

Factors Affecting Mule Deer

Justin Binfet
Heather O'Brien
Keith Schoup

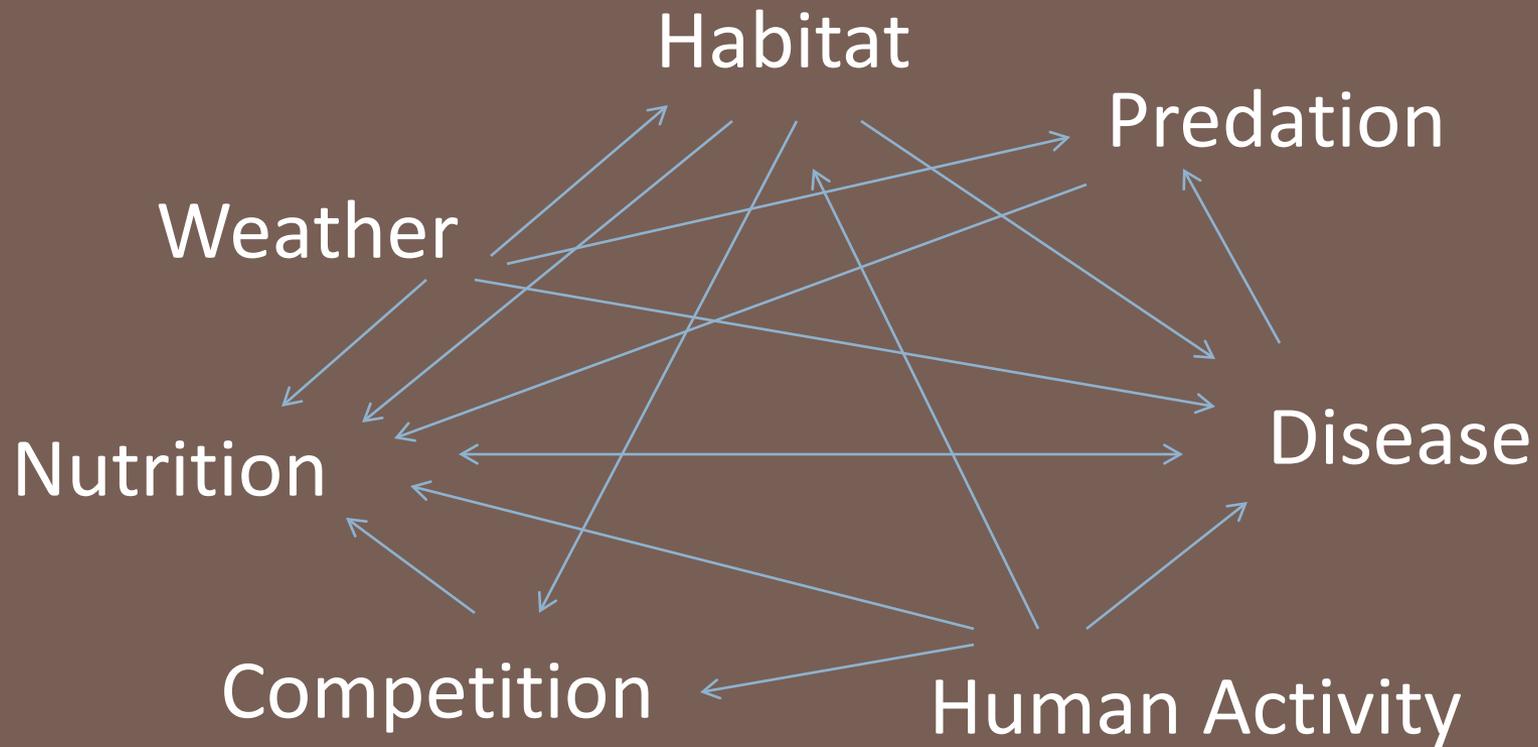
Wyoming Game and Fish Department

Factors Affecting Mule Deer

- Competition
- Disease
- Predation
- Human Activity
- Weather
- Habitat
- Nutrition



Factors can have interrelated effects on each other



BUT FIRST: WHAT IS CARRYING CAPACITY?



- The maximum population size that an area can sustain indefinitely, given the food, habitat, water and other necessities available in the environment.

BUT FIRST: WHAT IS CARRYING CAPACITY?

- Carrying capacity continuously changes depending on the **quality** and **quantity** of the resources available that a species depends upon for growth and survival



BUT FIRST: WHAT IS CARRYING CAPACITY?

- Degradation of resources results in lower carrying capacity (the same habitat can no longer support as many individuals indefinitely)
- Carrying capacity can change over time based on environmental factors



BUT FIRST: WHAT IS CARRYING CAPACITY?

