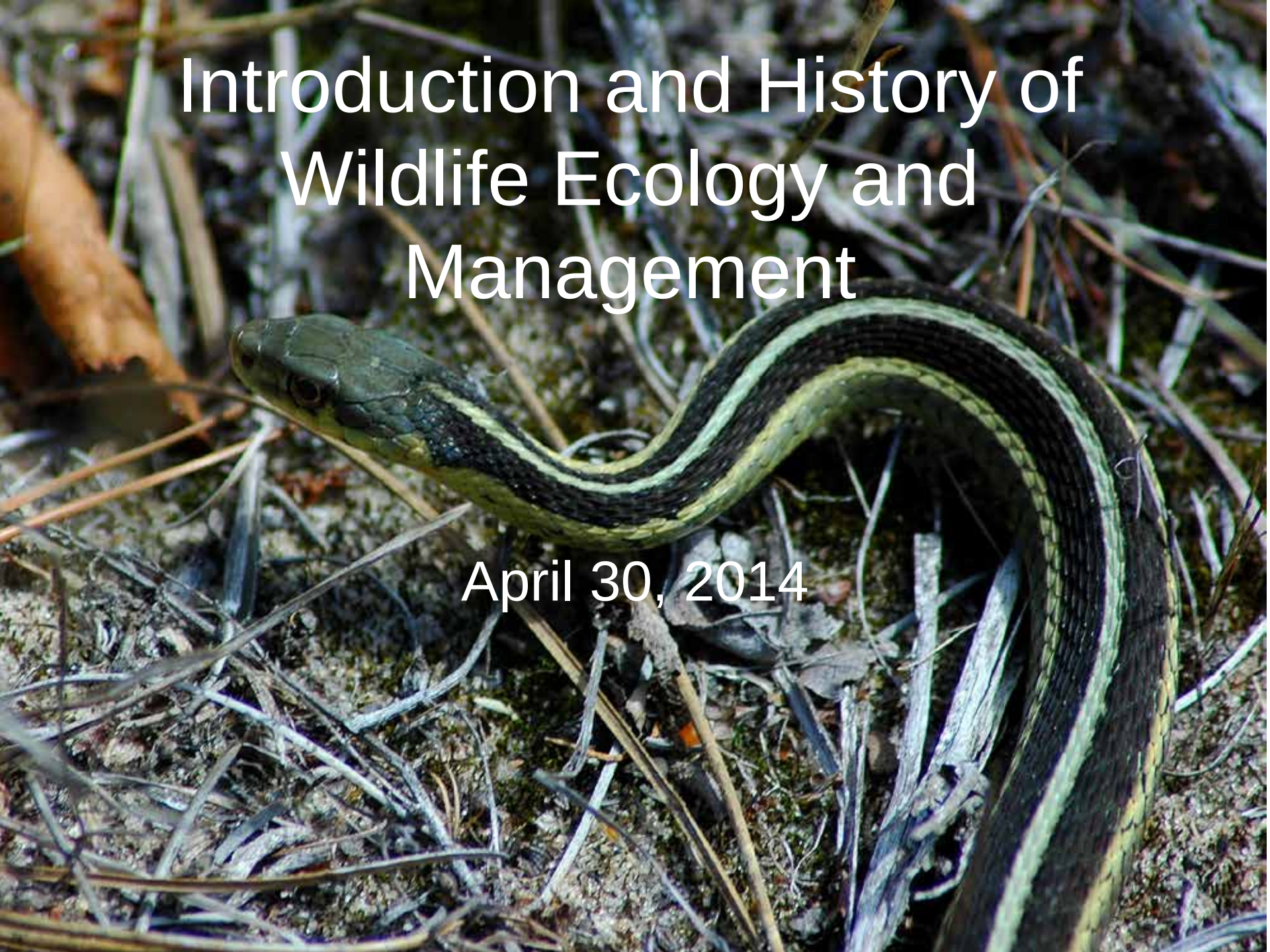


Introduction and History of Wildlife Ecology and Management

April 30, 2014

What is Wildlife?

