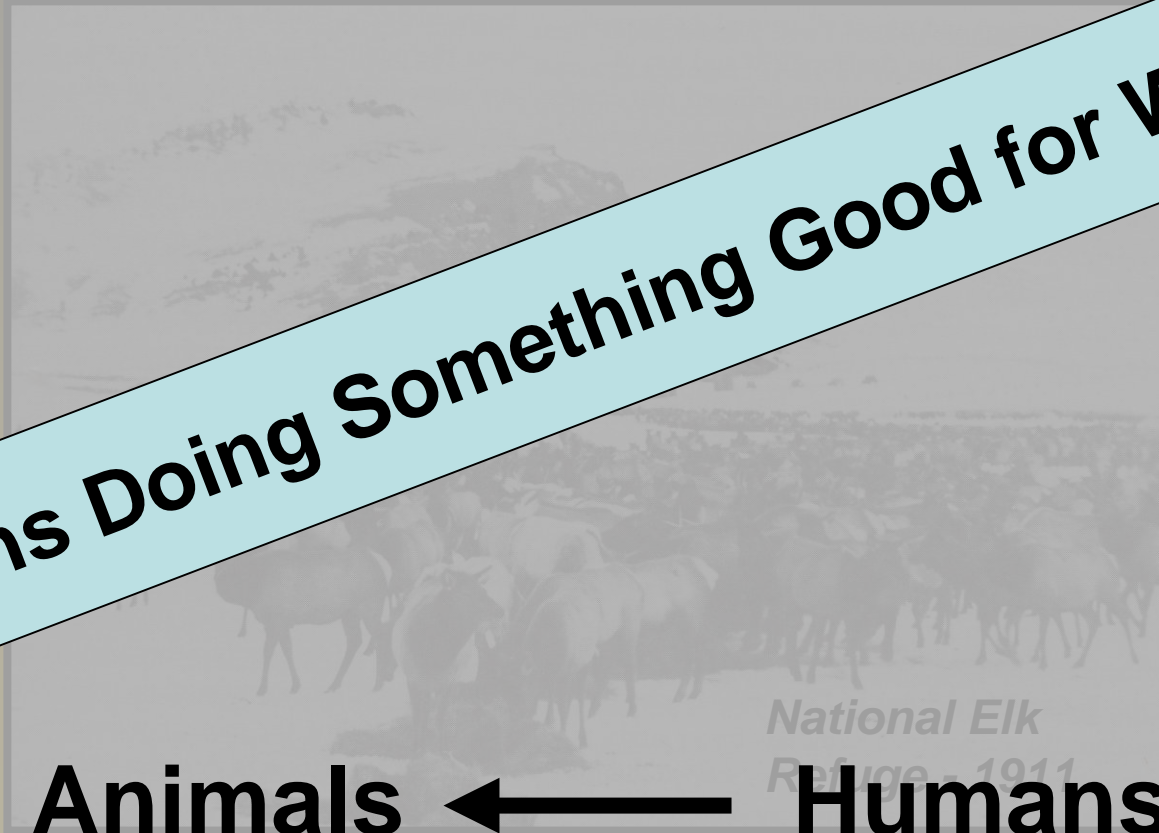


# Unintended Consequences of Good Intentions

**Humans Doing Something Good for Wildlife**

**Animals ← Humans**

Artificial feeding to prevent starvation

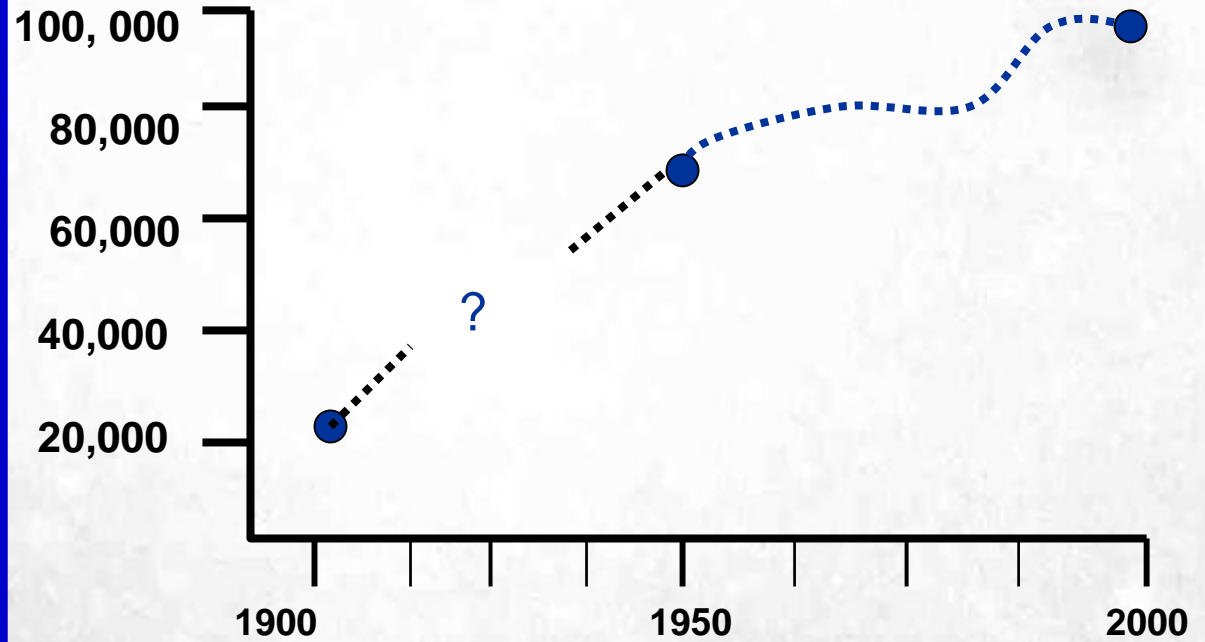




**What are the consequences ?**



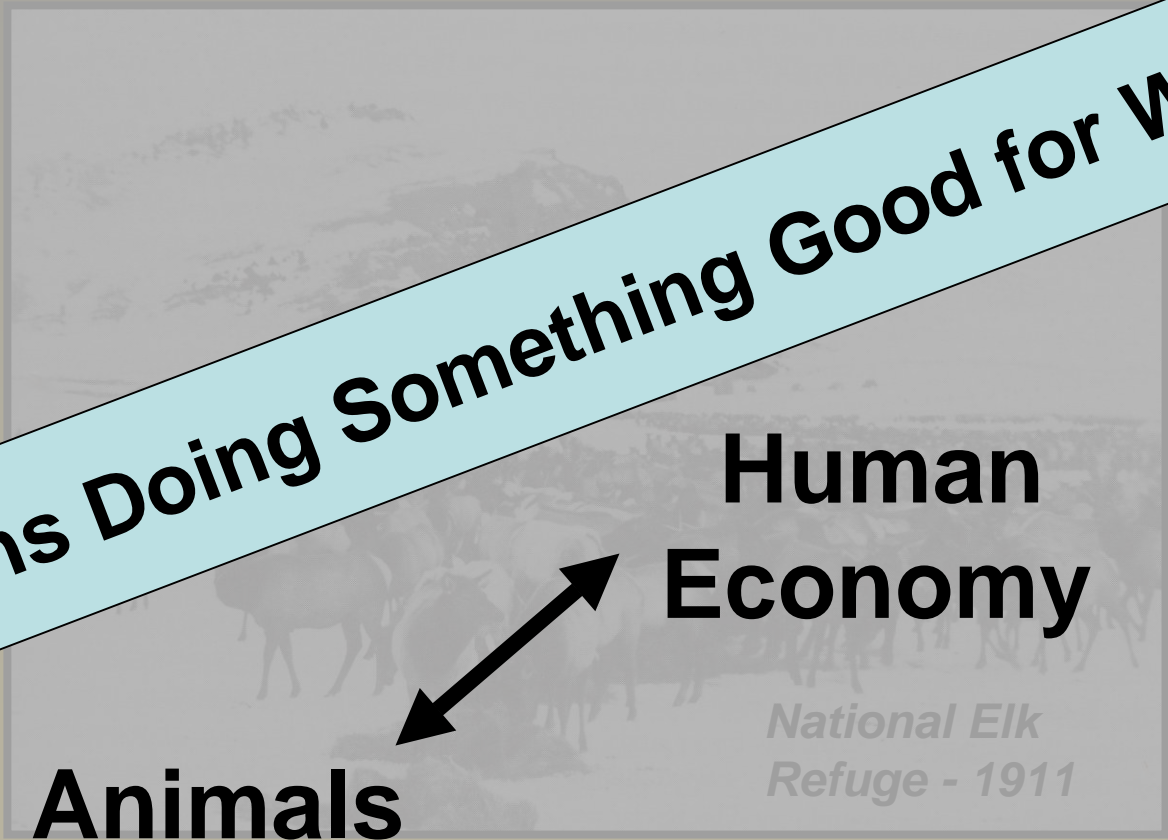




# Growth of Elk Populations in the Greater Yellowstone Ecosystem

# Unintended Consequences of Good Intentions

**Humans Doing Something Good for Wildlife**



**Human  
Economy**



**Animals**

Artificial feeding to prevent starvation

**What's changed over 85 years ?**

**I. Greenberg**



# Feed-ground in Wyoming



A large herd of elk and bison is shown in a snowy field. The elk are in the background, and the bison are in the foreground. The scene is set in winter with a snow-covered ground and a clear sky.

