Vertebrate Pest Management

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What Are Vertebrate Pests?

Nonhuman species of vertebrate animals that are currently troublesome locally, or over a wide area, to one or more persons, either by being a health hazard, a general nuisance, or by destroying food, fiber, or natural resources.

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Vertebrate Pests

- Birds
- Deer
- Deer mice
- Ground squirrels
- Meadow voles
- Moles
- Opossums
- Pocket Gophers
- Rabbits
- Raccoons
- Rats and House Mice
- Skunks
- Tree Squirrels

Control of Vertebrate Pests

- Vertebrate Pests Need
  - Habitat (cover)
  - Food
  - Water
- An integrated approach that utilizes a number of strategies and tools to control vertebrate pests is recommended

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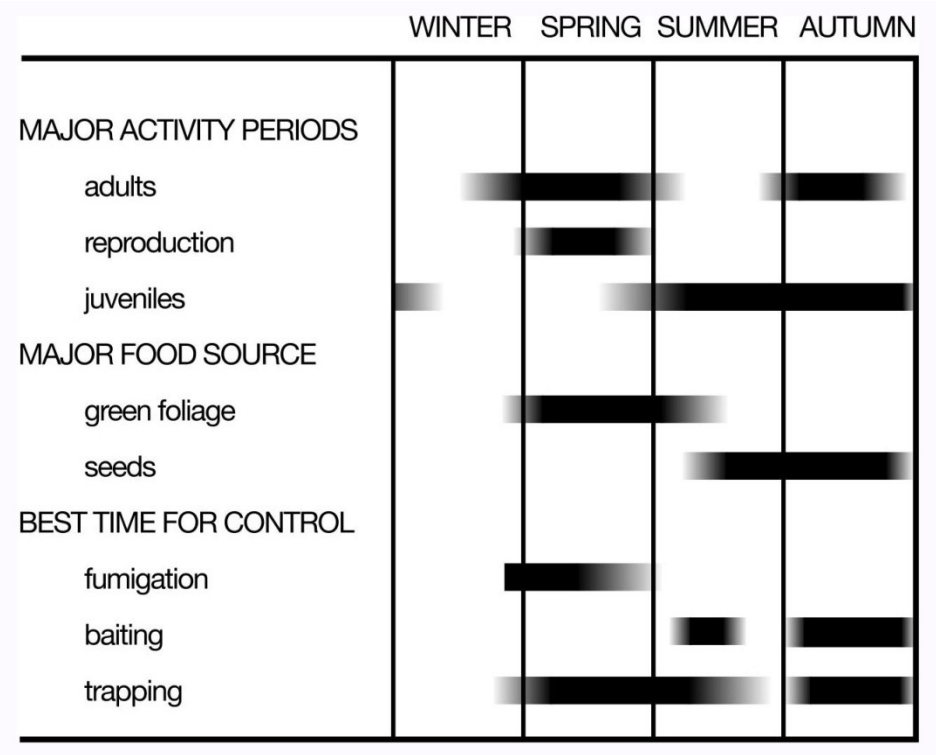
Importance of Biology/Ecology

- Understanding the biology and ecology of vertebrate pests will guide management decisions
  - Example:
    熜Ground squirrels



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Management Strategy

- Identify the pest
- Assess management options
- Develop and implement a plan
- Monitor results
- Perform continued management as needed

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Ground Squirrels – Species ID

- Gray-brown fur, with semi-bushy tail
- Active throughout the day
- Prefer to burrow next to buildings, on field edges, and alongside fencerows and roadsides
- Damage includes girdling of trees, consumption of forbs and grasses, chewing of irrigation lines, and abundant burrow openings

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Ground Squirrels – Biology

- Live in burrow system in colonies
- Breed once a year, 7-8 per litter
- Two periods of dormancy
  - Winter
  - Hottest days of summer
- Primarily herbivores
  - Consume green grass when available
  - Switch to seeds, grains, etc., when annual grasses dry out

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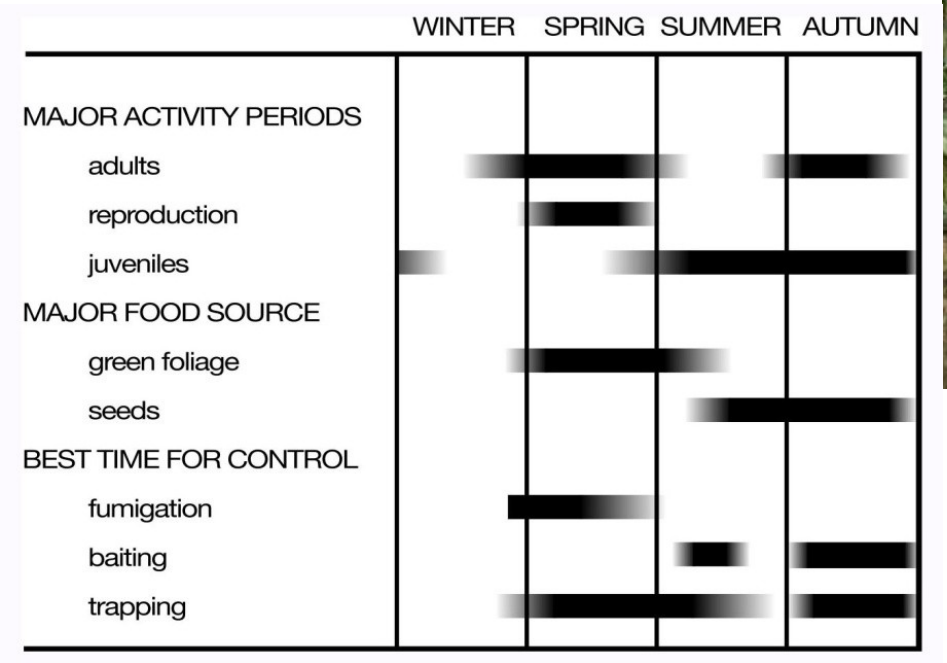
What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Ground Squirrels – Control