- Numerous definitions exist:
  - § Only game species
  - § Only birds and mammals
  - § All terrestrial vertebrates and invertebrates
  - § “the practical ecology of all vertebrates and their plant and animal associates.” JWM 1937
  - § “Wild animals, usually terrestrial vertebrates whose populations are monitored and managed for exploitation or conservation.” Sinclair et al. 2006





Wildlife Defined

- **<u>Wildlife</u>—*All terrestrial vertebrates except captive domesticated animals***
  - § Game species
  - § Non game species
  - § Feral animals
  - § Can be invasive/exotic or native
- What it does not include:
  - § Pets
  - § Livestock

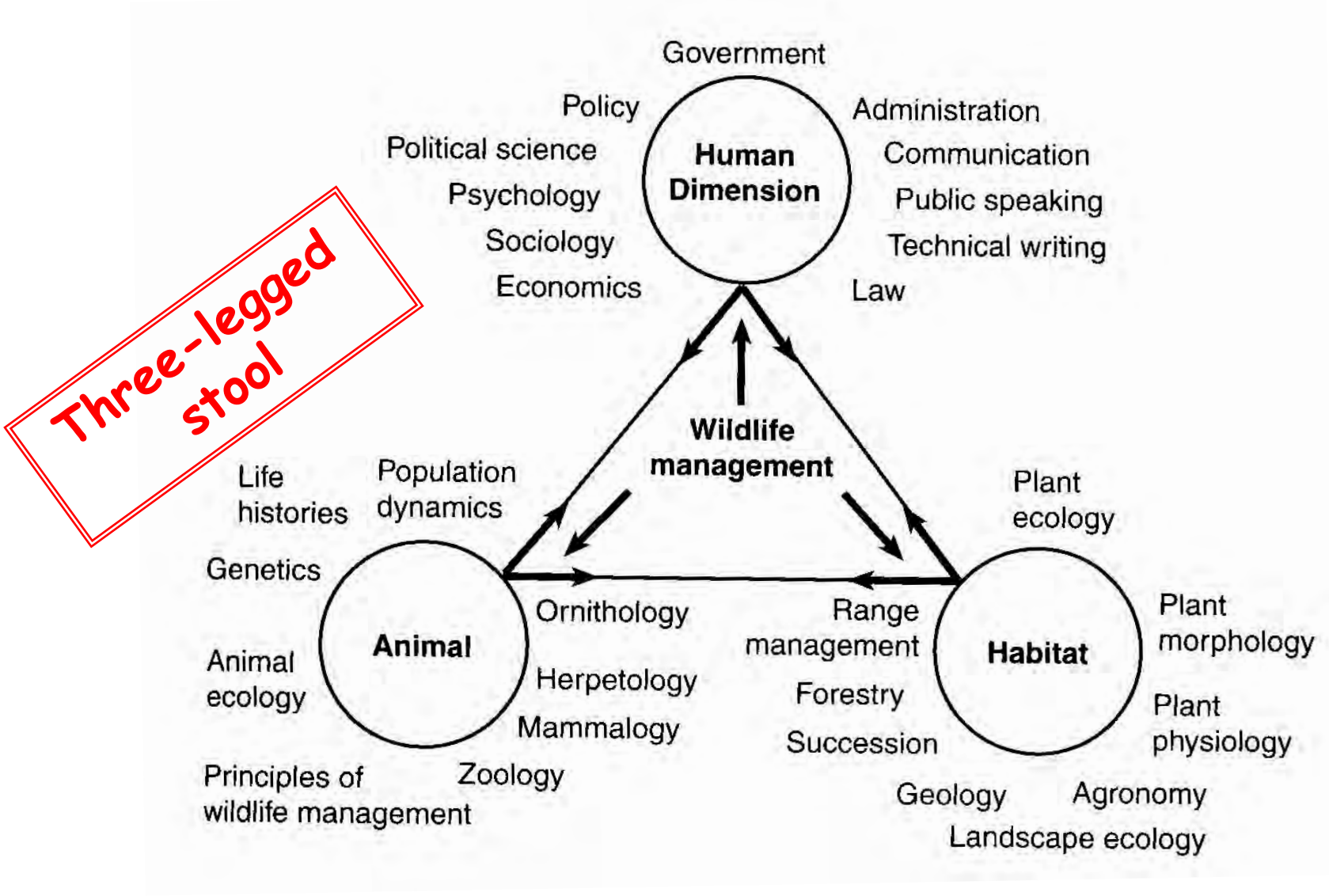
Wildlife Management

- Management indicates that human manipulations and decisions are present
  - active or passive
  - direct or indirect
- Management confers sense of human domination of nature
- Management and conservation can be synonymous