**+ 22 elk feed-grounds**

**Wild**  
(no feeding)

**Full Circle**



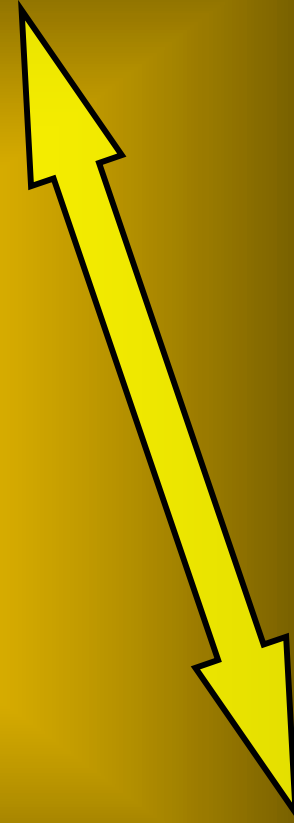
**Wild**

(no feeding)

**Free-roaming**

**Semi-Wild**

(winter feeding)

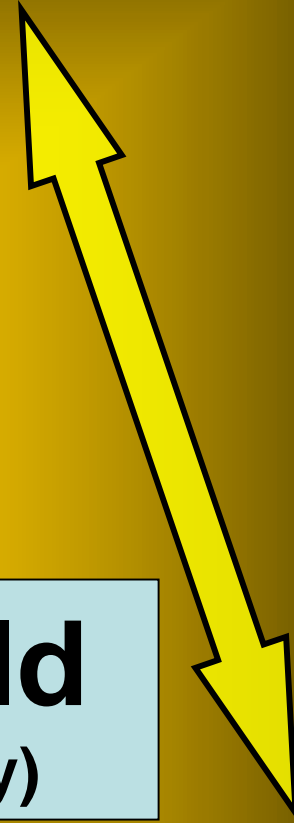


**Free-roaming**

**Wild**  
(no feeding)

**Semi-Wild**  
(winter feeding)

**Non-Wild**  
(feeding only)



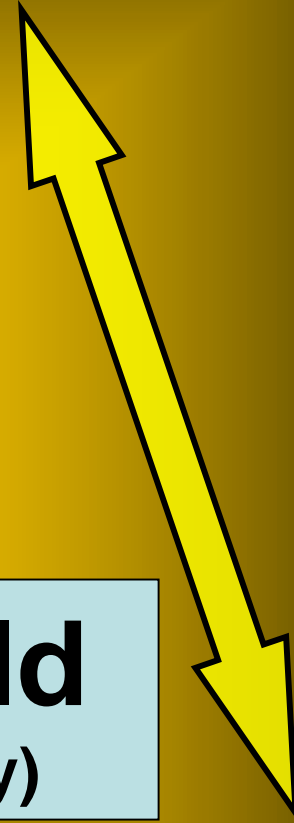
**Wild**  
(no feeding)

**Free-roaming**

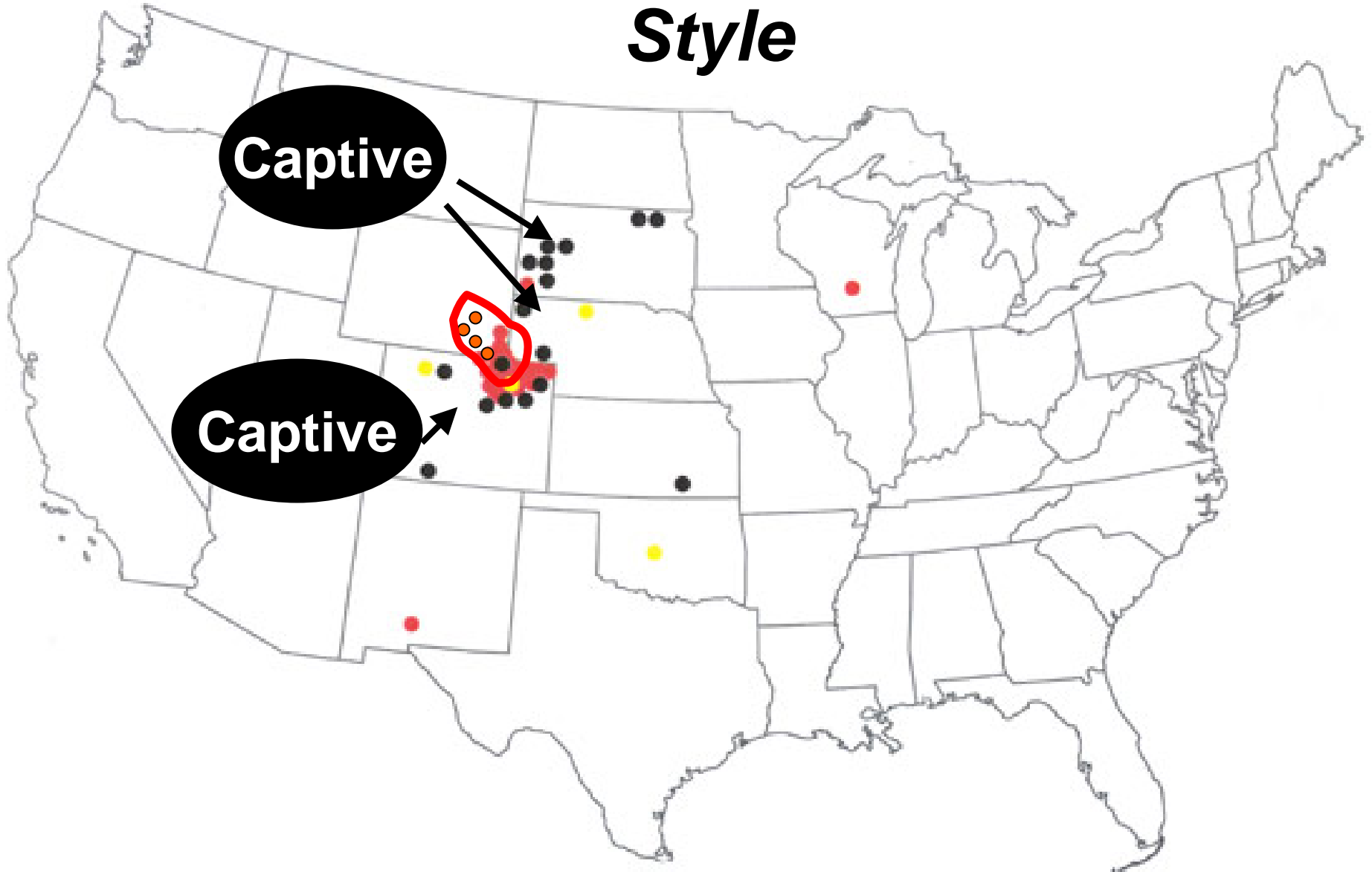
**Semi-Wild**  
(winter feeding)