- Classified as non-game mammal
- Methods of control
  - Fumigation
  - Baiting
  - Trapping

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Fumigation

- Only fumigate active burrows
- Best in the spring
  - Prevent reproduction
  - Soil is moist and will hold in gasses
  - Fire danger is lower
- Be aware for signs of non-target species
  - San Joaquin Kit Fox
  - Burrowing owl
- Do not fumig

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Fumigation

- Aluminum phosphide
  - Tablets can be used for ground squirrels and gophers
  - Is a restricted use pesticide; must be licensed to use
  - Contact a professional

Baiting

- Involves use of poison baits to control vertebrate pests
- There are multi-feed and acute rodenticides
- Also, there are second-generation anticoagulants for indoor use

	Anticoagulants	Zinc phosphide	Strychnine
Ground squirrels	X	X	
Pocket gophers	X	X	X
Moles	X	X	
Voles	X	X	
Rabbits	X		

Baiting

- Can use bait boxes or spot broadcast
- Only use approved baits
- Keep baits away from pets and non-target wildlife
- May take several feedings for anti-coagulant baits to be effective
- Allow some time for squirrels to get accustomed to bait boxes

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Control Options—Baiting

- Zinc phosphide
  - An acute toxin
  - Potential bait shyness
  - Can be used for spot treatments and broadcast baiting
  - Not to be used in or around buildings

Control Options—Trapping

- Gopher box traps can be used in tandem when set along runways
- Tunnel-type trap
- Conibear trap
  - Set in burrow entrance
- Live traps
  - Require euthanizing animals
- Always handle animal carcasses with gloves and dispose of them properly

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Pocket Gophers – Species ID

- Burrowing rodent, 6-8” long
  - Rarely seen above ground
- Gopher mounds are plugged and often fan-shaped
- Feed on taproots
- Mounds can kill plants and create a weed seed-bed

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Pocket Gophers – Biology

- Active year-round
- Usually live alone
- Seal openings to burrows
- Live up to three years
- Can produce up to 3 litters per year
  - 5-6 young per litter

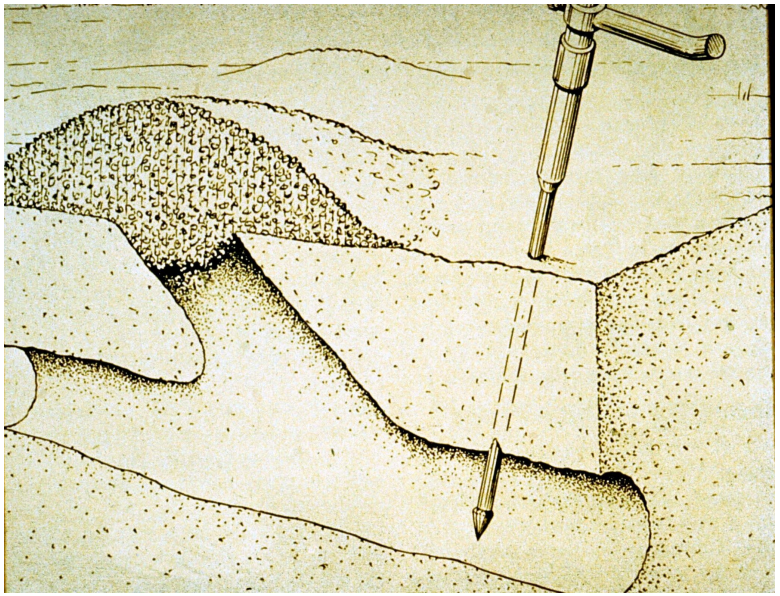
What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Pocket Gophers – Control