- All the factors we will discuss can influence the carrying capacity of mule deer in a region – especially those factors that affect **FOOD** and **WATER**



Factors Affecting Mule Deer

Here we go..

- Competition
- Disease
- Predation
- Human Activity
- Weather
- Habitat
- Nutrition



COMPETITION



- Competition is typically for the most limited resources: **quality forage**
- Can be between livestock, other ungulates, or each other
- The effects of competition are very difficult to quantify

COMPETITION

- Competition is more pronounced when quality forage is lacking (poor moisture/growth years)
- Competition is often more pronounced when premium resources are limiting (e.g. on winter ranges when forage is at a premium, or within riparian areas in arid landscapes)



COMPETITION



- Elk can tolerate lower-quality forage and digest more of it
- Digestive tract is longer – giving more time for microbes to break down plant material

COMPETITION



- White-tailed deer are generalists and have high reproductive potential
- White-tailed deer often occupy some of Wyoming's most productive habitats along riparian corridors and on irrigated fields

COMPETITION

- Habitat changes have largely favored elk (grasses)
- Mule deer are more sensitive to severe weather and environmental factors than elk



DISEASE

- Several diseases can have population-level impacts on deer, but are typically regional in nature
- Some diseases are more prevalent under certain environmental conditions
- Some diseases have periodic outbursts, while others are long-lasting and chronic
- Some diseases can be facilitated by human activity

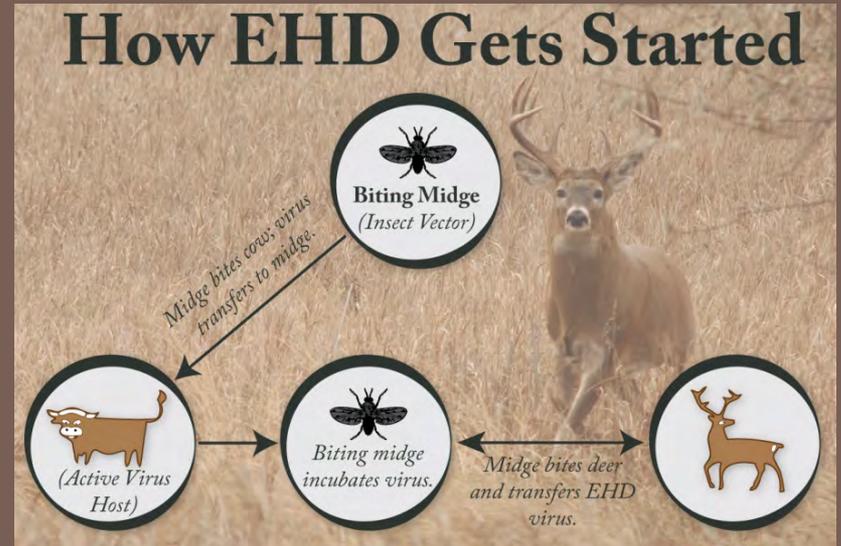
DISEASE



Acidosis



DISEASE

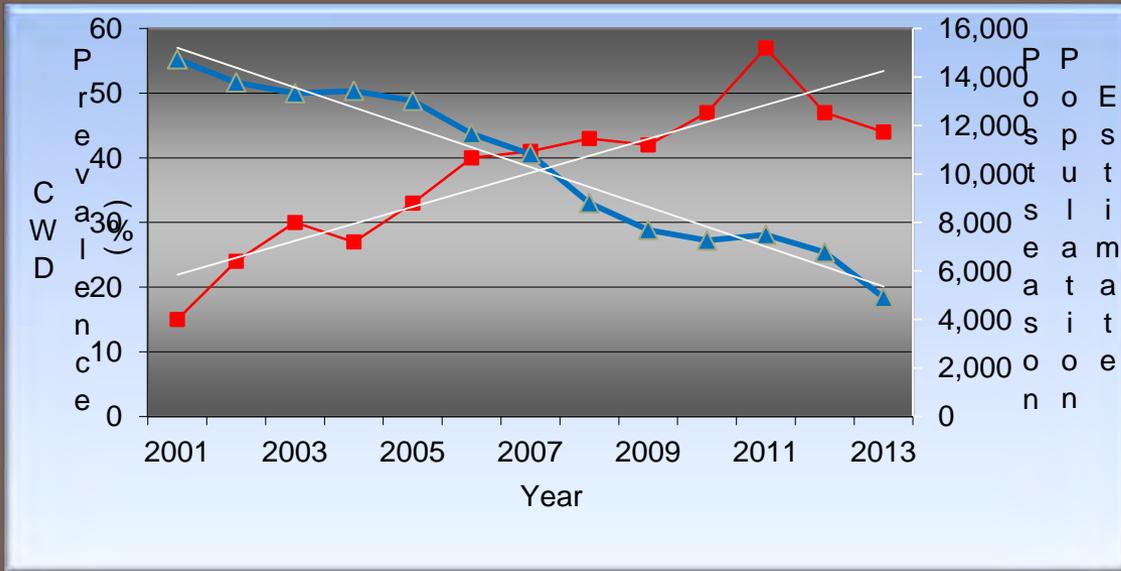


THE BITE THAT KILLS

White-tailed deer infected with EHD will seek out water because the animal is running a fever. Because of this, whitetails with EHD often die in water or are found near water.

