



Vertebrate Pest Management

Master Gardener
in training 2016



 **University of California**
Agriculture and Natural Resources

Education

- Leaving Certificate (Irish, English, Maths, Biology, Chemistry, Geography, French)
- BSc (Hons) Zoology, National University of Ireland, Galway
 - **The hair tube analysis and supplementary feeding of red squirrels (*Sciurus vulgaris*) in Portumna Forest Park, Co. Galway**
- PhD, NUIG
 - **Population Dynamics of Small Mammals in the West of Ireland: Implications of Hill Sheep Activity and Habitat**



NUI Galway
OÉ Gaillimh





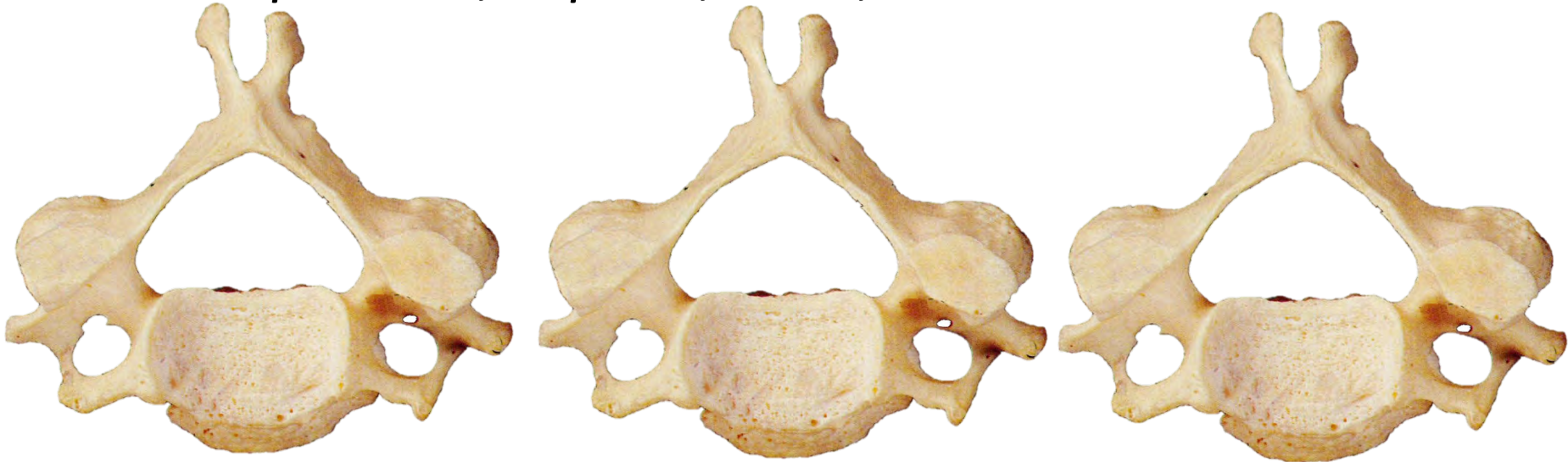
- Ireland
 - Implications of habitat and sheep grazing on ecology of small mammals
- California
 - Effectiveness of rodenticides for managing invasive roof rats and native deer mice in orchards
- United Kingdom
 - Stability of within-host–parasite communities in a wild mammal system
- Southeast Asia
 - Interactions of rodents and weeds in lowland rice cropping systems



What's a vertebrate?

noun

any chordate animal of the subphylum Vertebrata, characterized by a bony or cartilaginous skeleton and a well-developed brain: the group contains fishes, amphibians, reptiles, birds, and mammals