- Classified as non-game mammal

- Exclusion/Wire Mesh
  - Under raised bed gardens
  - Around trees



- Fumigation
  - Usually ineffective
- Baiting

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Baiting

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	Anticoagulants	Zinc phosphide	Strychnine
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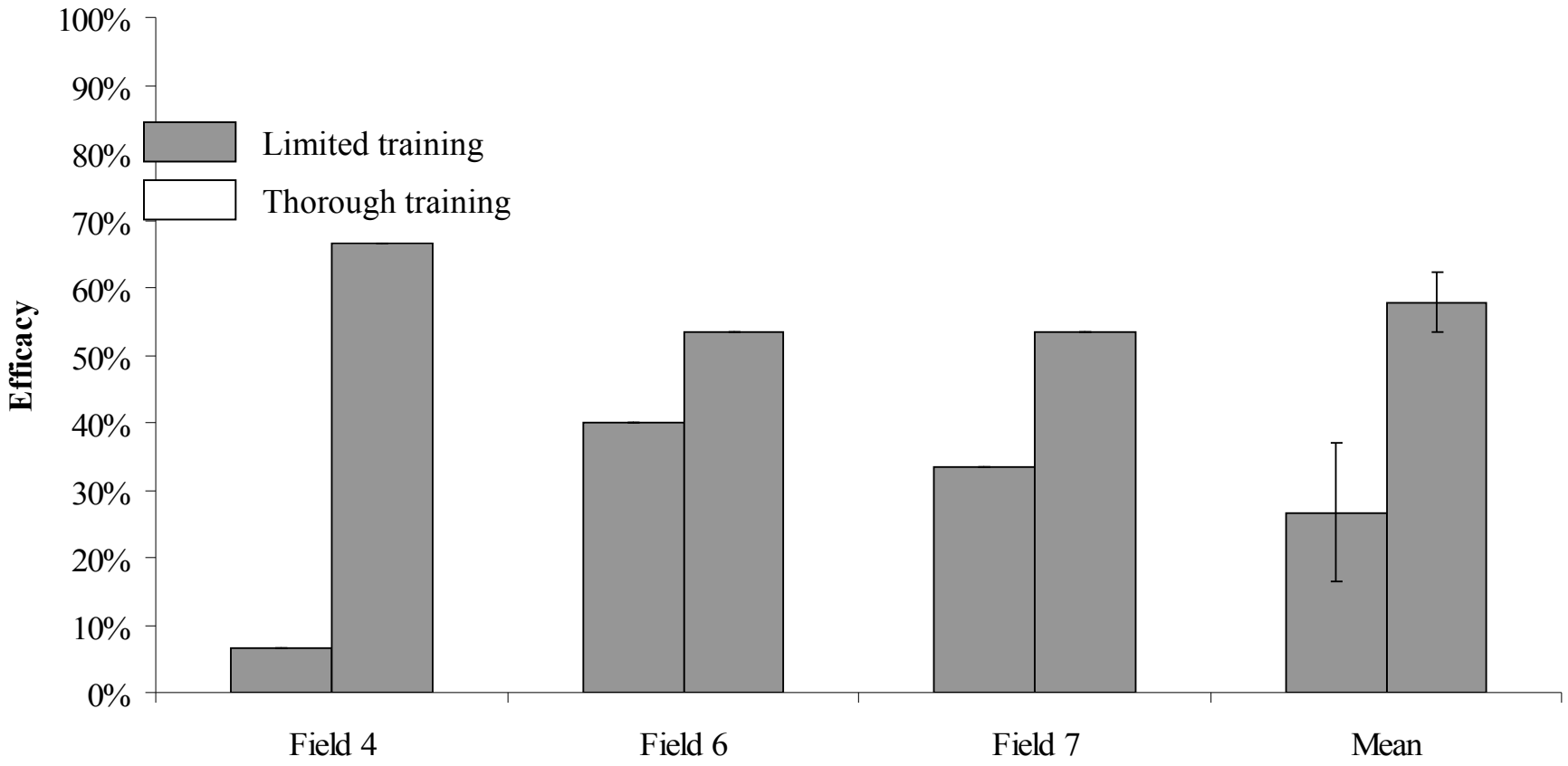
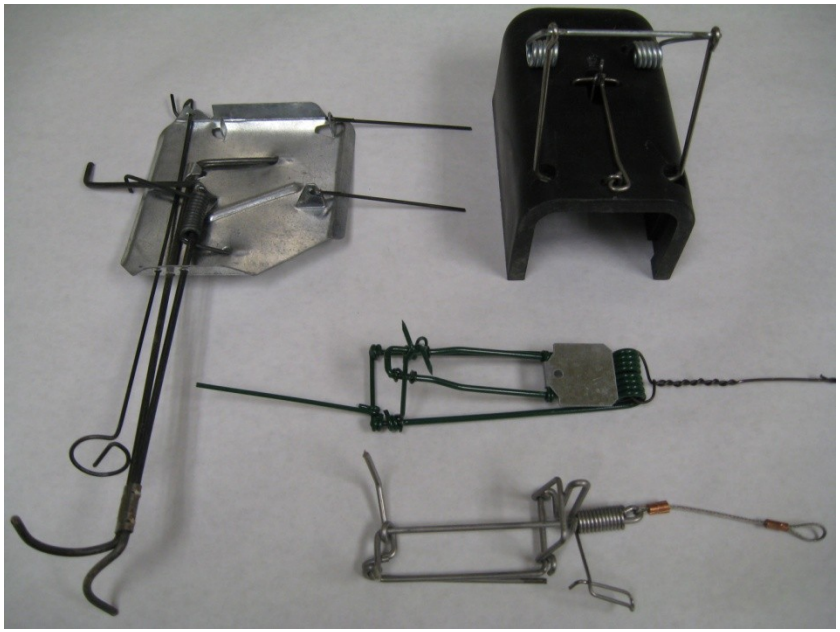
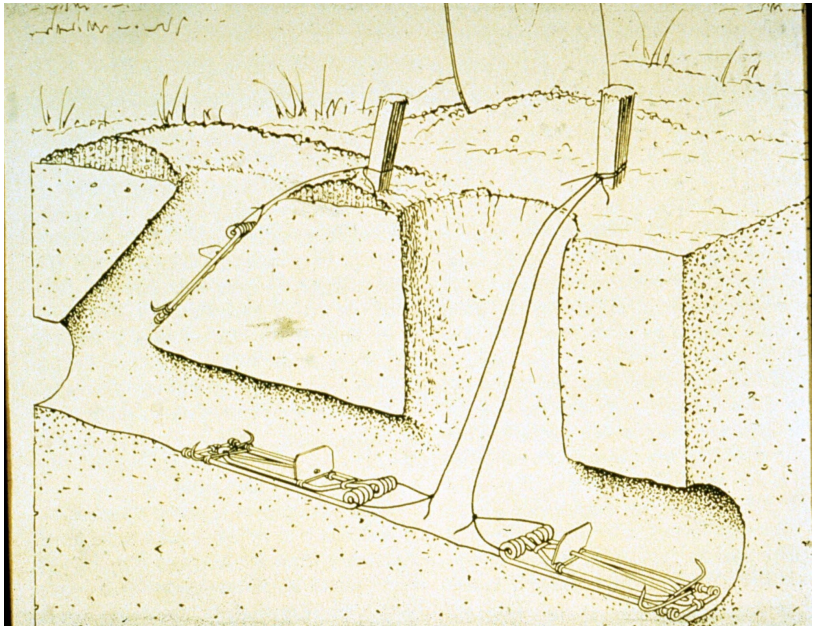
Pocket gophers	X	X	X
Moles	X	X	
Voles	X	X	
Rabbits	X		