Defining Wildlife Management

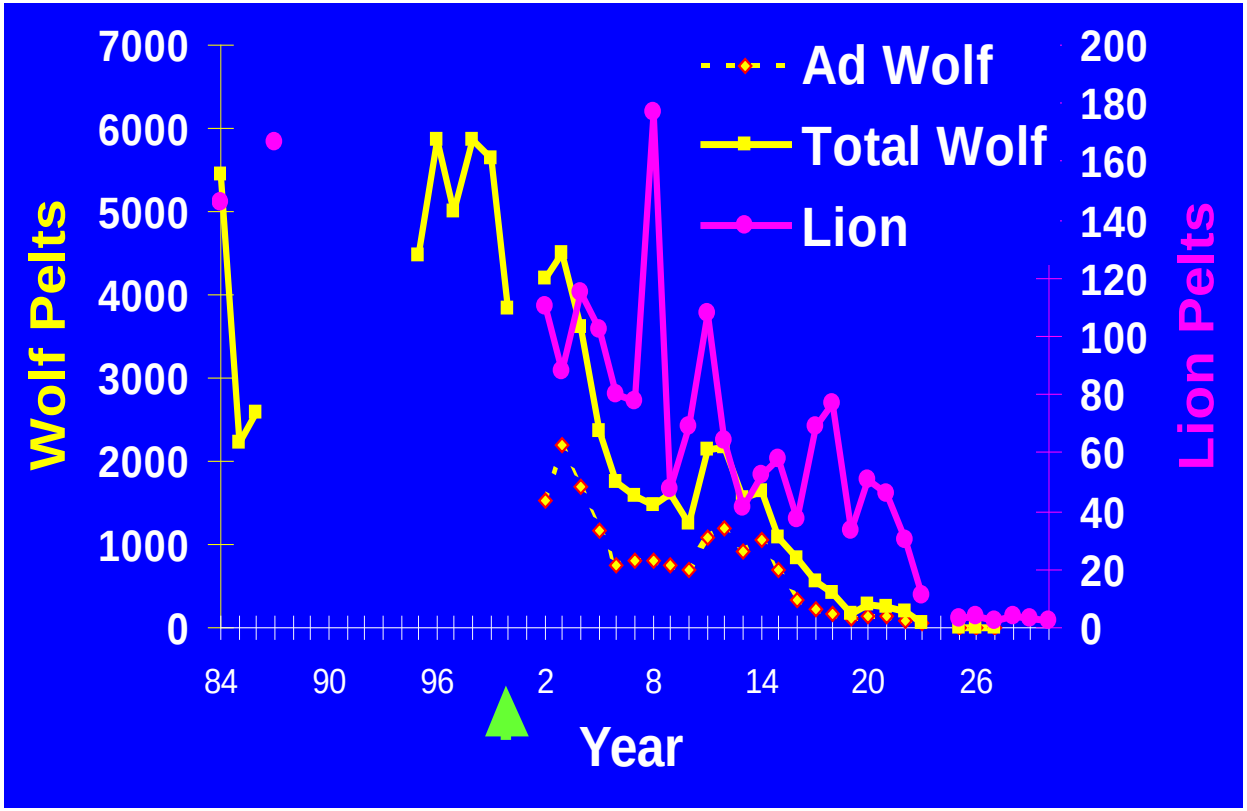
- Wildlife Management:
- “Game management is the art of making land produce sustained annual crops of wild game for recreational use.” Leopold 1933
- “the management of wildlife populations in the context of the ecosystem.” Sinclair et al. 2006
- “the application of ecological knowledge to populations of vertebrate animals and their plant and animal associates in a manner that strikes a balance between the needs of those populations and the needs of people.” Bolen & Robinson 2003

Interdisciplinary View of Wildlife Management (3-legged stool paradigm)



Result of Market Hunting and lack of regulations

Population Crashes



Mountain lion, adult wolf, and total wolf pelts for presented for bounty in Montana, 1884 - 1930

Near Extinction

- Photograph from the mid-1870s of a pile of American bison skulls waiting to be ground for fertilizer.
- During the 19th century, hunting played a major role in the extirpation or near extirpation of many species

Extinction

- Most numerous bird on Earth in mid 19th century
- Michigan was its last stronghold
- 3,000,000 birds shipped from there by a single hunter in 1878.
- In 1889 the species was extinct in MI.
- Last individual (Martha) died in 1914 in the Cincinnati Zoo

Extirpated Wildlife

- Lions in Europe
- Carolina parakeets
- Great auk
- Heath hen
- Hawaiian aviafauna
  - po'ouli
  - Approximately half of endemic birds