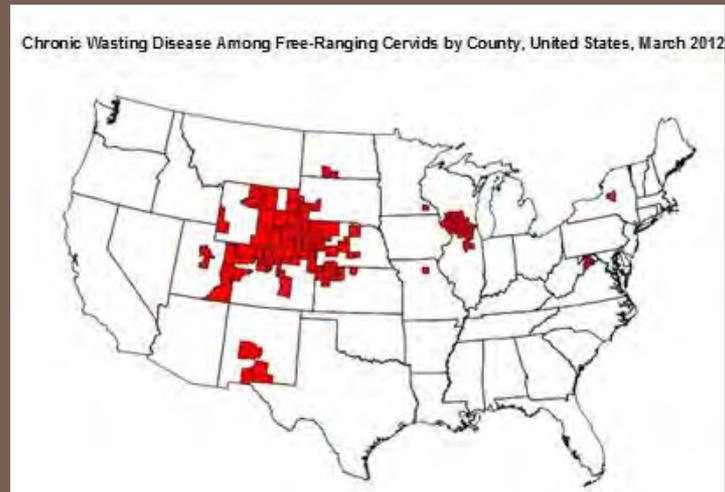


DISEASE



CWD

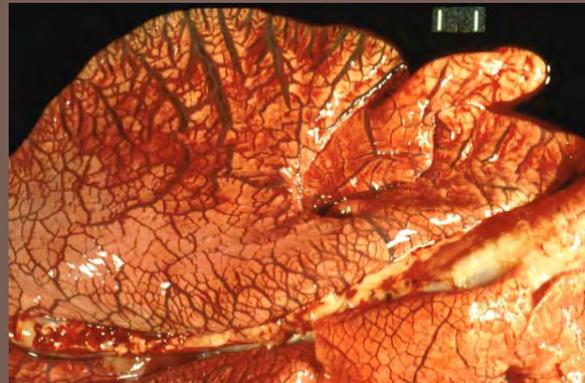
- Sick deer become more susceptible to predation
- 5 of 16 (31%) mule deer tested positive in 2014 in Area 66



DISEASE

Adenovirus (AHD)

- Typically die in 3-5 days
- Fatality high for fawns
- Some adults survive
- Regional outbreaks documented (1993 CA)
- Confirmed cases in urban deer - Casper Aug 2014



PREDATION

- Predation is most significant when a deer population has declined **well below carrying capacity**
- When deer populations are low and habitat conditions are poor, **predation can limit population growth**

PREDATION

- Coyotes – primarily prey upon fawns, but will occasionally take adults
 - Coyotes are *facultative carnivores*
 - Prey items for coyotes change depending on availability (i.e. rabbits)
 - Natrona County Predator Board kills more than 2,000 coyotes a year on average
 - Federal trappers (Wildlife Services) and coyote hunters add to that



PREDATION

- Facultative carnivores – take advantage when they can, eat other prey items the rest of the time and even some non-prey items



PREDATION

- Mountain Lions – routinely prey on both fawns and adult deer
 - Lions are *obligate carnivores* and rely more on ungulates for survival than coyotes
 - Have made a population comeback in some areas in recent years (i.e. Black Hills)
 - Lion predation and clinical CWD tied for the highest percentage of mortality in a recent CWD study in Area 65