Control Options—Baiting

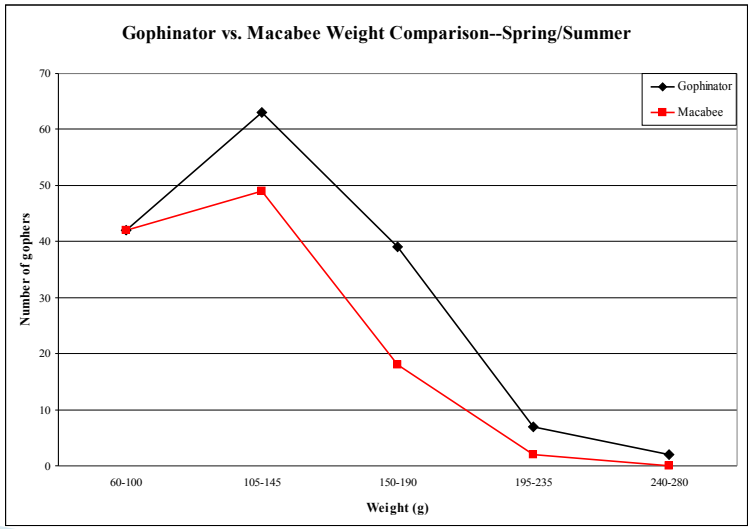


Pocket Gophers – Trapping





- Two main kinds of traps: pincers and squeeze-type box traps
- Common examples include Black Box, Cinch trap, Macabee, and Gophinator



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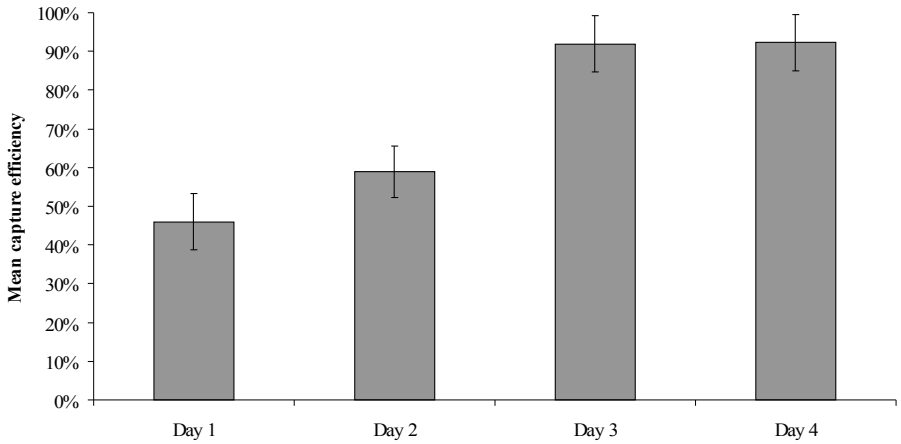
Pocket Gophers – Trapping

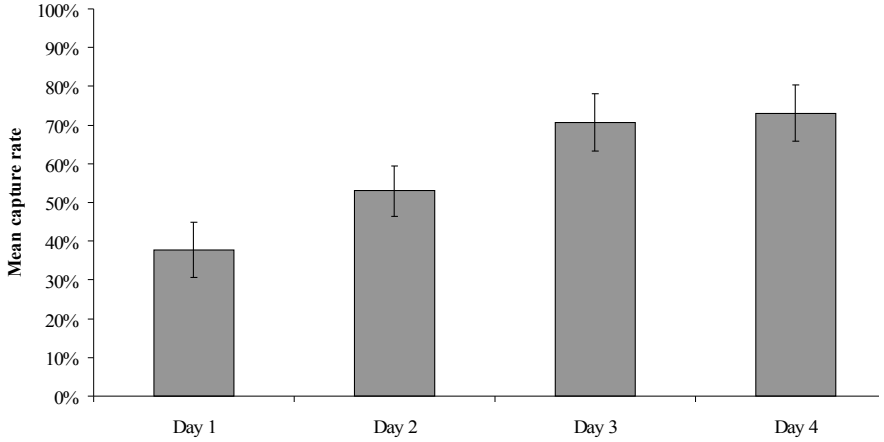
Has many positive attributes including:

- Knowledge that you've removed the target animal
- No use of toxic chemicals
- Available for use in organic setting
- Can be efficient and economical once user becomes proficient at trapping

Capture Efficiency



Capture Rate



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Pocket Gophers – Biocontrol

- Natural predators have been used to control vertebrate pest populations
- Falconers seem to work best
- Owl boxes are inconclusive at best
- Gopher snakes kill a few pests but are unlikely to control populations

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Moles – Species ID

- Burrowing mammals with a pointed snout and broad feet
- Mounds are volcano shaped with the plug in the center of the mound
- Can also be identified from raised earth indicating underground tunnels

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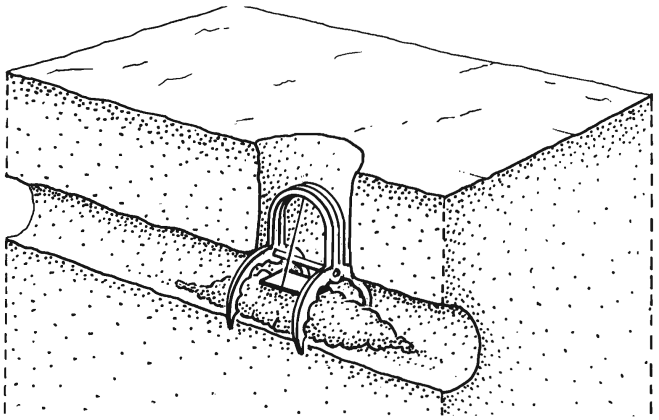
Moles – Biology

- Active throughout the year
- Eat worms and insects
- Poorly developed eyes
- Live almost entirely underground
- Litters produced once a year; 3 or 4 young per litt

Moles – Trapping

- Number of different kinds of traps including harpoon, choker, scissor-jaw, and body gripping
- Body gripping and scissor-type appear to be most effective
- Are placed in or over tunnels – should straddle or encircle tunnel
- Set at least 18" from mound



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Baiting

- Involves use of poison baits to control vertebrate pests
- There are multi-feed and acute rodenticides
- Also, there are second-generation anticoagulants for indoor use

	Anticoagulants	Zinc phosphide	Strychnine
Ground squirrels	X	X	
Pocket gophers	X	X	X
Moles	X	X	
Voles	X	X	
Rabbits	X		

Meadow Voles – Species ID

- Dark, grayish brown fur
- 4–6” long
- Short tail
- Spend considerable time aboveground, but mostly live in burrows
- Dig shallow burrows and leave well-worn trails
- Fecal pellets are