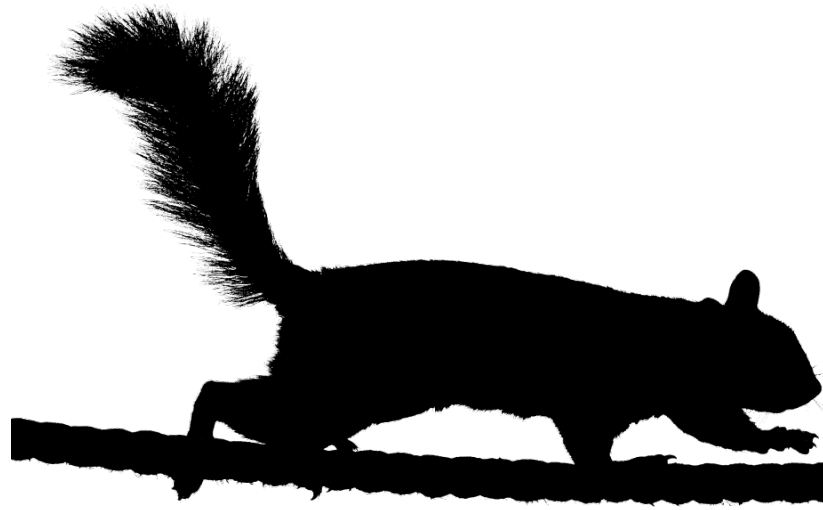
What's a pest?

noun

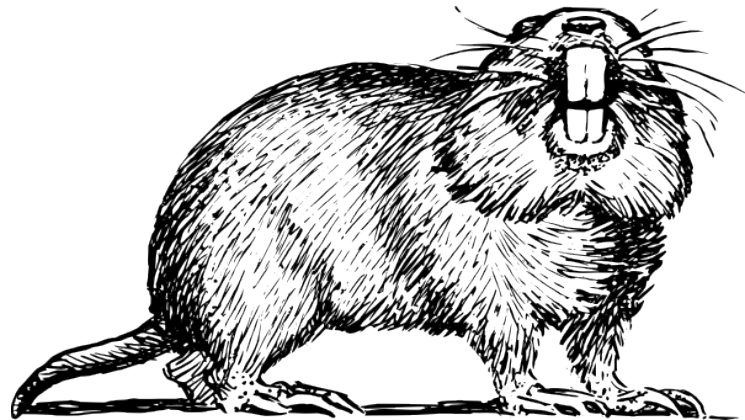
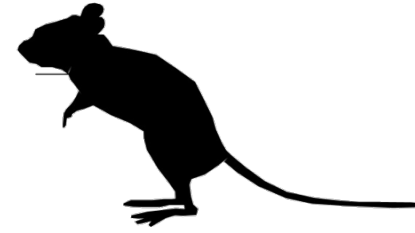
a person or thing that annoys, esp by imposing itself when it is not wanted; nuisance

any organism that damages crops, injures or irritates livestock or man, or reduces the fertility of land