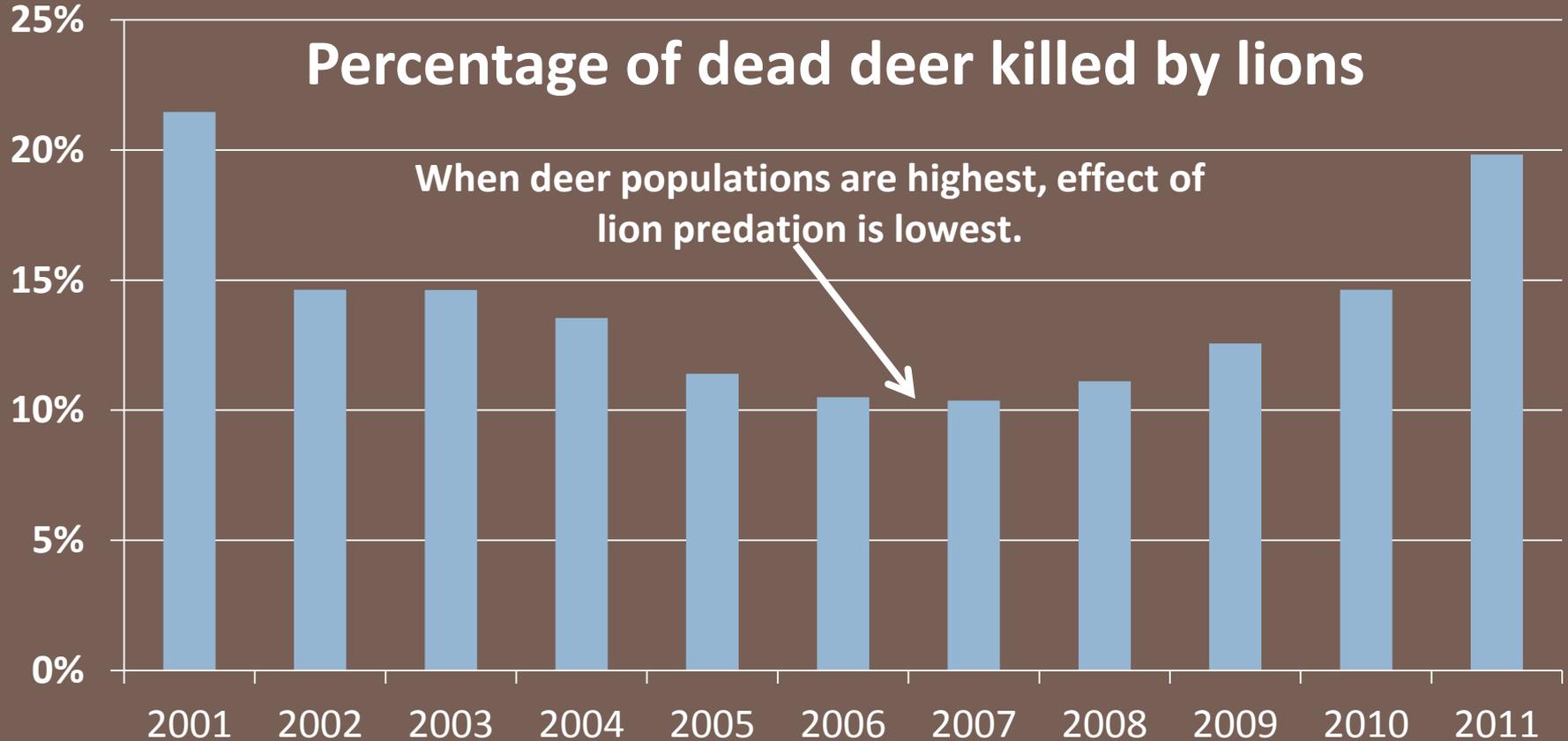
PREDATION

- Lions have more impact when mule deer populations are very low
- Can **inhibit growth** of herds that have already declined
- **Do not** cause decline in robust herds



PREDATION

Assume there are 125 adult lions every year, and they each killed 1 deer a week



PREDATION

- Extensive field experience has resulted in hundreds of conversations with hunters and landowners
- Many indicate coyote observations were much more rare from the 1950's through the 1980's
- Discontinued use of 1080/poisons

HUMAN ACTIVITY

- Housing developments impact deer numbers via habitat fragmentation, loss and conversion – increased human presence, fences, dogs, vehicular traffic, etc.



HUMAN ACTIVITY

- Industry: Oil, Gas, Wind, Mining etc: activities also fragment and alter habitats used by deer
- Facilitates spread of invasive plant species



HUMAN ACTIVITY

- Industry: Oil, Gas, Wind, Mining etc: activities also fragment and alter habitats used by deer
- Facilitates spread of invasive plant species



LOWER CARRYING CAPACITY

HUMAN ACTIVITY

- **Fire Suppression** allows forage plants to age, become less palatable & digestible
- Less variation in age classes of plants, no room for young, early succession plants that have higher nutritional value



WEATHER can influence:



- Forage growth & production
- Water & food availability
- Overwinter survival
- Disease prevalence & spread
- Effects can be both **localized** and **regional**