**Non-Wild**  
(feeding only)

**Captive**



# Globalization — *North American Style*

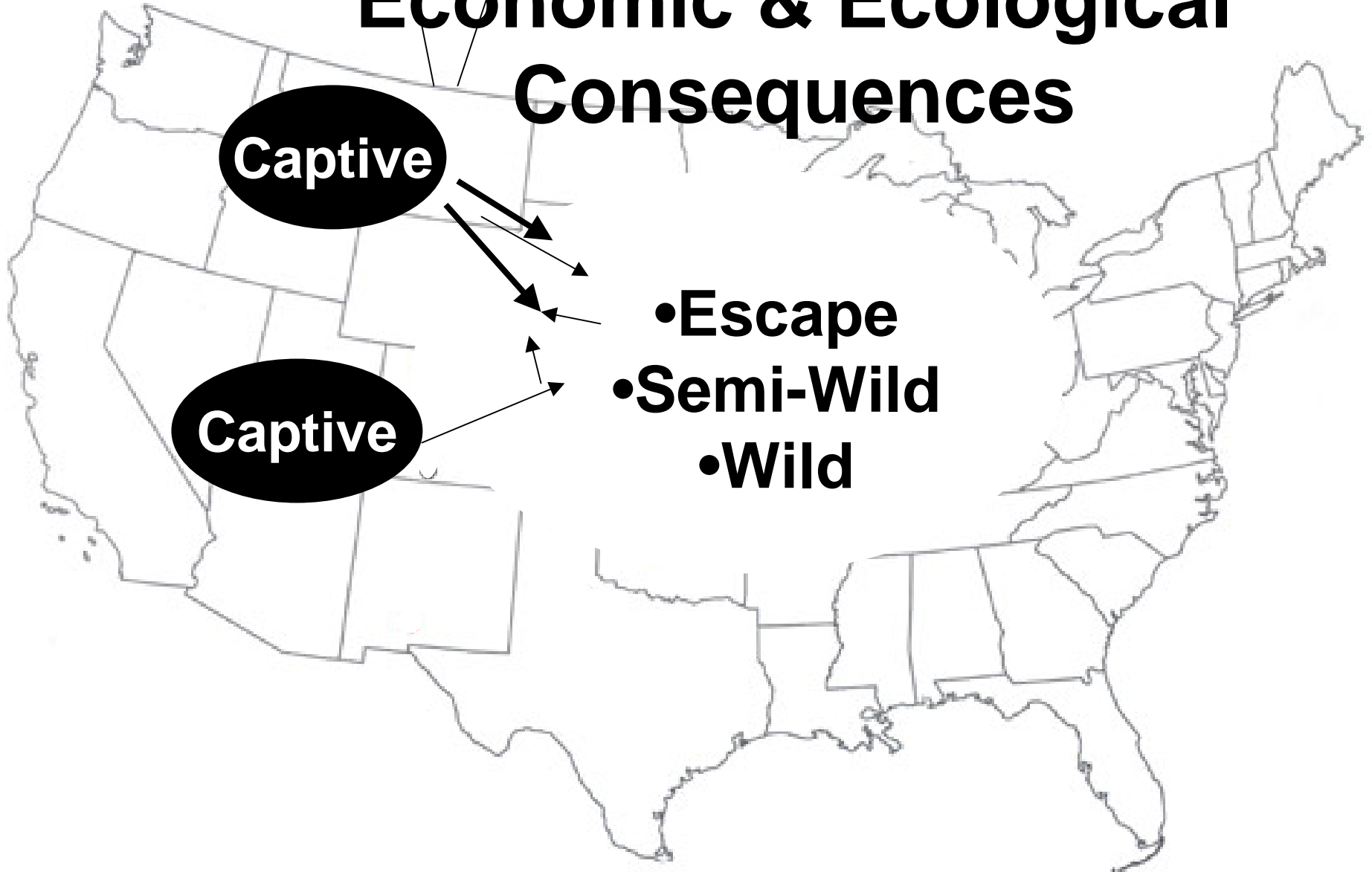


# Potential Economic & Ecological Consequences

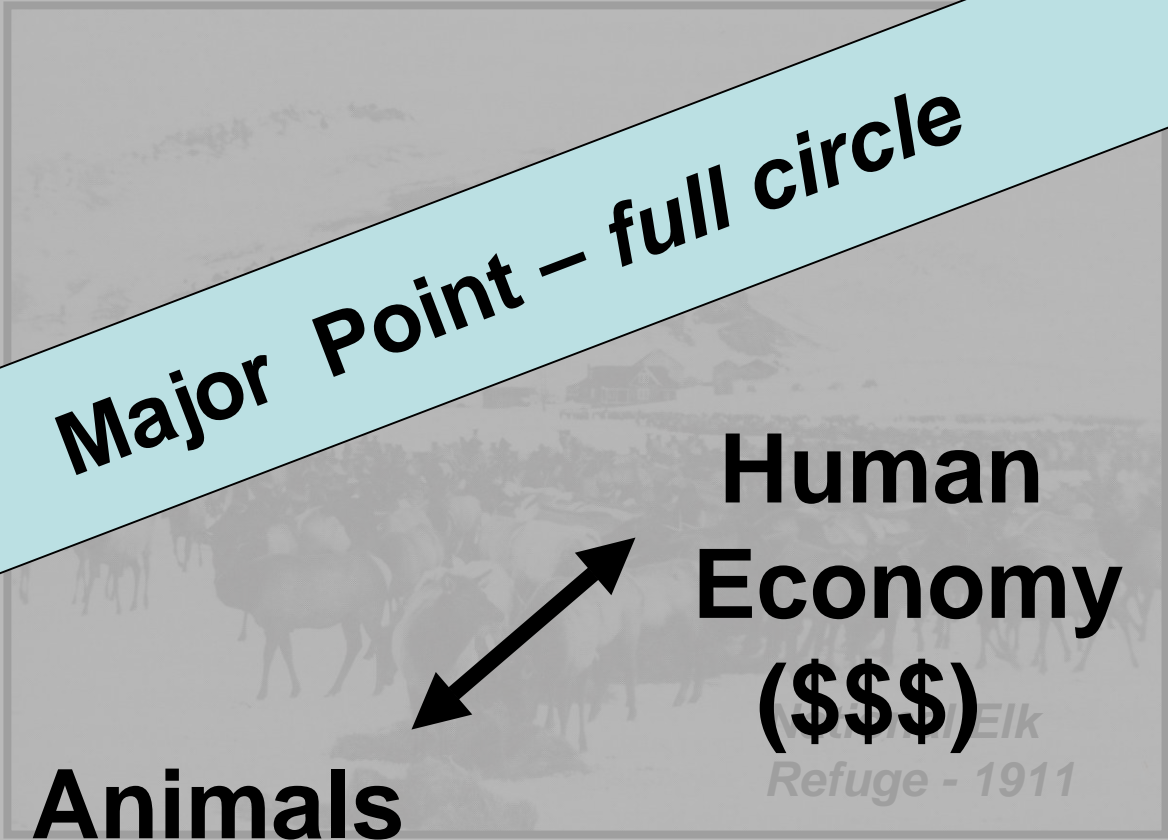
**Captive**

**Captive**

- **Escape**
- **Semi-Wild**
- **Wild**



# Unintended Consequences of Good Intentions



**Major Point – full circle**

**Human  
Economy  
(\$\$\$)**

**Animals**



Artificial feeding to prevent starvation

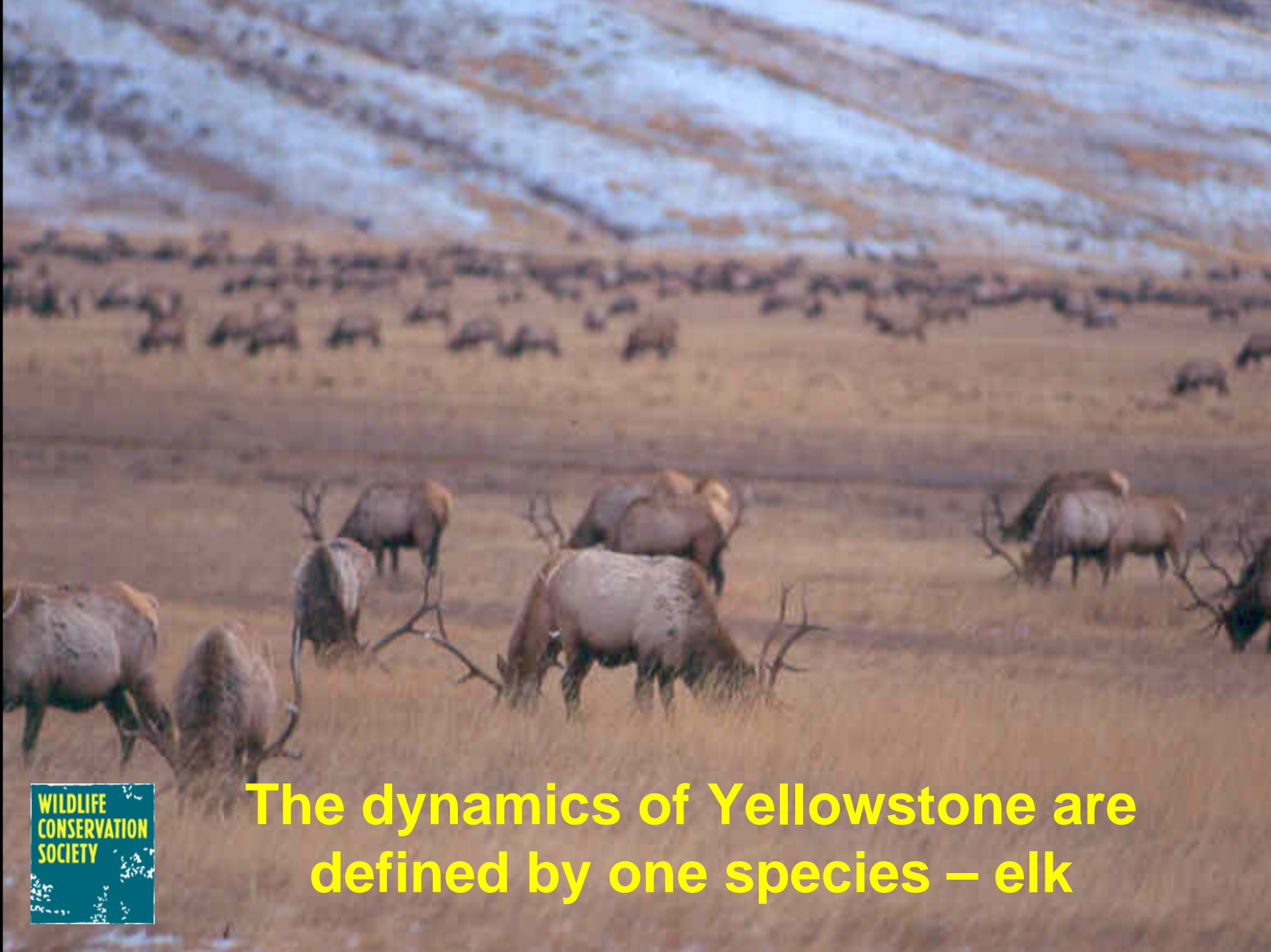
# Conservation Implications

# Conservation Implications

The boundaries and dynamics of the Serengeti are defined by one species -- wildebeest