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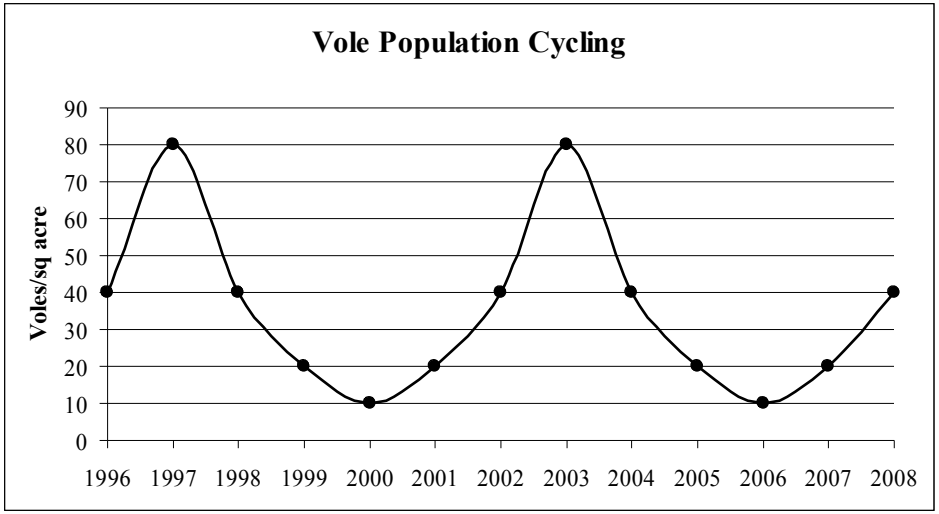
Meadow Voles – Biology

- Poor climbers
- Active day and night, year round
- Mostly herbivorous
- 5 – 10 litters per year, 3-6 young per litter
- Populations tend to cycle, exhibiting irruptive growth patterns



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What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Meadow Voles – Control

- Fencing and tree protectors can reduce or eliminate damage caused by voles
- Trapping can be successful with small populations
- Baiting
  - Broadcast baiting or spot baiting
- Meadow voles stick to their runways and paths

Photo courtesy of Steven Albano

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Baiting

- Involves use of poison baits to control vertebrate pests
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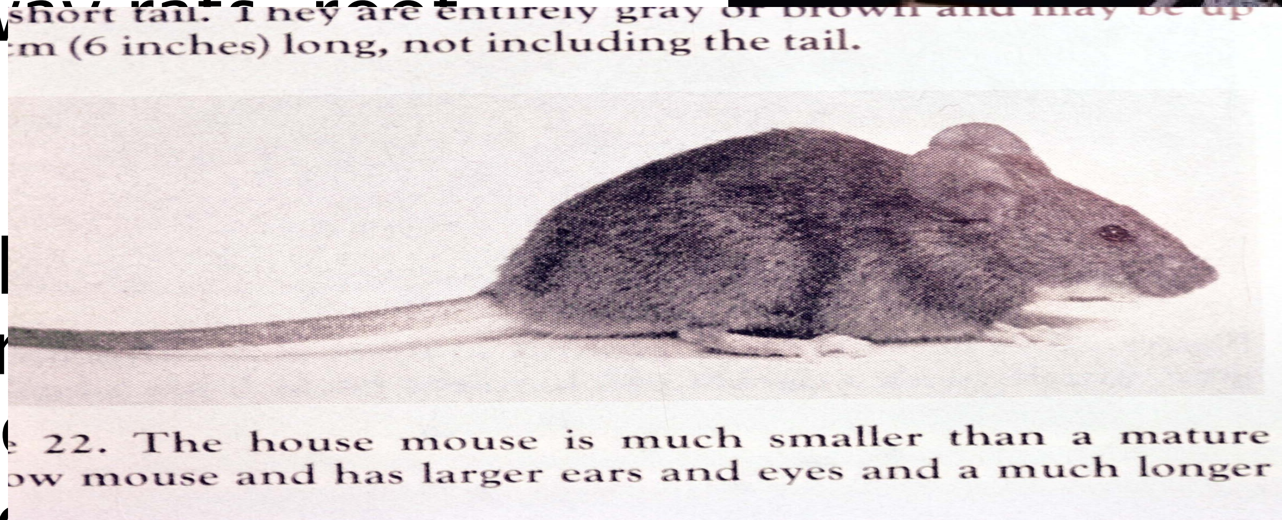
	Anticoagulants	Zinc phosphide	Strychnine
Ground squirrels	X	X	
Pocket gophers	X	X	X
Moles	X	X	
Voles	X	X	
Rabbits	X		

Other Rodents – Species ID

- Norw… rats, … deer …
- Can l… contr… outd…
- Can cause significant damage indoors and outdoors
- Can squeeze through openings ¼" across
- Rats much larger



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Other Rodents – Biology

- Mice reproduce prolifically
- Primarily commensal rodents
- Deer mice carry Hantavirus
- House mouse has almost no fur on tail
- Deer mice have larger eyes and ears

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Other Rodents – Control

- Non-game mammal
- Snap traps and live traps can be effective for small populations
- Baiting is a good option
  - May poison non-target species
  - Potential for odors
- Exclusion is the best option where possible

Photo courtesy of Steven Albano

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Tree Squirrels – Species ID

- Four species found in California
- Eastern Fox squirrel causes the most damage
- Are diurnal
- Will consume nut crops, dig holes in lawns, chew on cables, and nest in buildings

What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Tree Squirrels – Control

- Only Eastern Fox Squirrel classified as non-game
  - Other three species need a permit to control
- Trapping
- Exclusion

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Hares and Rabbits – Species ID

- Jackrabbits are hares
  - Most common rabbit-like pest in ag settings
  - Larger and have longer ears
  - Damage caused by foraging on stems and leaves of plants
- Cottontails are true rabbits
  - Small and have shorter ears

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What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Hares and Rabbits – Control