(rare) an epidemic disease or pestilence

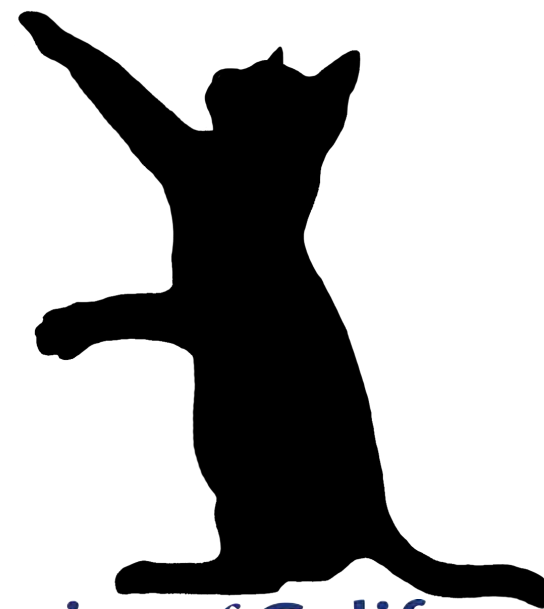
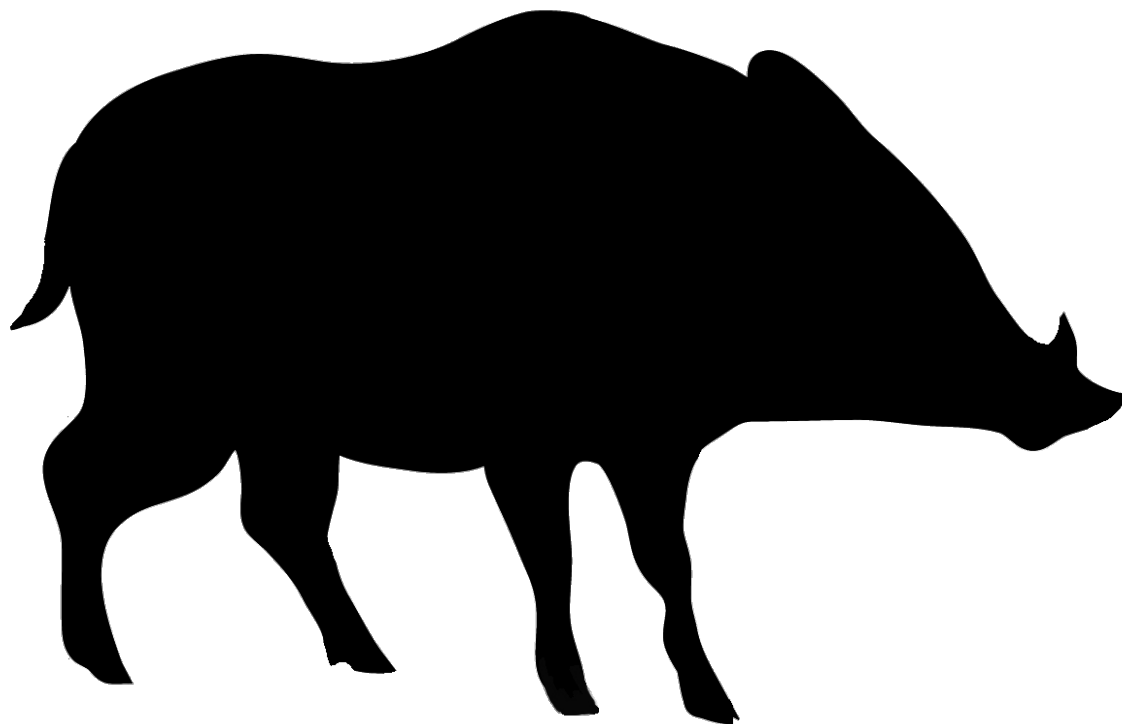


Rodents

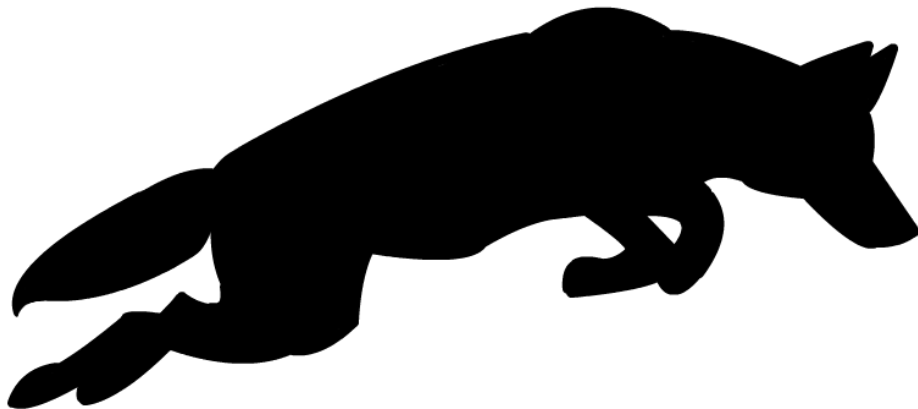
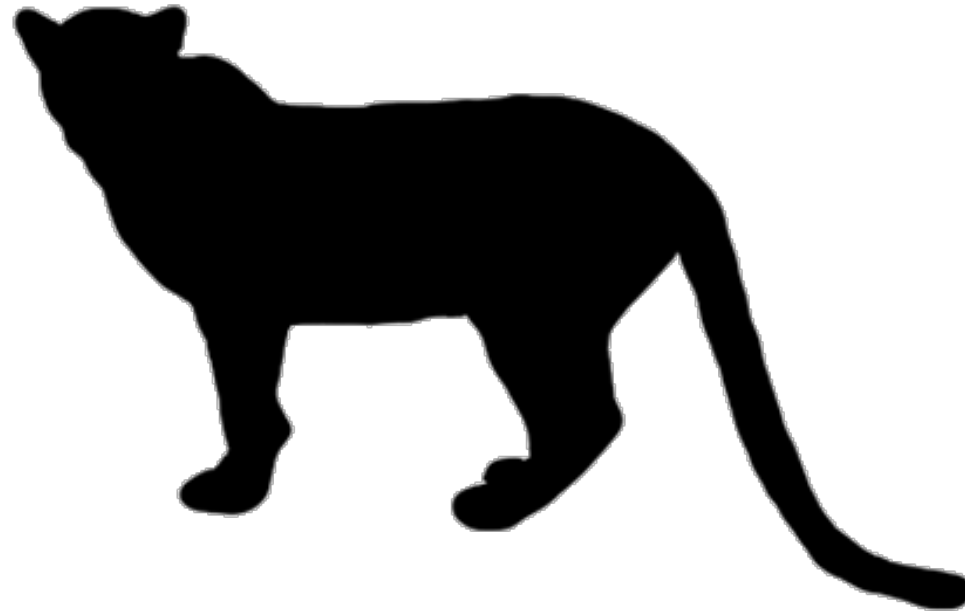