**The dynamics of Yellowstone are defined by one species – elk**

# Building a Food Web



Elk

# Building a Food Web



# Building a Food Web



Elk



Wolf



Grizzly bear



# Building a Food Web



Elk



cougar



# Building a Food Web



Elk



Black bear





# Building a Food Web

## Carnivores with some scavenging



# Next Layer



Elk

**White-tailed jack rabbit**



**Black-tailed jack rabbit**





# Next Layer



White-tailed jack rabbit



Black-tailed jack rabbit



Competition for food leads to decreased abundance

# Next Layer



**Competition for food leads to decreased abundance**

# Next Layer



**Competition for food leads to ? abundance**



# Building a Food Web

## Herbivores with smaller populations



**Competition for food leads to decreased abundance**

# Next Tier



Elk



Bait

# Next Tier



Elk



Red fox  
(dark phase)

# Next Tier



Elk



Coyotes



# Next Tier



Elk



Ravens



# Next Tier



Elk



Bald eagle





# Next Tier



Elk



Golden eagle

# Next Tier

**Scavengers highly supported**





# Next Tier



**Influence vegetation**

Two large yellow arrows point downwards from the green sphere, one to the left and one to the right, indicating the influence of the sphere on the vegetation shown in the images below.

# Next Tier



Elk



## Riparian

Willow, cottonwood, aspen



# Next Tier



Elk



**Wilson's Warbler**



**Gray Catbird\***



**Calliope Hummingbird**

# Next Tier

## Elk – Vegetation – Avian Biodiversity



# Conservation Implications of Food Webs

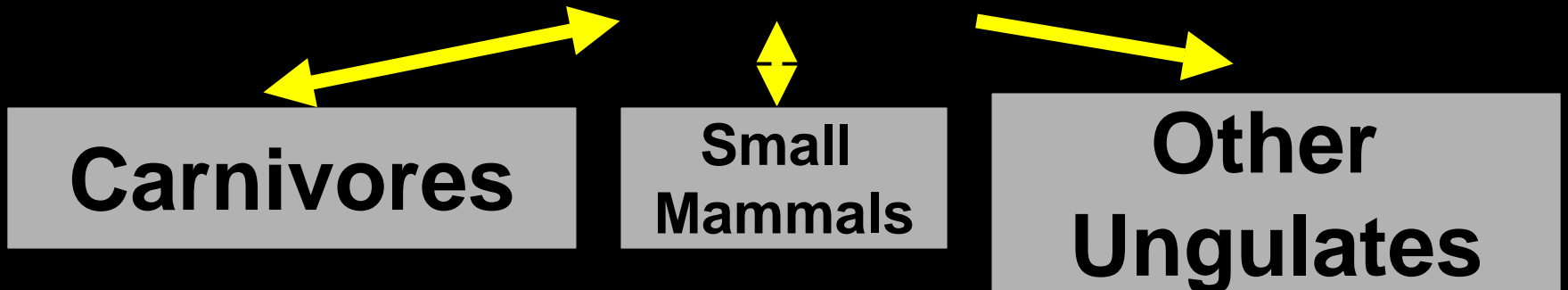


# Conservation Implications of Food Webs



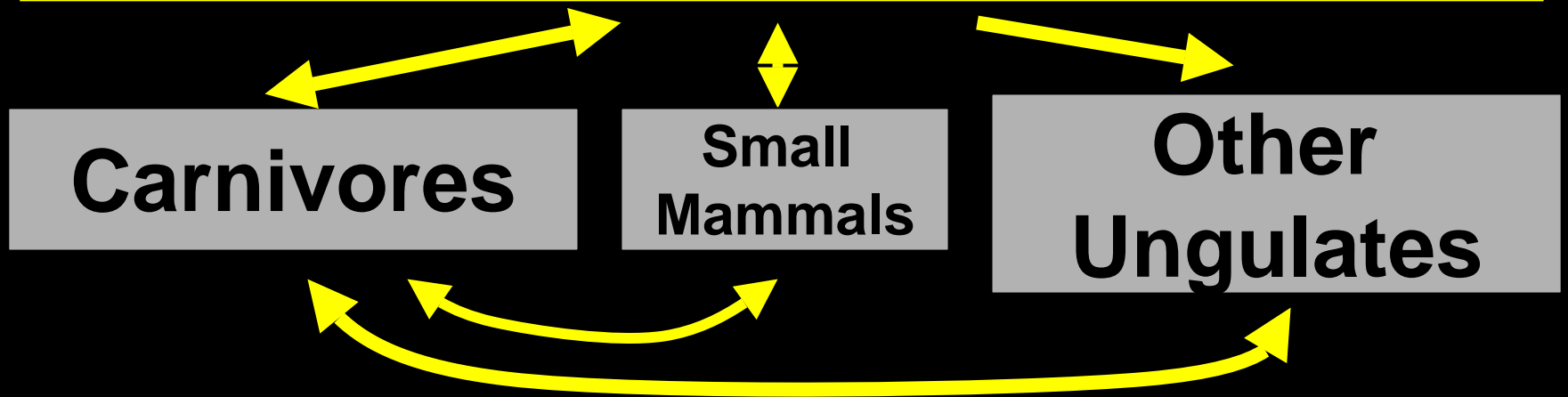
**Carnivores**

# Conservation Implications of Food Webs

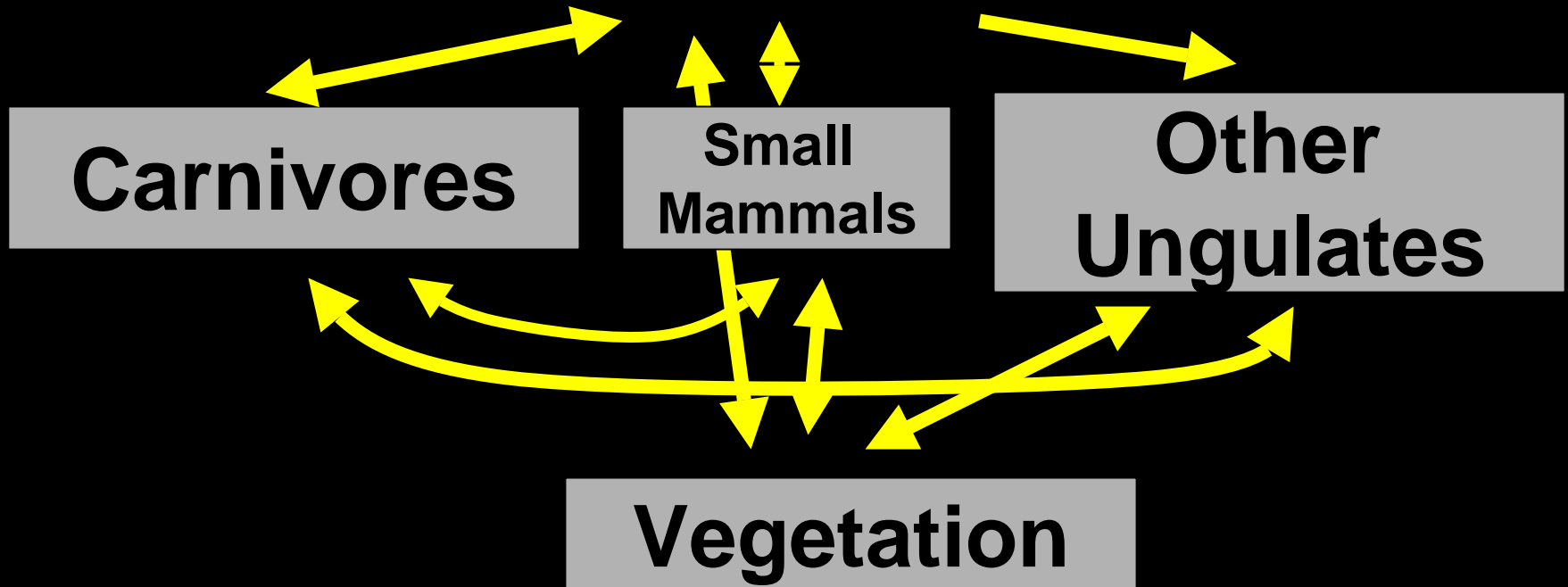




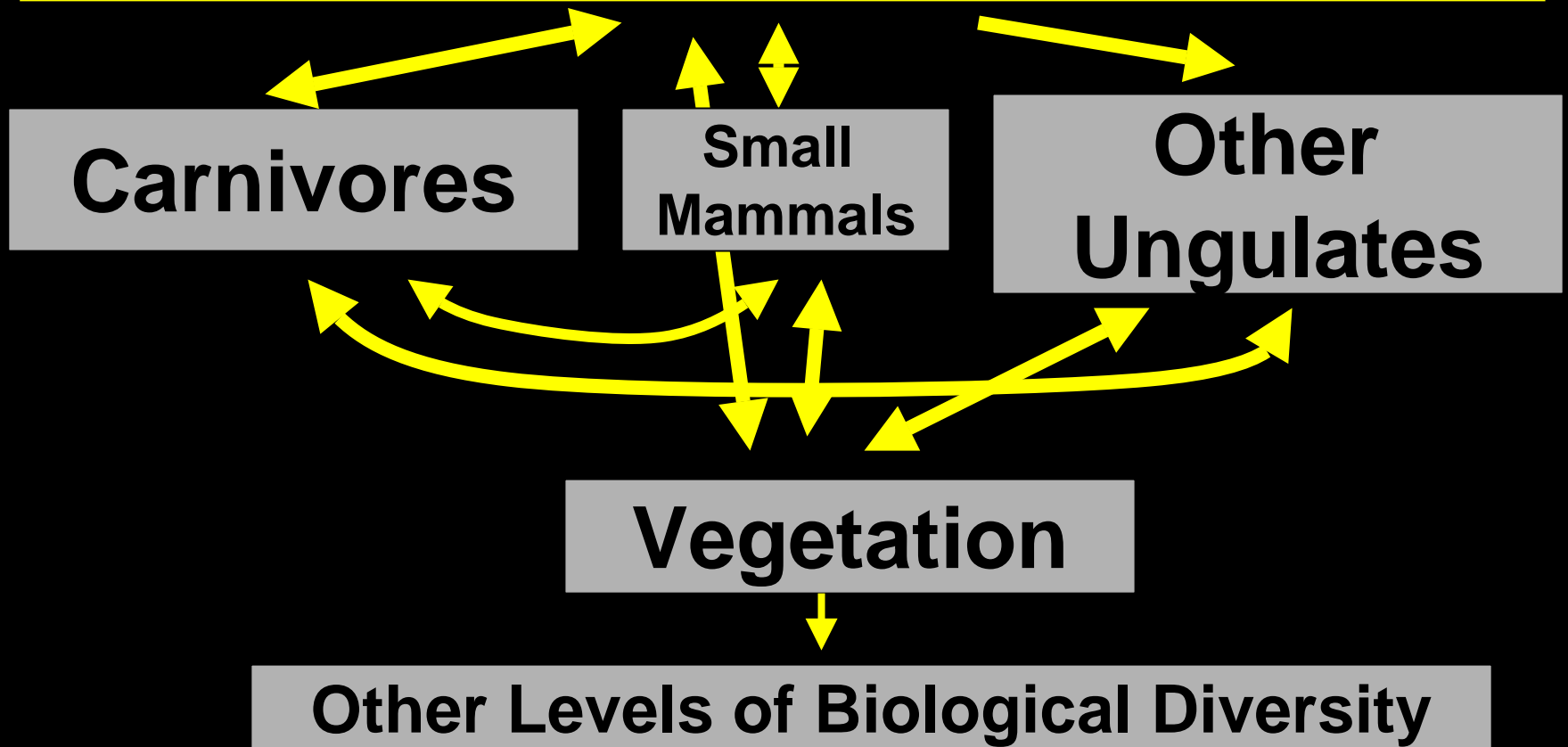
# Conservation Implications of Food Webs



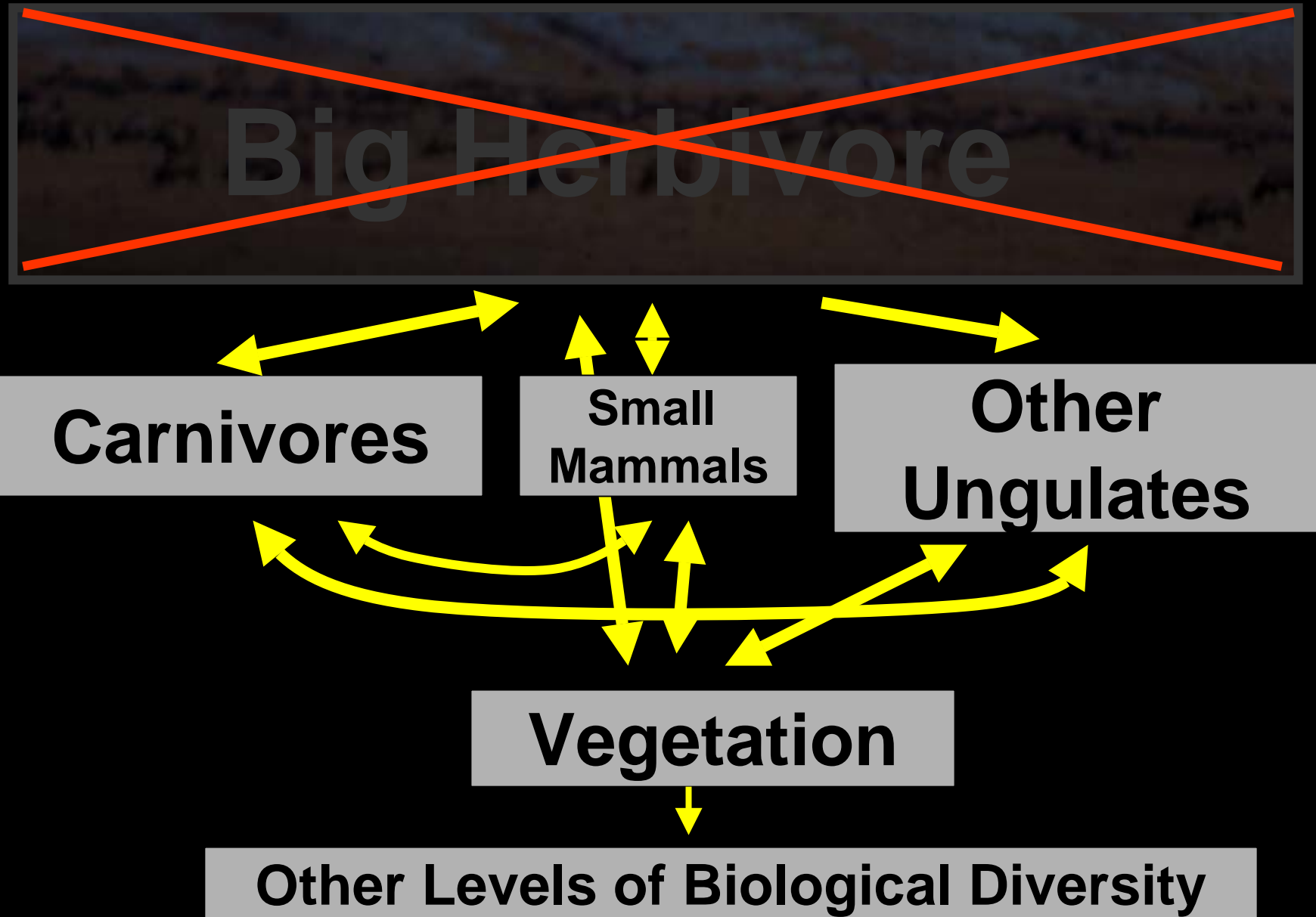
# Conservation Implications of Food Webs