- Game animals
  - No license required if a rabbit is causing damage
- Traps
  - Useful for jackrabbits and cottontails
  - Live traps not recommended
- Exclusion
  - Fencing
  - Trunk guards
- Baiting
  - Only registered for use in ag situations
  - All carcasses must be recovered

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Raccoon and Opossum – Species ID

- Will eat fruits and vegetables.
- Can get into garbage and pet foods.
- Potentially transmit diseases
- Opossum is the only native marsupial
- Both are nocturnal

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Skunks – Species ID

- Will dig holes looking for grubs and insects
- Will spray
- Will eat pet foods
- Can transmit diseases
- Carries Rabies

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Control of Raccoons, Opossums, and Skunks

- Raccoons
  - Furbearers
- Opossums
  - Non-game mammal
- Skunks
  - Non-game mammal
- Exclusion/Habitat Control
  - Electric fencing
- Trapping
  - Best done by a professional
  - Better resources for

Deer – Species ID

- Can cause significant damage to crops and gardens, especially when in close proximity to forested and riparian areas

- Most damage will occur during dawn, dusk, and at night, so identification of footprints and scat may be needed to determine deer were the cause of damage

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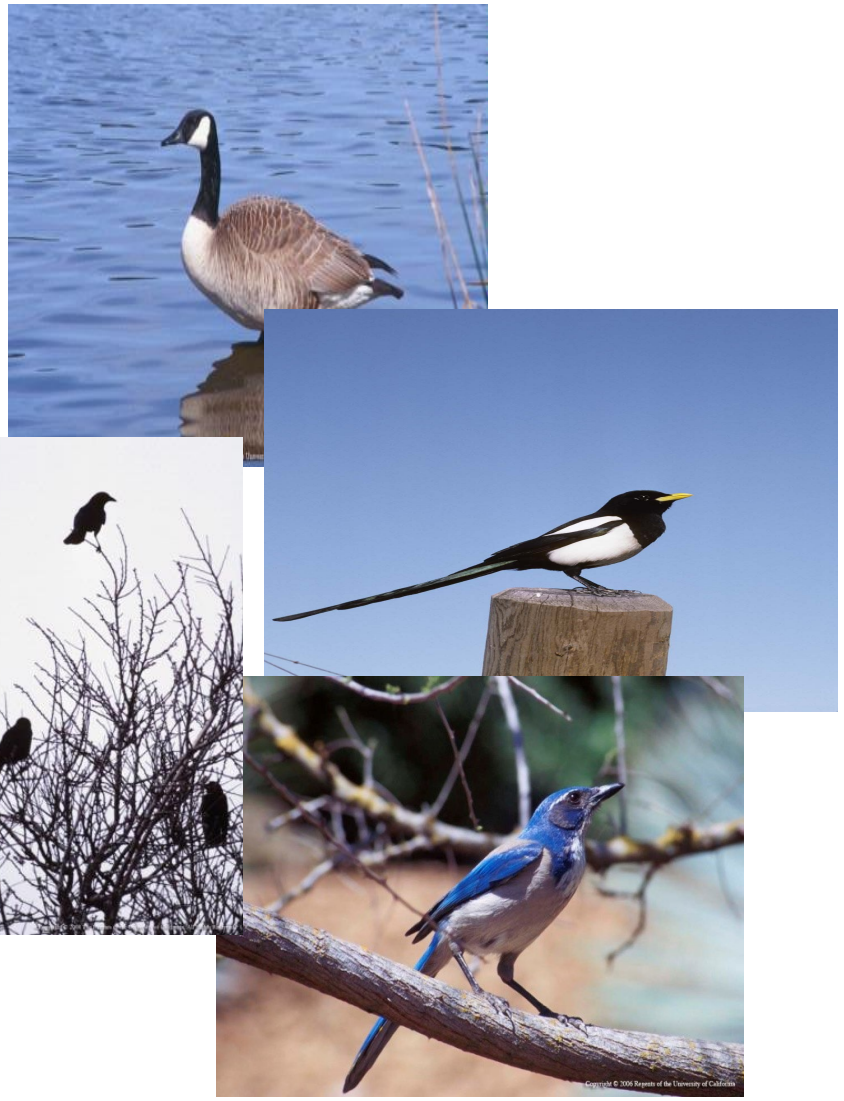
What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Deer – Control

Birds – Species ID

- A number of birds can be pests
  - Geese
  - Crows
  - Magpies
  - Starlings
  - House finches
  - Scrub jays
- Only the crow, magpie, and the starling can be taken without a permit