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Feral animals

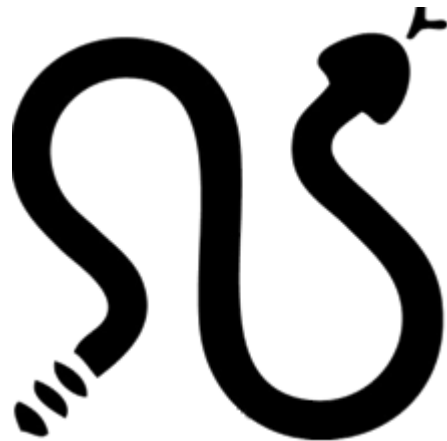
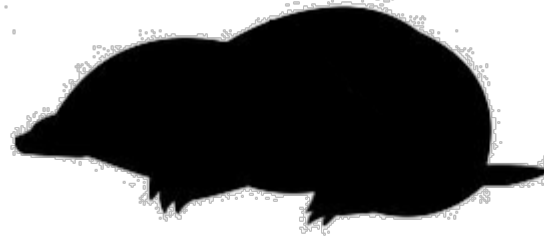


Carnivores



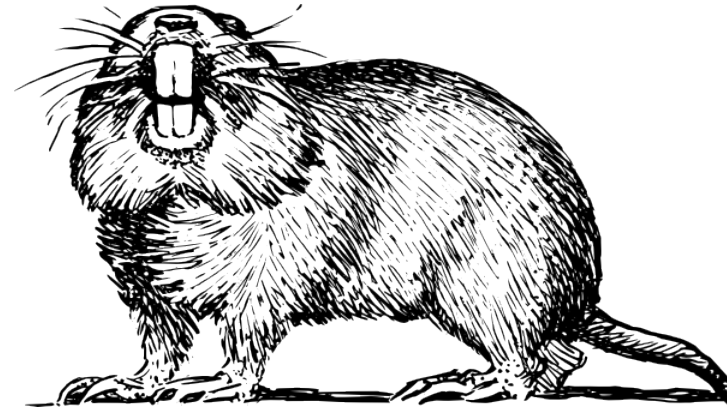


Other????



Why do we control vertebrate pests?

- Rodents and other vertebrate pests can damage
 - Buildings and structures
 - Landscapes
 - Crops
 - Food
 - Clothing
 - Documents
 - Electrical wires/boxes



Rodents Damage Cars By Chewing Electrical Connections: Tips On How To Avoid Costly Repairs

October 6, 2011

By George Gombossy

I am not a vegetarian, but would be if I had to kill what I ate. I even brake for skunks. But after having two of my car's electrical systems chewed up my mice, I am more than happy to kill the little rodents.

The second time was in September when the dreaded Check Engine Light came on my 2010 Honda Pilot. No big deal, I thought, since it was still under warranty.

Took the car to Hoffman Honda in Avon, where I discovered it was not a minor matter. Mechanic Steve Moreau checked his diagnostic tool and found that one of the sensors – a crucial one impacting the catalytic converter – was shot.

He



- It is estimated that rodents cause 128,000 house fires a year!