# Conservation Implications of Food Webs

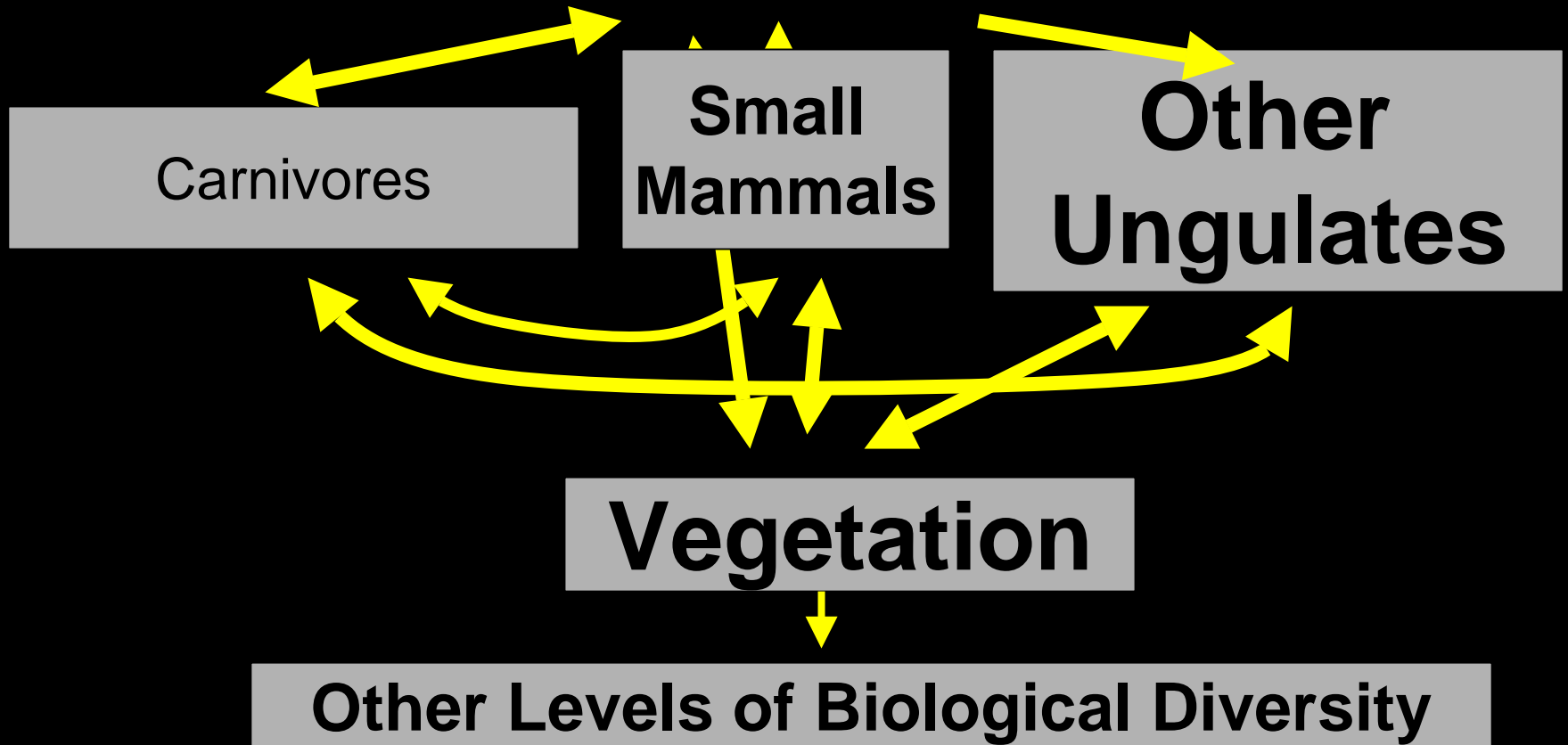


# Conservation Implications of Food Webs





# Conservation Implications of Food Webs



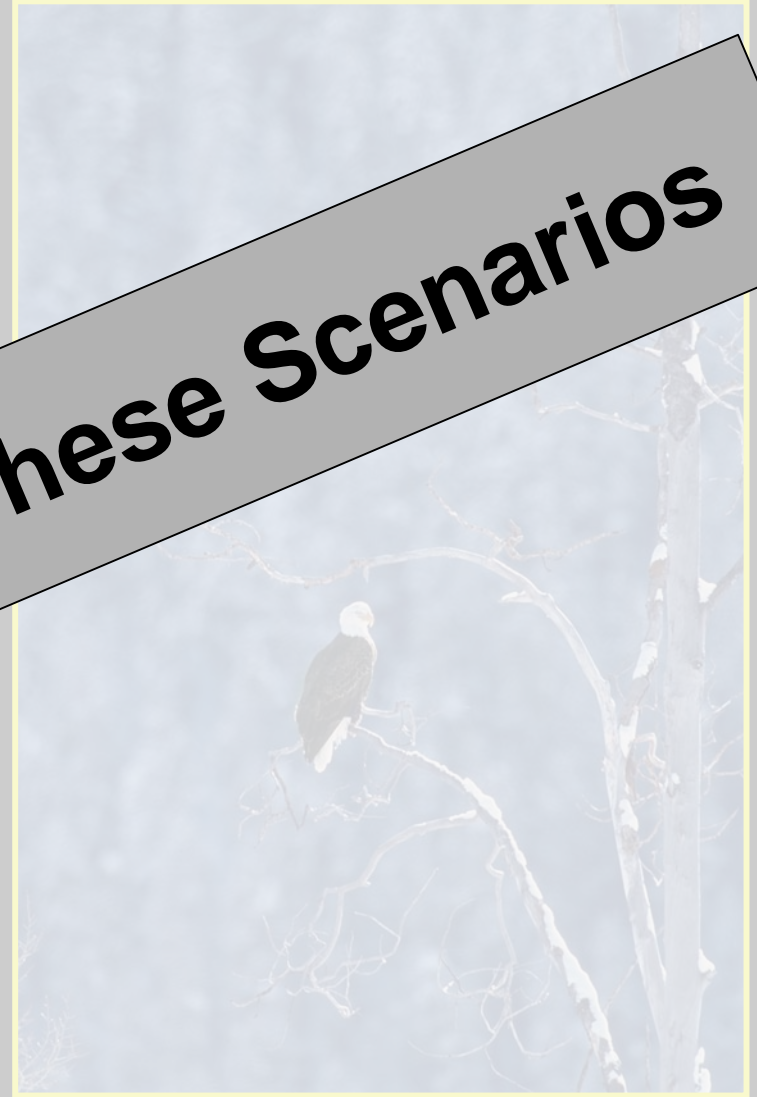
# Decreases Expected in T & E Species:



# Decreases ALSO Expected in:



Decreases ALSO Expected in:



**How Likely are These Scenarios**



# Recall ...

## Densities

animals/km<sup>2</sup>

250

200

150

100

50

0



Average

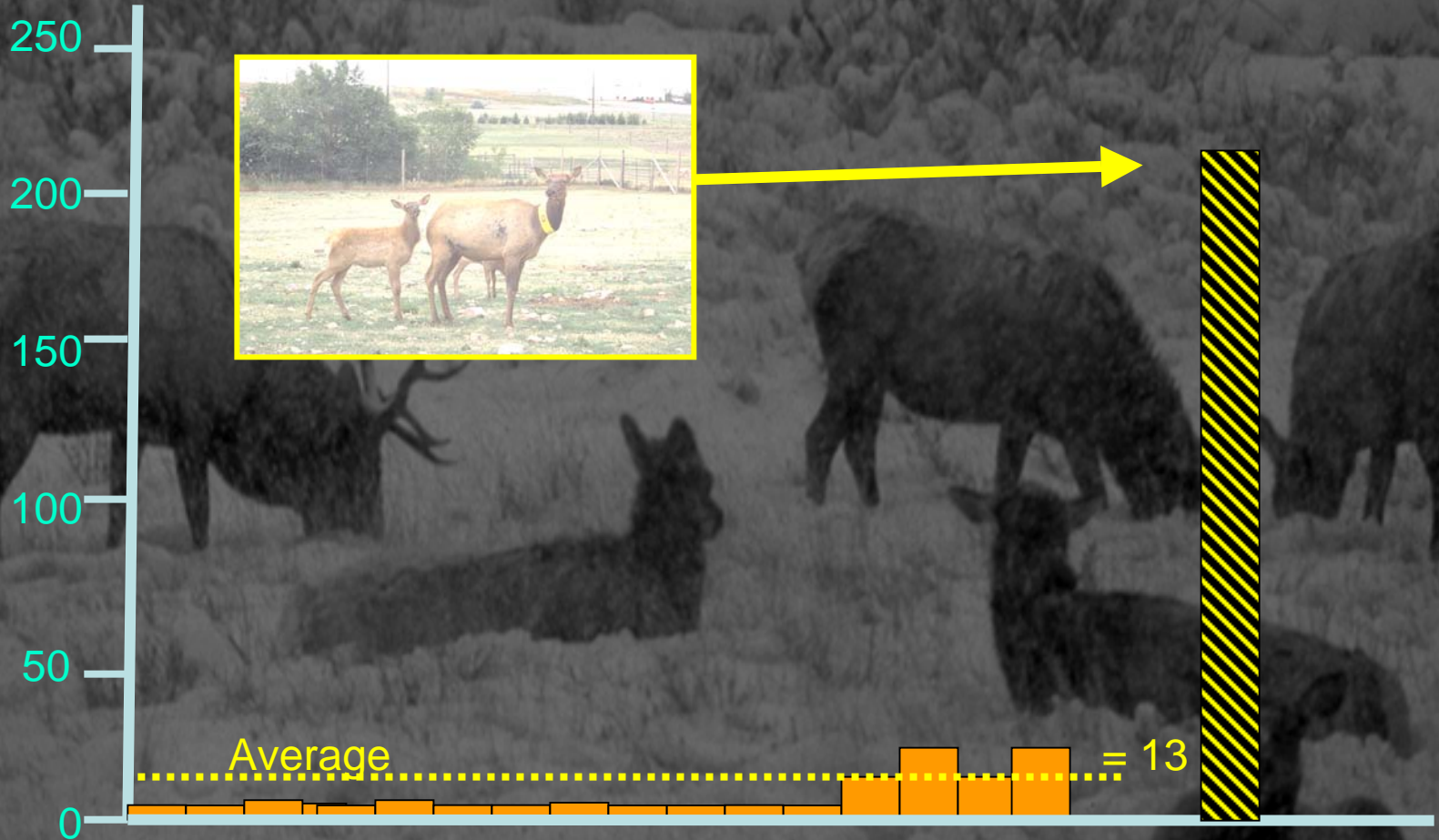
= 13



# What is the range for feed-grounds?

animals/km<sup>2</sup>

## Densities



animals/km<sup>2</sup>

1200

300

250

200

150

100

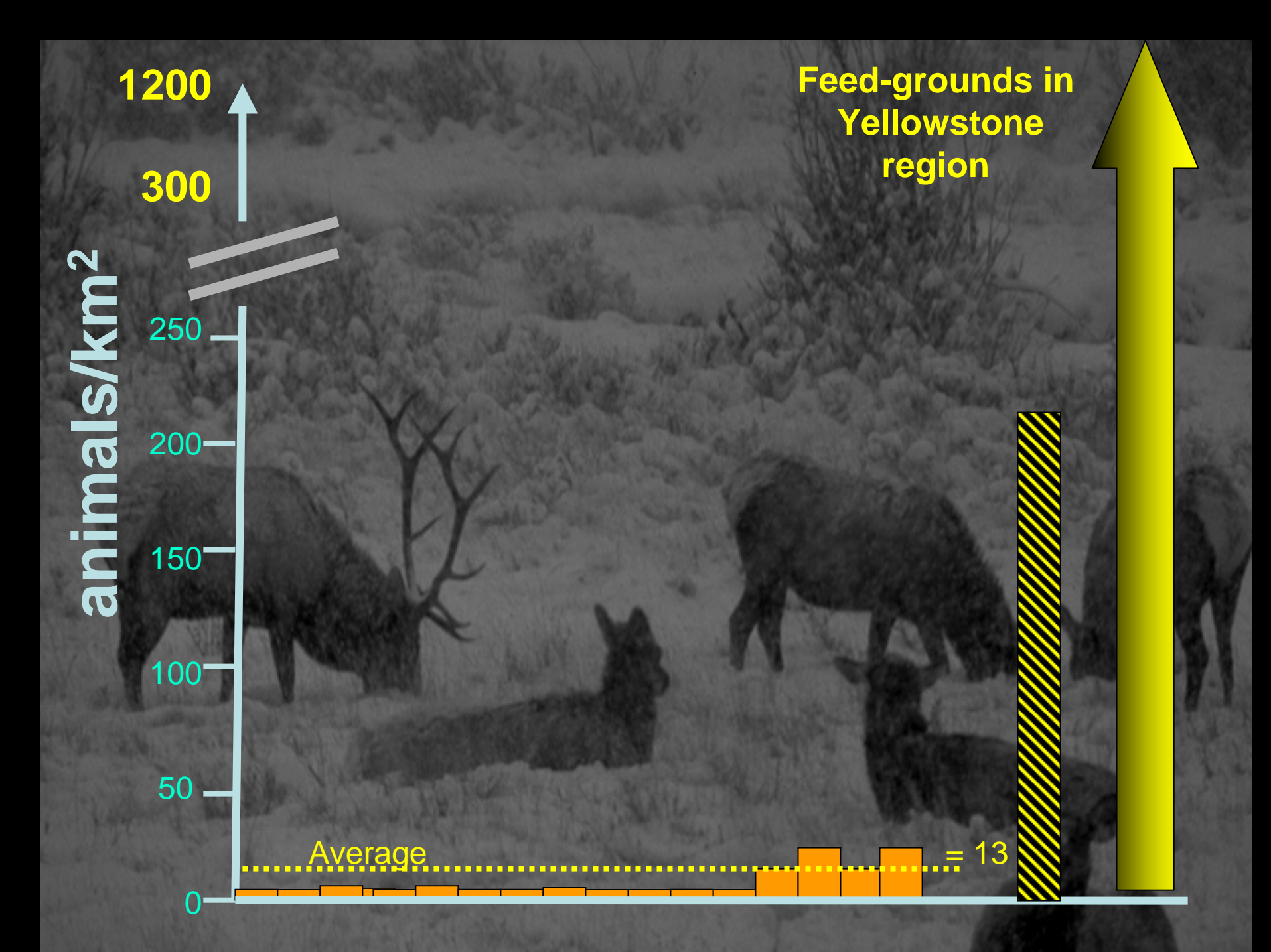
50

0

Feed-grounds in  
Yellowstone  
region

Average

= 13



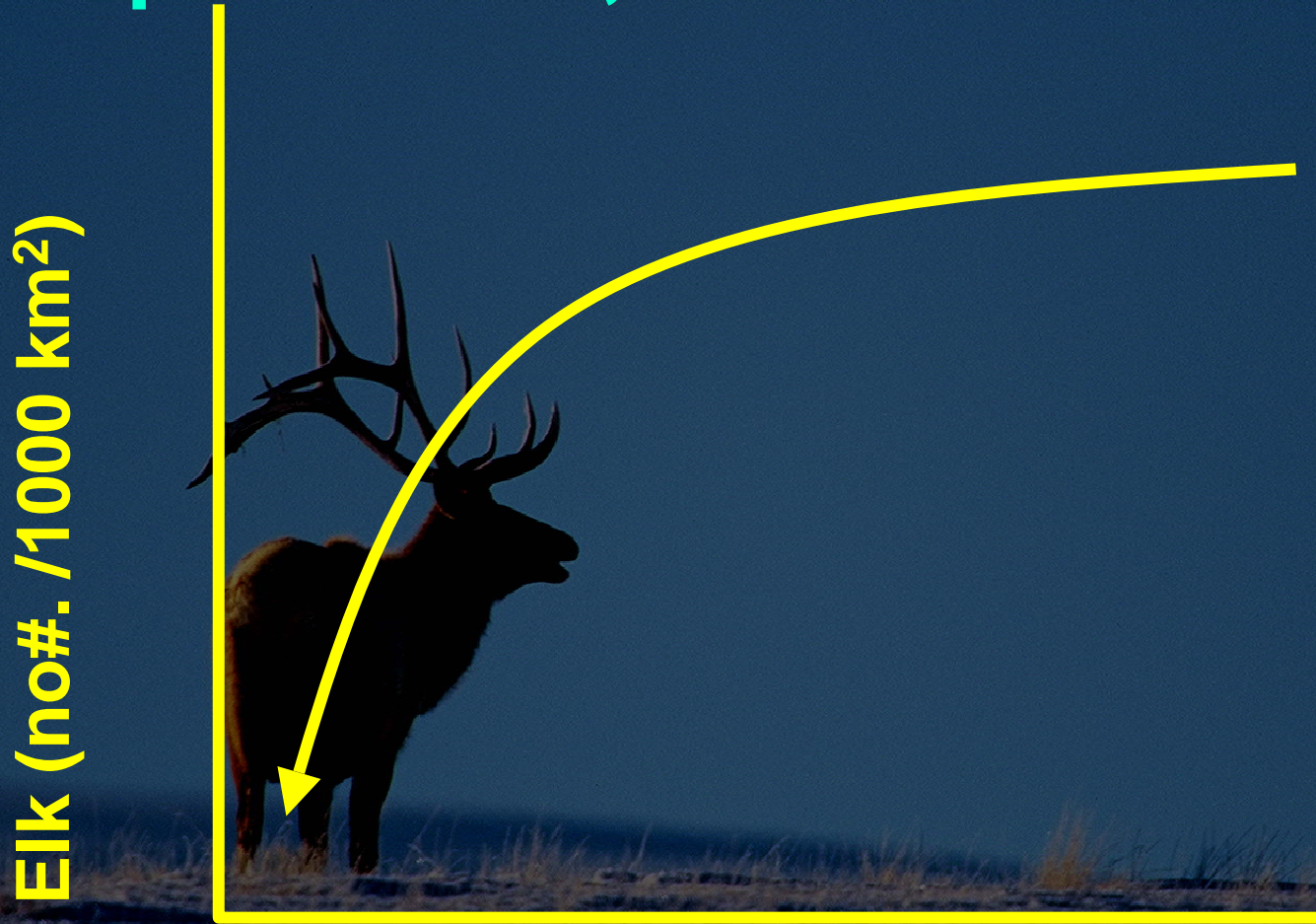


A high-angle photograph of a massive herd of elk running across a snow-covered field. The elk are densely packed, moving from the upper left towards the lower right. Their dark bodies and prominent orange-brown hinds are visible against the white snow. Long, dark shadows are cast across the snow, indicating a low sun position. The overall scene conveys a sense of intense movement and high density.