Causes of Extinction

- Most common drivers of extinction (in order of importance)
  1. Contraction (i.e. loss) and modification (i.e. alteration) of habitat
  2. Unsustainable harvesting by humans
  3. Introduction of a novel pathogen, predator, or competitor (i.e. exotic species) into the environment

Rise of Wildlife Management and Policies

- Need to manage for wildlife
- “The real problem of wildlife management is not how we shall handle the animals… the real problem is one of human management.”--Aldo Leopold, 1943

Wildlife Law

- Europe (Roman Empire to Magna Carta; 1215)
  - wildlife belonged to the king
- Following Magna Carta king kept wildlife in “sacred trust for people”
- Later, wildlife became the property of Parliament (the governing body)
- United States – wildlife is owned by the people – “public trust” resource
  - HI poses unique challenges of this idea

Scales & Approaches to Understanding Wildlife

- Individuals
  - Physiological and nutritional ecology
  - Animal behavior
- Populations
  - Population dynamics (i.e. animal demography): births, deaths, immigration, and emigration
- Communities
  - Competition, predation, etc.
- Ecosystem
  - Trophic dynamics, food webs, resilience and resistance

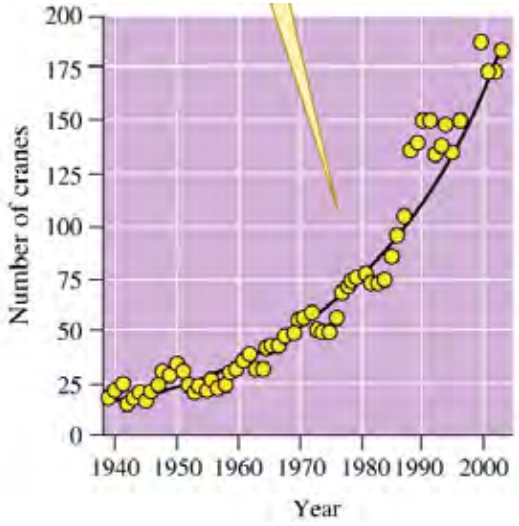
Population Dynamics

- The characteristics of populations are not static, but rather <u>they change over time</u>
- In other words, populations are '<u>dynamic</u>'
- Due to balance or change in rates of:
  1. **<u>Birth</u>**
  2. **<u>Death</u>**
  3. **<u>Immigration</u>**
  4. **<u>Emigration</u>**

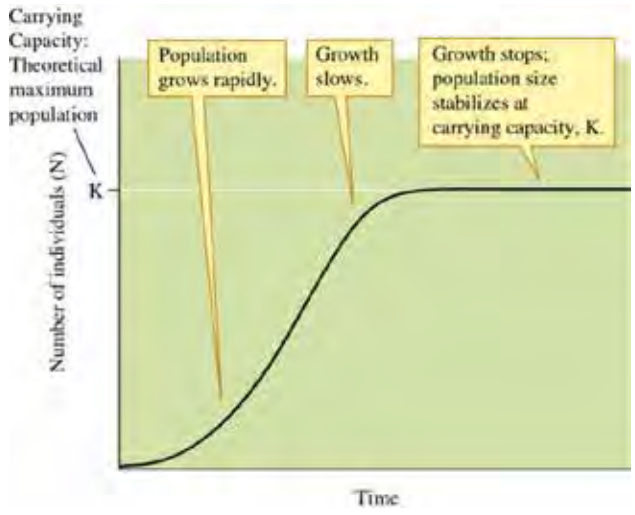
  - § These are the **<u>only 4 ways a population can change</u>**
- Estimating these and other characteristics require the use of demographic techniques (i.e., life tables and population models)

Populations: Modeling & Counting

- Simple population models:
  - Exponential & geometric growth (unlimited growth)
  - Logistic growth (limited by carrying capacity)
- Metapopulation models
  - Population is comprised of subpopulations
  - Sources and sinks
- How to estimate populations
  - Abundance, census, survey