WEATHER



WEATHER



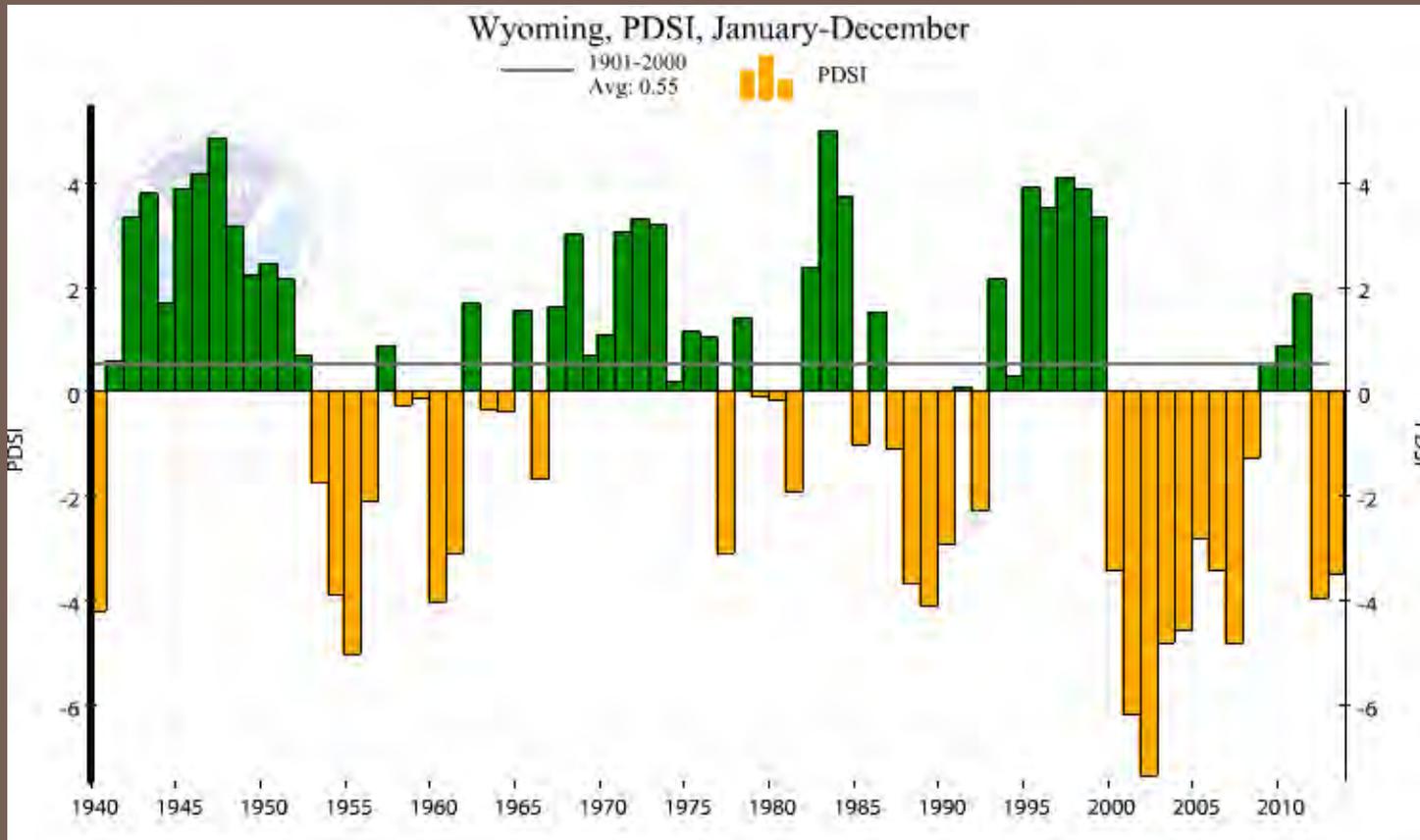
Deep snow can limit access to food; movement requires more energy

Prolonged conditions can lead to poor health, increase susceptibility to disease or predation, or result in starvation



WEATHER

Palmer Drought Severity Index



Wyoming has been under extreme drought for much of the past 15 years

Mule Deer Nutrition and Plant Utilization

True mountain mahogany production

Bates Hole True Mountain Mahogany Mean Annual Growth



HABITAT

Quality depends on:

- * annual moisture and growth (**weather**)
- * plant community composition
- * age of plants
- * utilization by herbivores (**competition**)

HABITAT

Plant Community Composition

- Mule deer prefer certain plant species because of their nutritional value and digestibility
- Diets change depending on the region and season.
- Local favorite shrubs: Antelope Bitterbrush, True Mountain Mahogany, Buffaloberry, Serviceberry, Snowberry, Chokecherry, Sagebrush

HABITAT

Plant Community Composition

- Invasive species can take over space otherwise occupied by preferred plants
- Invasive species may be less palatable to deer and other herbivores
- Less nutritional value
- Lowers carrying capacity of habitat