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Raccoon proof trash cans



Why do we control vertebrate pests?

- Disease
 - Rat bite fever
 - 4,000 people a year, mostly young children.
- Asthma
 - Urine, saliva and dander of rats and mice can trigger asthma attacks
- Salmonella



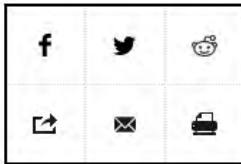
Disease



Cat Disease Threatens Endangered Monk Seals

On the beaches of the Hawaiian islands, monk seals are dying from a pathogen in cat feces that is carried to the ocean in polluted runoff and sewage

By Teresa Dawson, Environmental Health News on December 7, 2010 5



FERAL CAT TRAPS SET TO STOP SPREAD OF TYPHUS IN OC

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May 25, 2012 12:00:00 AM PDT

By Subha Ravindhran and Eileen Frere

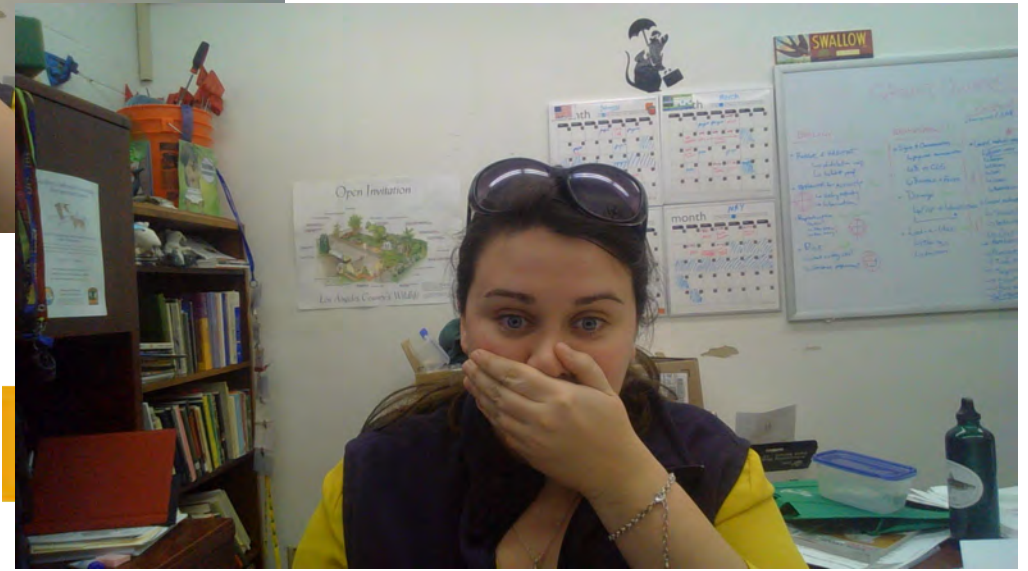
SANTA ANA, Calif. -- Feral cats near two Santa Ana schools are being corralled Tuesday as part of an effort to stop the spread of typhus, a potentially deadly disease.

Vector Control officials set traps near El Sol Science and Arts Academy and Frances Willard Intermediate School. Authorities believe the cats are hosts of the fleas that are infected with typhus.

Orange County officials believe the fleas caused a person living in the area to contract typhus. That person was hospitalized last month but has since made a full recovery.



My door is
always open
but.....



It is against the law to feed wildlife!

§ 251.1. Harassment of Animals.

14 CA ADC § 251.1

BARCLAYS OFFICIAL CALIFORNIA CODE OF REGULATIONS

Barclays Official California Code of Regulations [Currentness](#)

Title 14. Natural Resources

Division 1. Fish and Game Commission-Department of Fish and Game

Subdivision 2. Game, Furbearers, Nongame, and Depredators

Chapter 1. General Provisions and Definitions (Refs & Annos)

14 CCR § 251.1

§ 251.1. Harassment of Animals.

Except as otherwise authorized in these regulations or in the Fish and Game Code, no person shall harass, herd or drive any game or nongame bird or mammal or furbearing mammal. For the purposes of this section, harass is defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering. This section does not apply to a landowner or tenant who drives or herds birds or mammals for the purpose of preventing damage to private or public property, including aquaculture and agriculture crops.