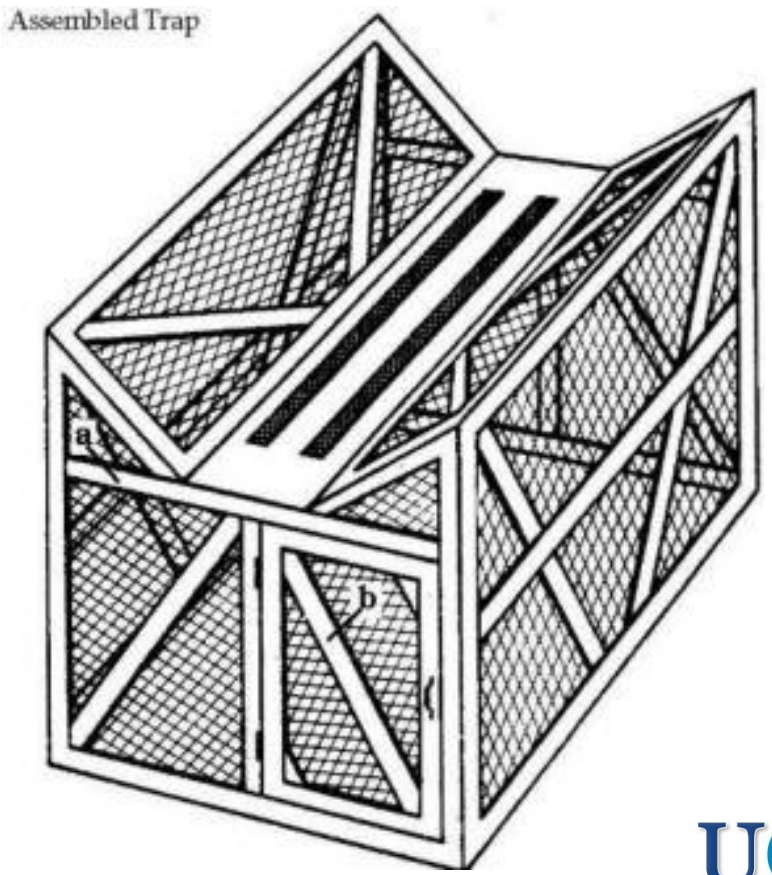
Bird Damage

What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X

Control Options—Trapping

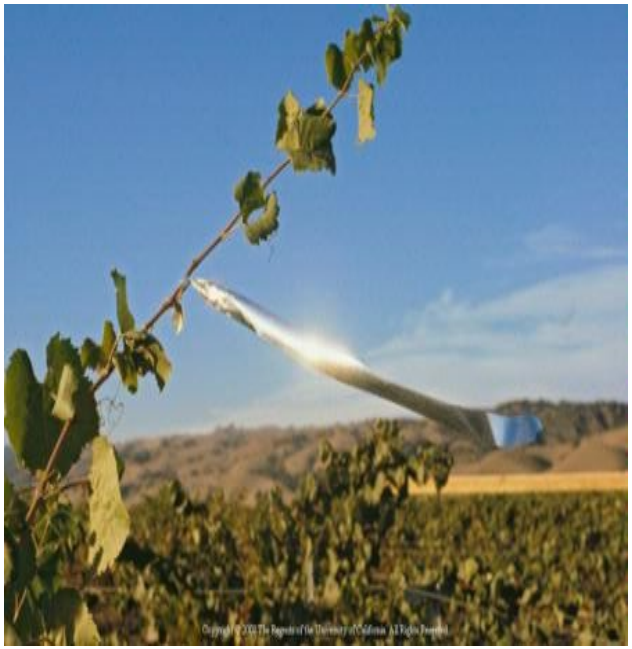
- Traps such as this modified Australian crow trap can be used to capture target birds

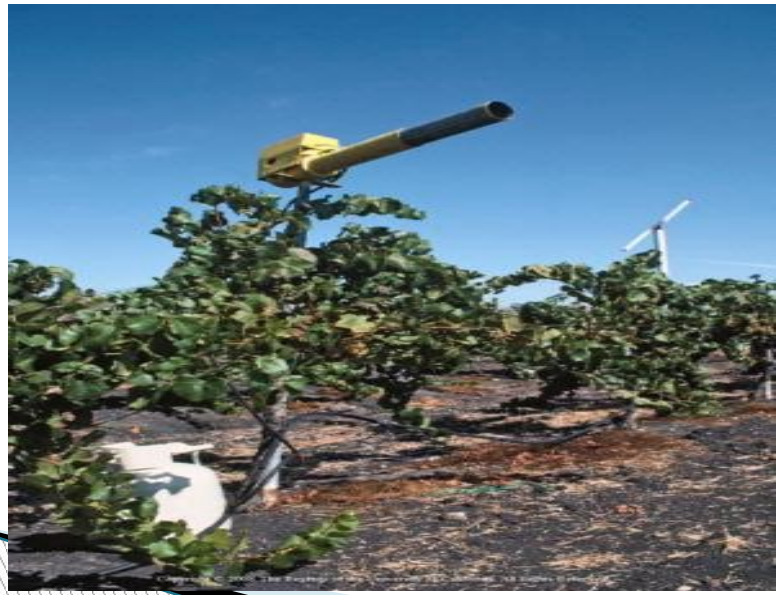


- Birds must be euthanized after capture
- Some snap-trap sets can be used

Bird Control – Frightening

- Includes visual and auditory devices
  - Scare-eye balloon
  - Noisemakers
  - Mylar streamers
  - Stationary devices need to be moved every 7 days





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Habitat Modification

- Involves altering habitat to reduce the desirability for pests
- Example:
  - Remove brush piles to control ground squirrels
  - Control weeds to reduce cover for voles

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Control Options—Repellents

- Repellents
  - Rely on objectionable odors or unpleasant tastes
  - Effectiveness is spotty and usually temporary
- Ultrasonic devices
- Water Sprayer

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Control Options—Other Strategies

- Shooting
  - Labor intensive
  - Compliment to frightening
- Carbon monoxide
- Gas explosive device
- Grub control

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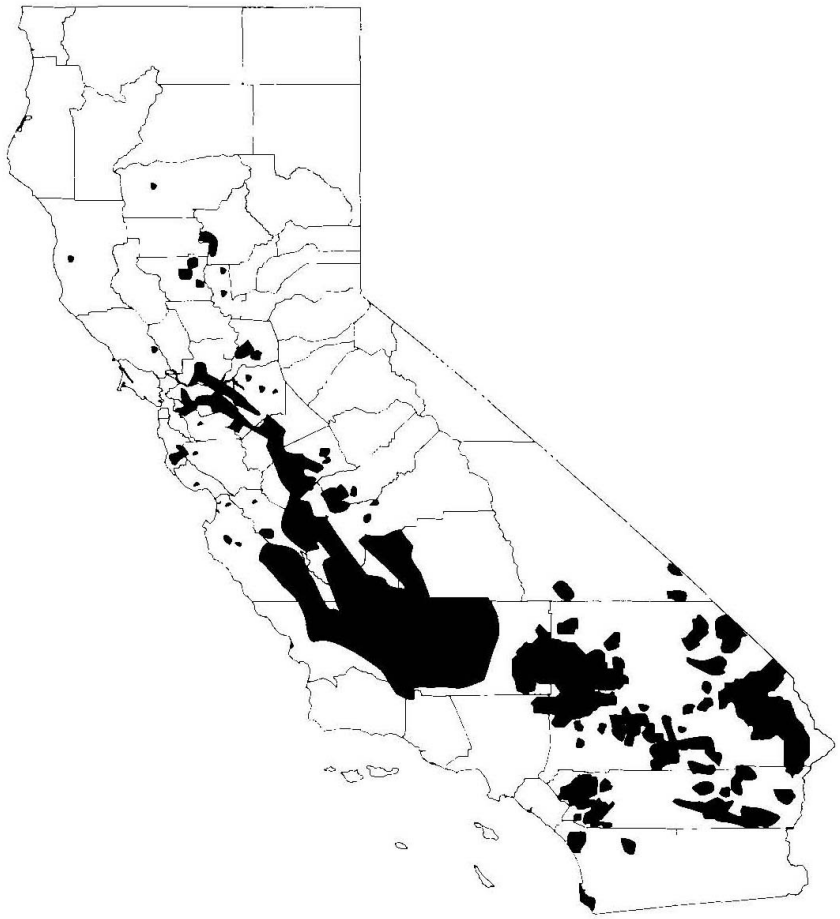
Assessing Options