HABITAT

Age of Plants

- Older shrubs have more cellulose, more secondary compounds
- Takes more energy to digest and deer get less nutritional benefit
- Older plant communities develop when fire is suppressed
- Shrubs are the plants deer rely on when quality food availability is **already low**



HABITAT

Utilization by Herbivores



- Preferred shrubs may be over-utilized by deer and other herbivores
- Production of new growth may not keep up with consumption
- Results in reduced plant vigor – less nutritional value per bite for deer

HABITAT

Methods to Improve Quality

- Controlled burns, mechanical treatments, chemical treatments
- to reduce old shrub stands and create conditions for new shrub growth
- to combat invasive species and create space for native & preferred plants



Habitat Improvements for Mule Deer

Aspen Regeneration



Mule Deer Nutrition and Plant Utilization

Big Sagebrush Utilization



There is often extremely high use of sagebrush in Bates Hole from wintering antelope

Habitat Improvements for Mule Deer

Big sagebrush thinning



Habitat Improvements for Mule Deer

Cheatgrass treatment



Habitat Improvements for Mule Deer

Riparian restoration



Habitat Improvements for Mule Deer

Juniper Thinning



Historic Juniper Conditions



Current Juniper Conditions



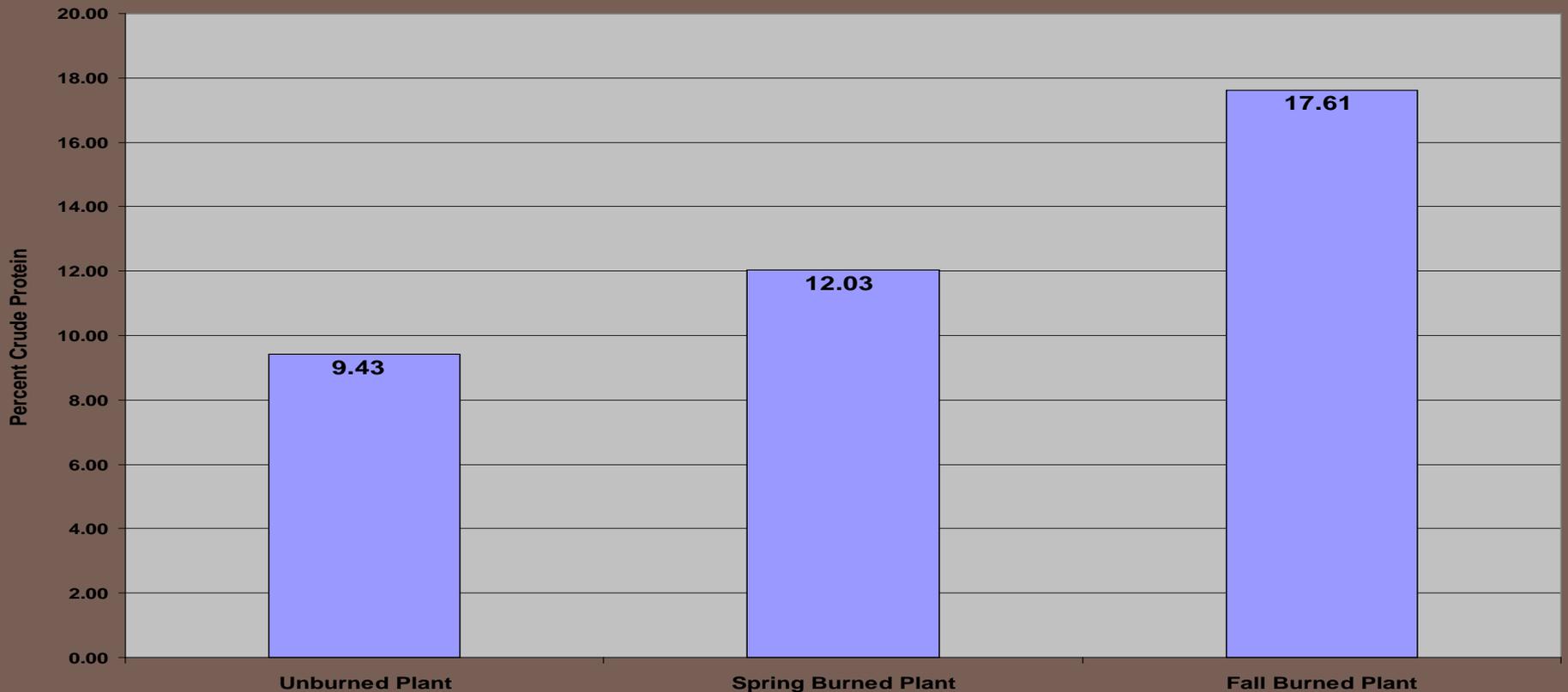
Habitat Improvements for Mule Deer

Controlled Burns



Habitat Improvements for Mule Deer Controlled Burns

Crude Protein Content of True Mountain Mahogany



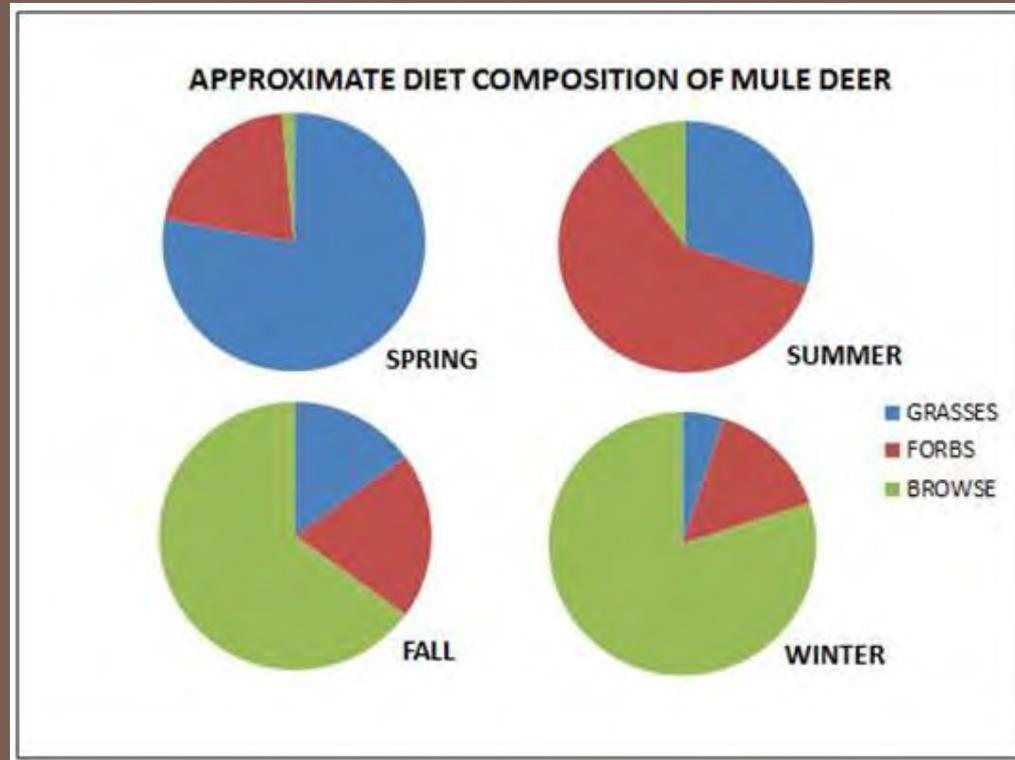
NUTRITION

- Mule deer need certain types and amounts of nutrients