Note: Authority cited: Sections 200, 202, 203, 355, 3800 and 4150, Fish and Game Code. Reference: Sections 200, 202, 203, 203.1, 207, 215, 220, 2000, 3800 and 4150. Fish and Game Code.

Songbirds dying at birdfeeders

by Dan Rademacher on January 08, 2013



pine siskin, *Carduelis pinus*. Creative Commons photo by Becky Gregory.



It is illegal to translocate wildlife

§ 671.6. Release of Animals into the Wild.
14 CA ADC § 671.6
BARCLAYS OFFICIAL CALIFORNIA CODE OF REGULATIONS

Barclays Official California Code of Regulations [Currentness](#)
Title 14. Natural Resources
Division 1. Fish and Game Commission-Department of Fish and Game
Subdivision 3. General Regulations
Chapter 3. Miscellaneous (Refs & Annos)

14 CCR § 671.6

§ 671.6. Release of Animals into the Wild.

(a) No person shall release into the wild without written permission of the commission any wild animal (as defined by Section 2116 of the Fish and Game Code), including domestically reared stocks of such animal, which:

- (1) is not native to California;
- (2) is found to be diseased, or there is reason to suspect may have the potential for disease;
- (3) may be genetically detrimental to agriculture or to native wildlife; or
- (4) has not been successfully introduced prior to 1955.

(b) no permission will be granted to any person to release to the wild state turkeys that have been domestically reared for propagation or hunting purposes, except as provided in subsection 600(i)(4) of these regulations. Only wild trapped turkeys trapped from the wild by the Department may be released into the wild.

(c) Every person who releases Barbary partridges, Turkish or Greek chukar partridges; French, Spanish or Arabian red-legged partridges; and/or bobwhite or coturnix quail into the wild shall have a valid permit signed by the director of the department before making such a release. Persons desiring to release such birds shall submit an application showing the number and sex of birds to be released, the location of the proposed release, and the proposed date of such release. At the time of release of such birds, the department may require that they shall be banded by the permittee with appropriate bands furnished by the department. The department may require a report giving the age, sex and number of the individual birds released.

(d) Application for the introduction of all non-native birds or animals, except those birds cited in subsection 671.6(c), shall be made to the commission on forms supplied by the department.

Note: Authority cited: Section 2120, Fish and Game Code. Reference: Sections 2116, 2116.5, 2118, 2118.2, 2118.3, 2118.4, 2120 and 2121, Fish and Game Code.

HISTORY

1. Amendment filed 1-23-78: effective thirtieth day thereafter (Register 78, No. 4). For prior history, see Register 75, No. 23.

Fish and Game Code § 465.5 (g)(1)

“ Immediate Dispatch or Release. All furbearing and nongame mammals that are legal to trap must be immediately killed or released. Unless released, trapped animals shall be killed by shooting where local ordinances, landowners, and safety permit. This regulation does not prohibit employees of federal, state, or local government from using chemical euthanasia to dispatch trapped animals.”

It is illegal to drown wildlife

Section 4004 (g) Fish and Game Code

“Kill any trapped mammal in accordance with this section by intentional drowning, injection with any chemical not sold for the purpose of euthanizing animals, or thoracic compression, commonly known as chest crushing. This subdivision shall not be construed to prohibit the use of lawfully set conibear traps set partially or wholly submerged in water for beaver or muskrat or the use of lawfully set colony traps set in water for muskrat”

Cruelty to animals

California Penal Code

§ 5969. Cruelty to animals. (a) Except as provided in subdivisions (c) of this section or section 5969.5, every person who maliciously and intentionally harms, mutilates, tortures, or wounds a living animal, or maliciously and intentionally kills an animal is guilty of an offense punishable by imprisonment in the state prison, or by a fine of not

.....cruelly beats, mutilates, or cruelly kills any animal....

less than ten thousand dollars (\$10,000), or by both the fine and imprisonment. (b) Except as otherwise provided in subdivisions (c) or (d), every person who overdrives, overloads, drives other overloaded, overworks, tortures, torments, deprives of necessary sustenance, drink, or shelter, cruelly beats, mutilates, or cruelly kills any animal, or causes or procures any animal to be so overdriven, overloaded, driven other overloaded, overworked, tortured, tormented, deprived of necessary sustenance, drink, shelter, or to be cruelly beaten, mutilated, or cruelly killed and otherwise having the charge or custody of any animal, either as owner or otherwise, subjects any animal to needless suffering, or inflicts unnecessary cruelty upon the animal, or in any manner abuses any animal, or fails to provide the animal with proper food, drink, or shelter or protection from the weather, or who drives, rides, or otherwise uses the animal when such use is, in every such instance, prohibited.

