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Furbearer and Carnivore Ecology

Management Applications in the Southeast U.S.



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Furbearing Animals

- **Aquatic:** require water for habitat needs
- **Semi-aquatic:** food and habitat may be near water, but also spend much of their lives upland
- **Terrestrial:** live upland, only use water for drinking

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Aquatic

- Beaver
- River Otter
- Muskrat

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BEAVER (*Castor canadensis*)

- North America's largest rodent
- Mate in January or February- have ~2 kits in spring
- Live in territorial family units called colonies
- Often live to be 15-20 years old



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Beaver Habitat



- Habitat areas can include streams, lakes, rivers, even drainage ditches
- Stream flow determines number of dams
- Dams cause flooding which promotes aquatic plants
- Beavers eat up to 2 pounds of woody material each day


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Beaver History


- Much American settlement was brought about by beaver trapping.
- Fur industry through the 1800's nearly depleted beaver population
- By 1938, ~ 500 beaver left- today 150,000+



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Beaver Management

- Beaver dams are beneficial to many species, however they cause flooding, incurring millions of dollars in damage
- Forests, farmlands, and culverts are especially vulnerable to beaver damage
- Fencing, dam removal, and trapping are effective beaver management techniques



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River Otter (*Lutra canadensis*)

- Only aquatic member of the mustelid (weasel) family
- Carnivorous- eating fish, small mammals, birds, insects, and amphibians.
- Mate in late winter, delayed egg implantaion, 1-5 young born the following spring
- Promiscuous, and solitary, territories or "activity centers" overlap
- Many otter dens are beaver lodges, or man-made structures



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Otter History and Management

- Trapping for fur in 1800's and 1900's decreased otter populations with some Southeastern areas being completely depleted
- Most important factors in Otter presence are water quality, fish abundance, and wetland habitat availability.
- Problem animals in recreational ponds are often effectively removed with trapping or shooting.

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Muskrat (*Ondatra zibethicus*)

- Largest rodent in the mouse family
- Breed year round, producing one litter/month
- Population densities follow a 6-10 year cycle
- Habitats can include streams, ditches, beaver ponds, marshes, farm ponds, and mine pits



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Muskrat Management

- During times of overpopulation, muskrat can damage the shoreline of wetland areas
- Predation is one method of natural control
- Trapping and shooting are effective methods of control for eliminating problem muskrat

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Semi-Aquatic

- Mink
- Raccoon

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Mink (*Mustela vison*)

- Polygamous members of the weasel family
- Carnivorous animals that have adapted to eating aquatic and terrestrial prey
- Mainly solitary except during breeding



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Mink Management




- Trapping and hunting can cause serious mink population declines
- Poor water quality, DDT, and mercury can cause reproductive failure
- Minks will prey on some small domestic animals such as chickens and rabbits
- Exclusion and trapping are the most effective methods of control

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Raccoon (*Procyon lotor*)


- Very adaptable, easily recognized mammal of North America
- Crepuscular/Nocturnal activity
- Breeding season in January and February with 2-8 kits born in spring
- Males are territorial during breeding season
- Depend upon wetlands for large portion of diet
- Use tree hollows and shallow underground dens for nesting sites



Raccoon (*Procyon lotor*)

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Raccoon Management



- Raccoons can cause damage to crops, personal property and bird populations
- Raccoons have the propensity to carry rabies and parvovirus which threaten domestic animals and humans
- Moderate hunting is effective in controlling populations
- Restocking should be carefully considered



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Terrestrial

- Opossum
- Fox
- Coyote
- Skunk
- Bobcat

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Opossum (*Didelphis virginiana*)



- Only marsupial in North America
- Two breeding seasons and three litters per year (young live in marsupium for several weeks)
- Known for feigning death to escape enemies
- Adaptable to many habitats but prefer woodlands with stream accessibility
- Managed to prevent predation on eggs of ground-nesting birds

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Fox (*Canidae*)



- Red and gray foxes most abundant in North America
- Den sites include tree and ground cavities, brush piles, and thickets
- Pups are born and raised for 1-2 months in den site by both parents
- Males are especially territorial and scent mark perimeter of home range
- Opportunistic omnivores (can threaten some ground nesting bird populations)
- Especially vulnerable to distemper, mange, and rabies

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Coyote (*Canis latrans*)



- Since 1900, have expanded east of the Mississippi
- Breed in the winter, whelp in the spring usually producing litters of ~4 pups.
- Compete with fox for habitat
- Opportunistic omnivores- also scavengers
- Territorial and solitary hunters except during breeding season
- Vulnerable to distemper, mange, parvovirus, rabies, hepatitis
- Adaptable to almost any habitat (including suburban areas)
- Managed to decrease predation on livestock and agricultural crops (i.e. watermelon)

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Skunk (*Mephitis mephitis*)




- Member of the weasel family most noted for volatile scent glands
- Breed in late winter and give birth to 2-10 kits in late spring
- Opportunistic omnivores especially favor insects
- Non-territorial mammals usually over-lap home ranges
- Rabies dormancy in skunks is a threat to humans, livestock, and other wild animals
- Other carnivores and human trapping keep populations in check

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Bobcat (*Lynx rufus*)