- Nutritional needs of deer change depending on the time of year
- Some plant species provide better nutrition than others
- Plants of a certain age can be more digestible

NUTRITION

Spring diet promotes **growth** (high protein & phosphorus)

Fall diet promotes **fattening** (high carbohydrate, fat, and energy)



Summer diet transitions between growth and fattening

Winter diet is for **maintenance** (low protein & energy)

Mule Deer Nutrition and Plant Utilization

Spring/Summer –
growth oriented

- Does – last trimester of pregnancy
- Does – birth to fawn(s)
- Does – lactation
- Buck – body growth and antler development



Mule Deer Nutrition and Plant Utilization

Spring/Summer – crude protein requirements

- Last trimester pregnancy – 13 to 16 percent
 - Lactation for fawn – 13 to 14 percent
- Lactation for multiple fawns – 14 to 15 percent
- Body growth and antler development – 9 percent minimum

Mule Deer Nutrition and Plant Utilization

Spring/Summer – primary diet

- High protein and phosphorus
 - High grass utilization
- Some forb (wildflower) utilization
- Low shrub (browse) utilization
- Transition into high forb utilization (summer)
 - Some grass utilization
 - Some shrub utilization

Mule Deer Nutrition and Plant Utilization



Fall – fatten oriented

- Does – body maintenance
 - Does – breeding
- Buck – body maintenance, fat storage, breeding
- Fawn – body growth and development

Mule Deer Nutrition and Plant Utilization

Fall – crude protein requirements

- Body maintenance – 6 to 7 percent
- Breeding – greater than 13 percent
- Body growth – 9 percent minimum