# **Integrate CWD, Density & Wolves**

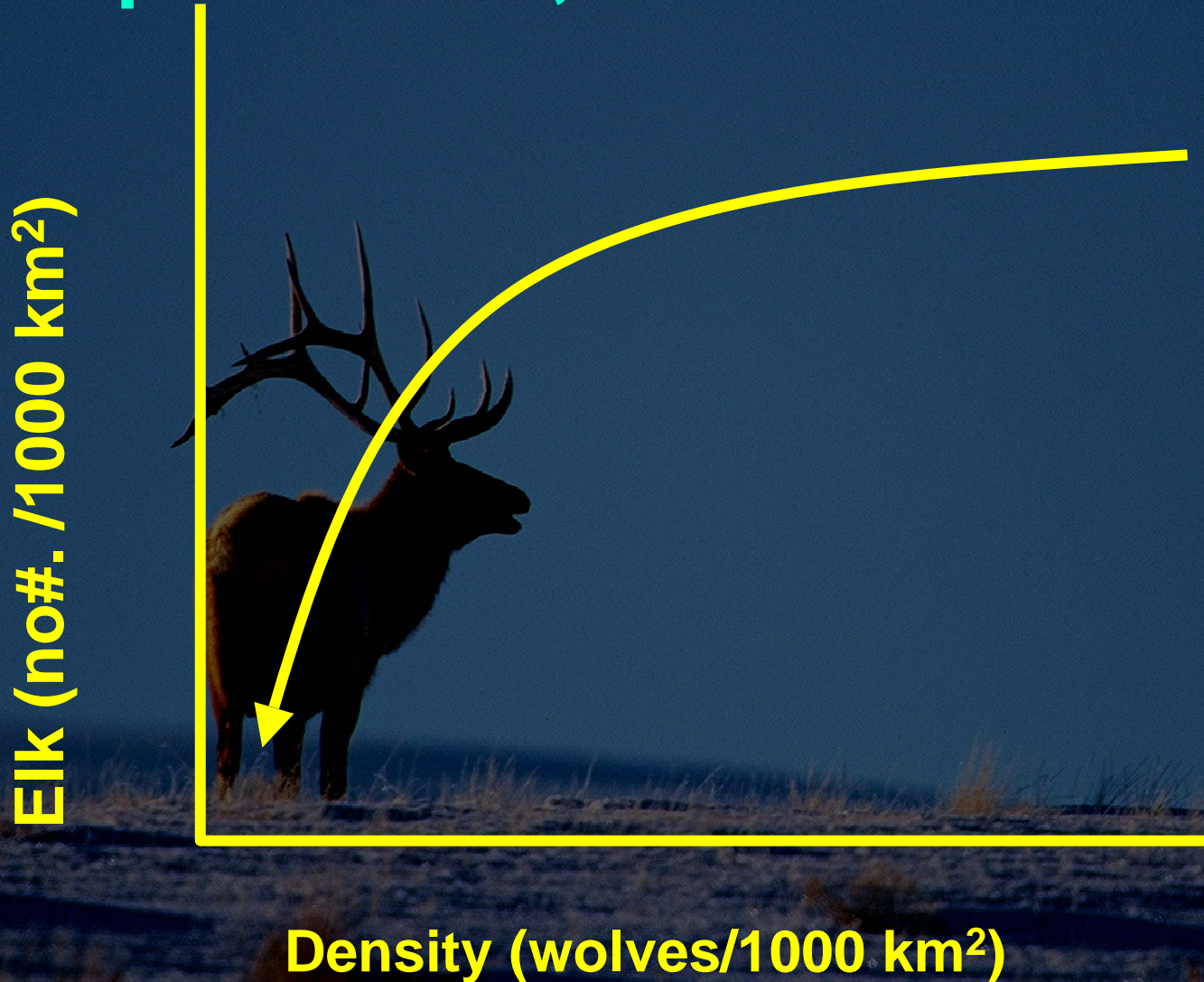


If disease is transmitted at captive rates, then elk will crash





If disease is transmitted at captive rates, then elk will crash





# If disease is transmitted at captive rates, then elk will crash



# TO SUM UP

- Conservation means different things
- Distribution & density

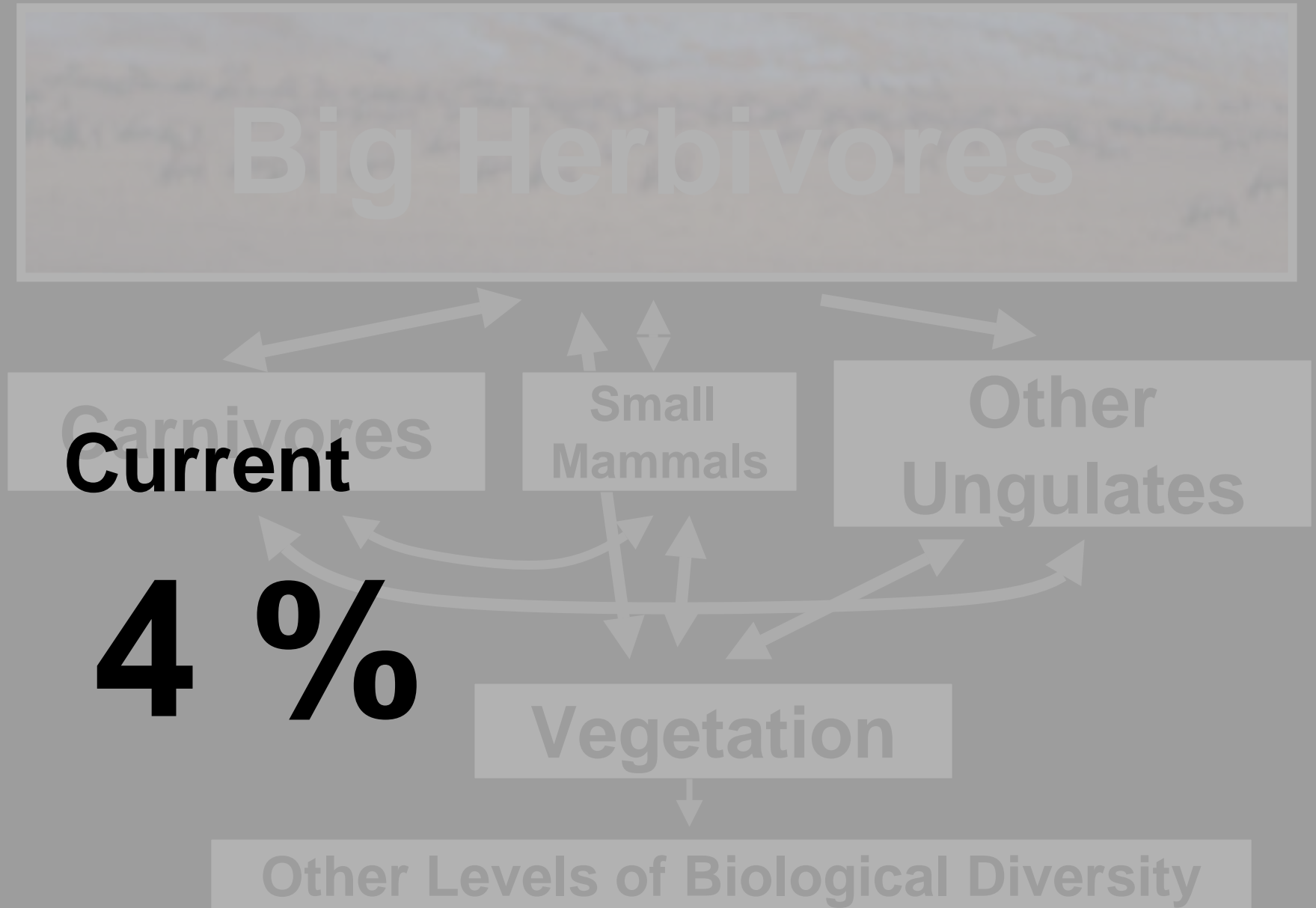


- Unintended effects of good will
- Consequences
  - species
  - ecosystems

Photo courtesy of  
Colorado Division of Wildlife



# Conservation Implications



# Conservation Implications

Big Herbivores

Carnivores

Small  
Mammals

Other  
Ungulates

4% (< coyotes)

(< drought)

Other Levels of Biological Diversity

# Conservation Implications

Big Herbivores

Carnivores

Small Mammals

Other Ungulates

4%



50-70%

Vegetation

Other Levels of Biological Diversity ?



# One World – One Health