- How bad is the infestation?
- Is it bad enough to warrant control?
- What time of year is it?
- What are the different costs for potential treatments?

Assessing Options

- Are endangered species potentially present in your area?
- Consult your county Ag Commissioner to find out
- Go to:
  - http://www.cdpr.ca.gov/
  - PRESCRIBE



Following-up

- Regularly check for sign of vertebrate pests (e.g., mounds, burrows, scat, actual observations of pests).
- Follow-up control methods can be used to eliminate individuals that were not removed during initial

Useful Information

UC IPM Pest notes:

- http://www.ipm.ucdavis.edu/PMG/menu.vertebrate.html

UCCE Vertebrate Pest Control Education Videos:

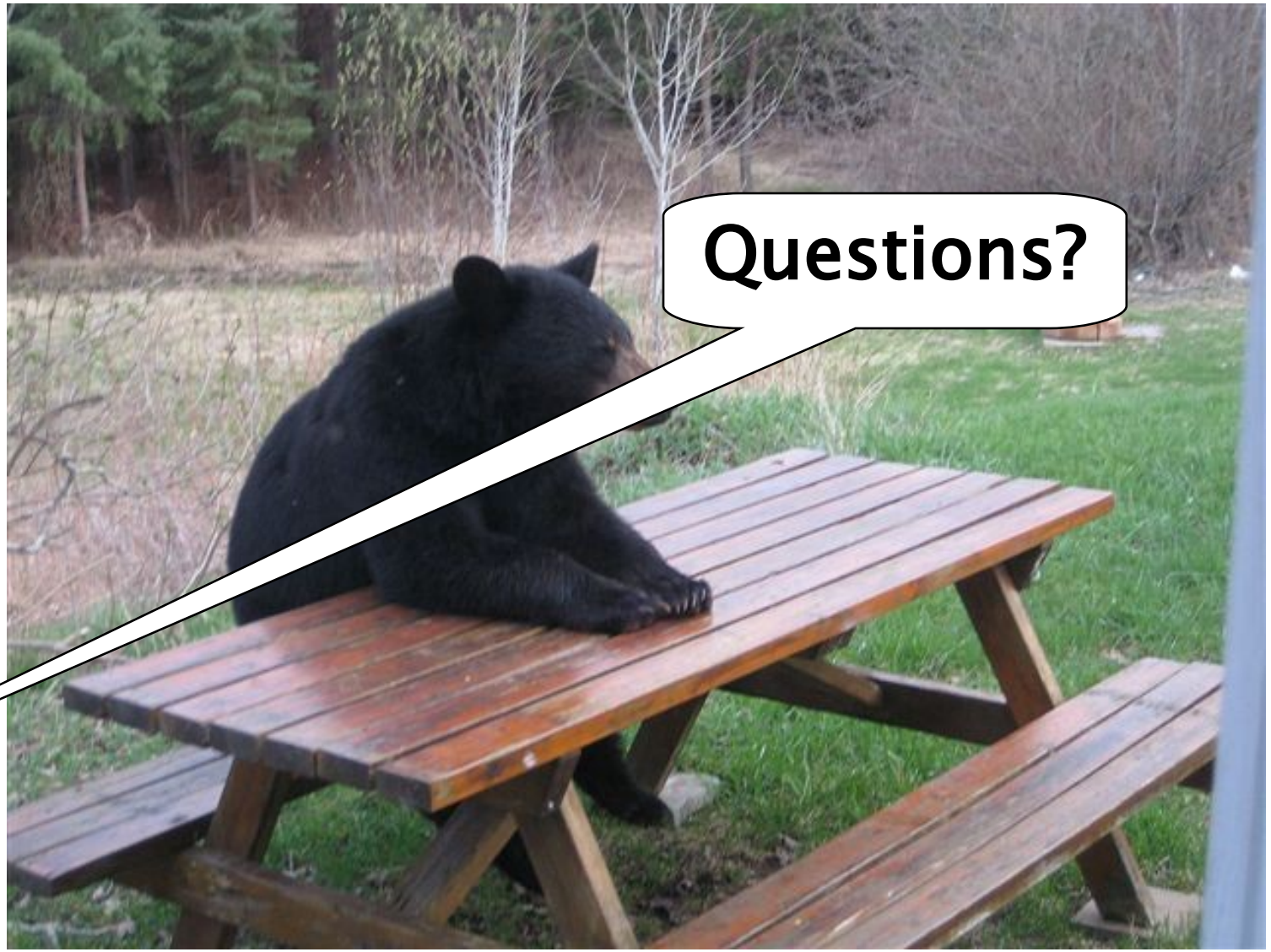
- http://groups.ucanr.org/vpctraining/

California DPR Endangered Species Query:

- http://calpip.cdpr.ca.gov/county.cfm

The Vertebrate Pest Control Handbook:

- http://www.vpcrac.org/about/handbook.php


Questions?