Mule Deer Nutrition and Plant Utilization

Fall – primary diet

- High carbohydrate, fat and energy
 - Increase shrub utilization
 - Some forb utilization
 - Some grass utilization

Mule Deer Nutrition and Plant Utilization

Winter – maintenance oriented

- Body maintenance
- Support growing fetuses



Mule Deer Nutrition and Plant Utilization

Winter – crude protein requirements

- Body maintenance – 8 to 9 percent minimum



Mule Deer Nutrition and Plant Utilization



Winter – primary diet

- Lower protein and energy
- High shrub utilization
- Some forb utilization
- Low grass utilization

NUTRITION

- Nutritional status of doe deer has influence on pregnancy rates, fetal health, and newborn fawn health
- If a doe has **poor** nutrition, her fawn is **less likely** to survive its first days, months, year



NUTRITION

- Protein requirements are typically highest during body growth, which usually coincides with periods when highest forage protein levels are found in plants - the active growing season
- If mule deer does can fulfill protein requirements for body maintenance, the remaining protein is used for milk production to support fawns



NUTRITION

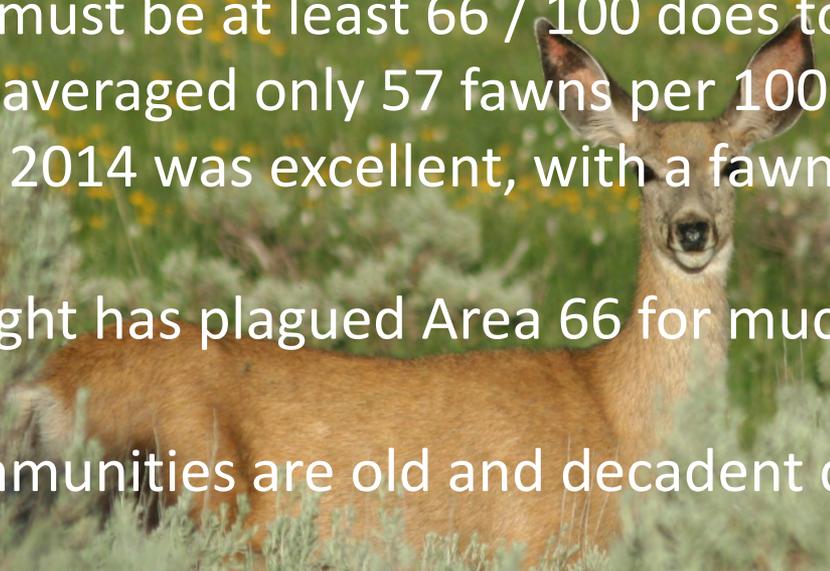
- Nutritional status also influences **antler growth** in bucks
- Vitamin, mineral, and protein deficiencies can inhibit antler growth



What to do?

- **Habitat treatments:** controlled burns, mechanical & chemical treatments
- **Competition control:** reduce elk and white-tailed deer numbers? not that easy
- **Predator control:** focused on areas where population growth may be suppressed
- **Further study** of habitats & nutrition, preferred plant species, inventories and improvement projects, diseases
- **MDIs** to come up with new ideas

SUMMARY

- Abundant mule deer populations in the 1950's and 60's were unsustainable
 - Mule deer populations have declined throughout their range, not just in Area 66 and WY
 - Statewide fawn/doe ratios have declined by ~20% over the last 30 years
 - Fawn ratios must be at least 66 / 100 does to sustain populations
 - Area 66 has averaged only 57 fawns per 100 does since 2006
 - Fortunately, 2014 was excellent, with a fawn ratio of 82
 - Long-term drought has plagued Area 66 for much of the past 15 years
 - Most shrub communities are old and decadent due to decades of fire suppression
- 
- A photograph of a mule deer standing in a field of green shrubs and yellow flowers. The deer is facing the camera and has a brown coat. The background is a blurred field of similar vegetation.

SUMMARY (cont)

- Predator populations have rebounded over the years
- Competition has increased in Area 66, especially with elk (and white-tailed deer in some areas)
- Fortunately, there has been little human disturbance in most of Area 66
- Subdivisions have sprawled to Hat Six, more of Casper Mountain, and the Platte River and Bates Creek



SUMMARY (cont)

- There are good densities of mule deer in portions of Area 66, while other areas have very low densities despite having adequate habitat (i.e. Hat Six, Little Red Creek, Smith Creek, etc.)
- CWD continues to be a concern in Area 66; unknown if it is a limiting factor
- Travel management continues to be a concern in Area 66; there are very high road densities in portions of Bates Hole and on Muddy Mountain



It's All About Fawns!

Doe Nutrition + Fawn Nutrition + Doe & Fawn Survival
=
Population Growth