- Elusive member of the felidae family
- Large carnivorous cats are easily adapted to most habitats, but prefer forested areas with diverse prey populations
- Solitary, territorial animals breed once per year
- Livestock is vulnerable to desperate bobcat



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Furbearer Populations

<p style="text-align: center; color: blue;">Pros</p> <ul style="list-style-type: none">• Furbearing animals keep rodent and insect populations under control• Valuable indicator species of water and soil quality• Pelts are important part of economy• Unique and essential component of a healthy ecosystem	<p style="text-align: center; color: red;">Cons</p> <ul style="list-style-type: none">• Overpopulated areas are depleted of biodiversity- especially ground-nesting birds• Low prey populations can cause furbearers to threaten livestock, domestic animals, and crops• Threaten human and domestic animals with rabies, distemper, parvovirus, hepatitis, and mange• Beaver damage can cause millions in forest and road damage
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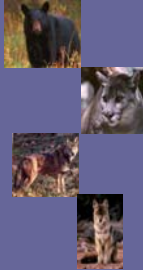
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Furbearer Control

- 1) Identify the problem
 - pinpoint problem animals
 - assess damage
 - awareness of social and economic factors
- 2) Understand the ecology of the animal
 - Be familiar with the unique life history and ecological issues surrounding the animal
- 3) Select the appropriate control method
 - Economically and environmentally sound
- 4) Continued evaluation and feedback of applied method
 - modify method if necessary

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Carnivores



- Carnivores are predators, that is, they actively pursue and consume other animals to meet nutritional needs
- Carnivores are an essential component to a healthy

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Factors Influencing Predation

- abundance of prey (buffer species)
- abundance of carnivores (competitors)
- habitat conditions (for prey and predator)
- disease
- climate and weather patterns
- human interactions (conflicts and conservation)

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Essential Presence of Predators

- Keep prey populations healthy by removing sick/old/injured
- Maintain biodiversity by keeping prey populations in check (keystone predator)
- Important to the economy- pelts are valuable

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Carnivores are tertiary and quaternary consumers

- Review of trophic levels of any food web



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Energy Transfer

- Why do carnivores need more to eat?



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Predation Theories (hint: be careful!)

- Lotka-Volterra predation equations
- Rozenweig model
- Keystone Predator model
- Ratio-dependent models

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Lotka-Volterra

Lotka-Volterra model is the simplest model of predator-prey interactions. The model was developed independently by Lotka (1925) and Volterra (1926):

$$\begin{cases} \frac{dH}{dt} = rH - aHP \\ \frac{dP}{dt} = bHP - mP \end{cases}$$

It has two variables (P, H) and several parameters:
H = density of prey
P = density of predators
r = intrinsic rate of prey population increase
a = predation rate coefficient
b = reproduction rate of predators per 1 prey eaten
m = predator mortality rate

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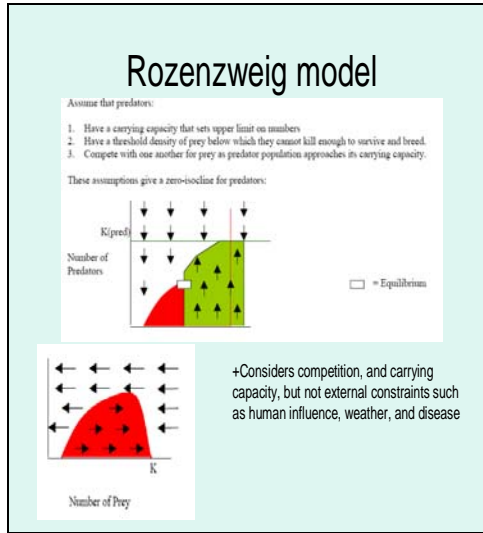
PROBLEMO!

- THEY DIDN'T CONSIDER COMPETITION!
- Thus:
 - 1) Prey populations can grow infinitely without resource limitations
 - 2) Predators have unlimited supplies of prey

~Would you agree that this is a bit *unrealistic*?

This model is theoretically useful in determining predator/prey populations, but not realistic for management applications.

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- ### Carnivore Management
- Passive (doing nothing is still a management technique)
 - Active
 - control populations
 - enhance/restore populations

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- ### Controlling Populations
- When prey species become scarce, predators must adapt to survive- livestock and crops in danger of predation
 - Hunting, trapping, manipulating habitats
- *Must keep in mind that carnivore species intrinsically adapt when populations are threatened
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- The three images show: 1. A wolf standing in a grassy field. 2. A person in a white coat and hat standing next to a dog. 3. A wolf and a dog standing together in a field.

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Restoring Populations



- Florida Panther
- Red Wolf
- Black Bear



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Public Influence

- As a wildlife manager, you must always be cognizant of public perceptions, attitudes, and interactions regarding predators
- In general the public feels predators:
 - 1) have a right to exist
 - 2) should be reintroduced to native habitats
 - 3) do need to be managed but with conditions
 - 4) should not be hunted or trapped unconditionally
 - 5) are not the cause of game population declines
 - 6) play an important role in maintaining biodiversity



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LIMITING FACTORS: Any factor, natural or unnatural that limits the population of a species

CARRYING CAPACITY: The number of animals a specific area can sustain over time

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Credits

- Dr. Bruce Leopold
- Yarrow and Yarrow
- University of Montana
- University of Vermont