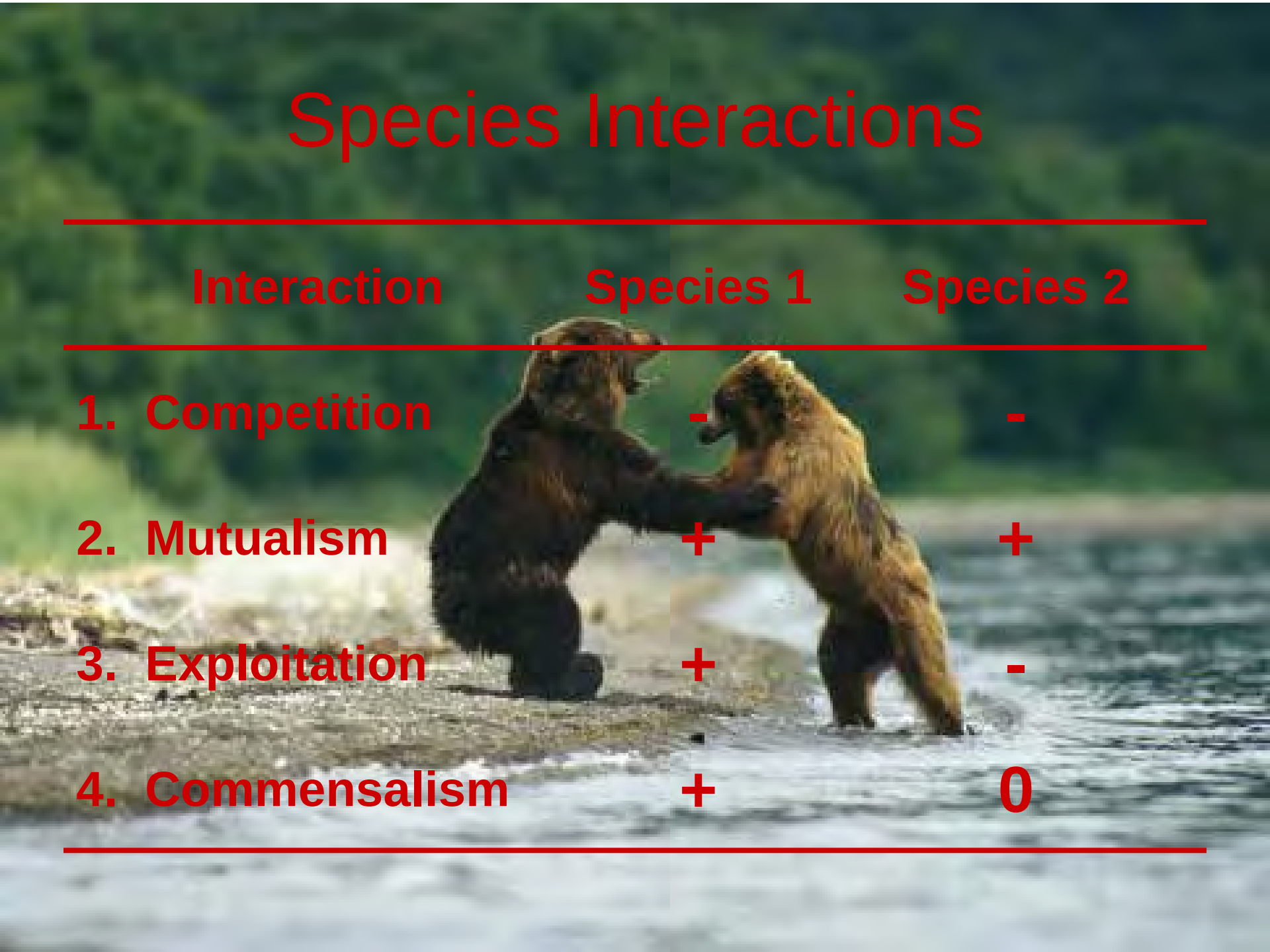
whooping crane



How Large is This Population?

White-eared kob antelopes

Species Interactions



Interaction	Species 1	Species 2
1. Competition	-	-
2. Mutualism	+	+
3. Exploitation	+	-
4. Commensalism	+	0

Habitat

- Before we discuss management, need to understand habitat
- Habitat is used in a variety of ways
- Often times it is used to describe an area supporting a particular type of vegetation
  - Likely arose out of habitat type, referring to “land units having approximately the same capacity to produce vegetation.”
- This vegetation provided the three basic components necessary for animals: **1) cover, 2) food, and 3) water**

Habitat Continued

- However, habitat is best described as relating to a particular species, and sometimes even to a particular population
- **Habitat**—*an area with a combination of resources (food, water, cover) and environmental conditions (temp., precip., presence of predators) that promotes occupancy by individuals of a given species (or population) and allows those individuals to survive and reproduce*