Vertebrate Pests and IPM

- Identification
 - Damage
 - Biology
- Management
 - Exclusion
 - Sanitation
 - Repellents
 - Trapping
 - Toxic baits
 - Fumigants



Identification

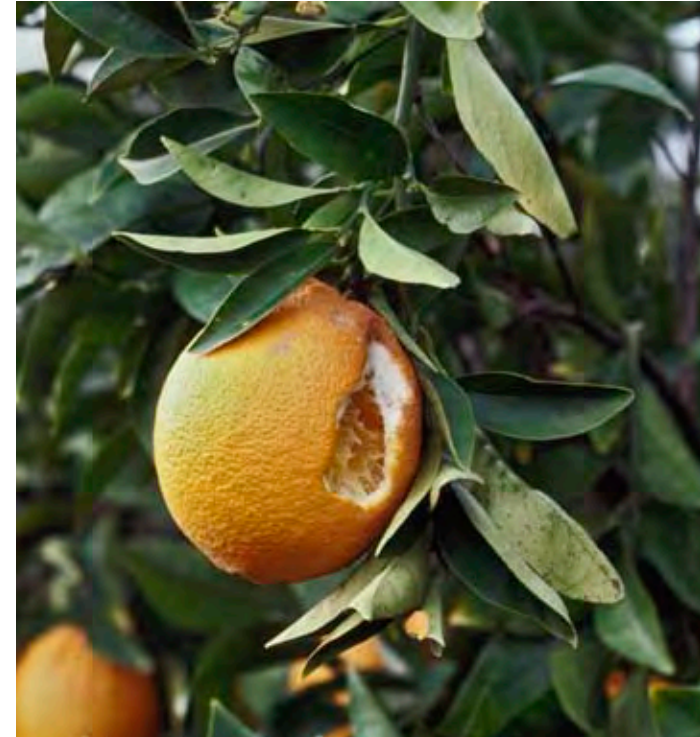
- Know your pest
- You can't manage what you can't measure



Damage



Damage



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Damage

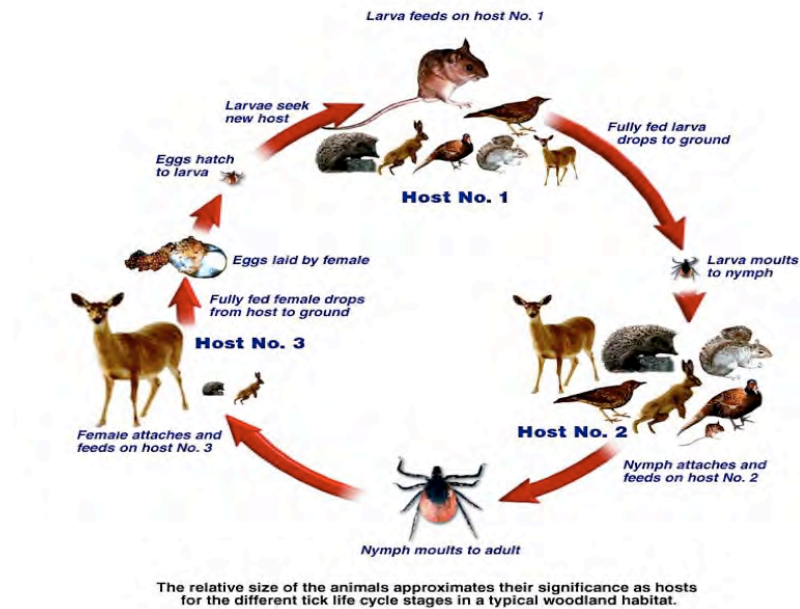


Damage

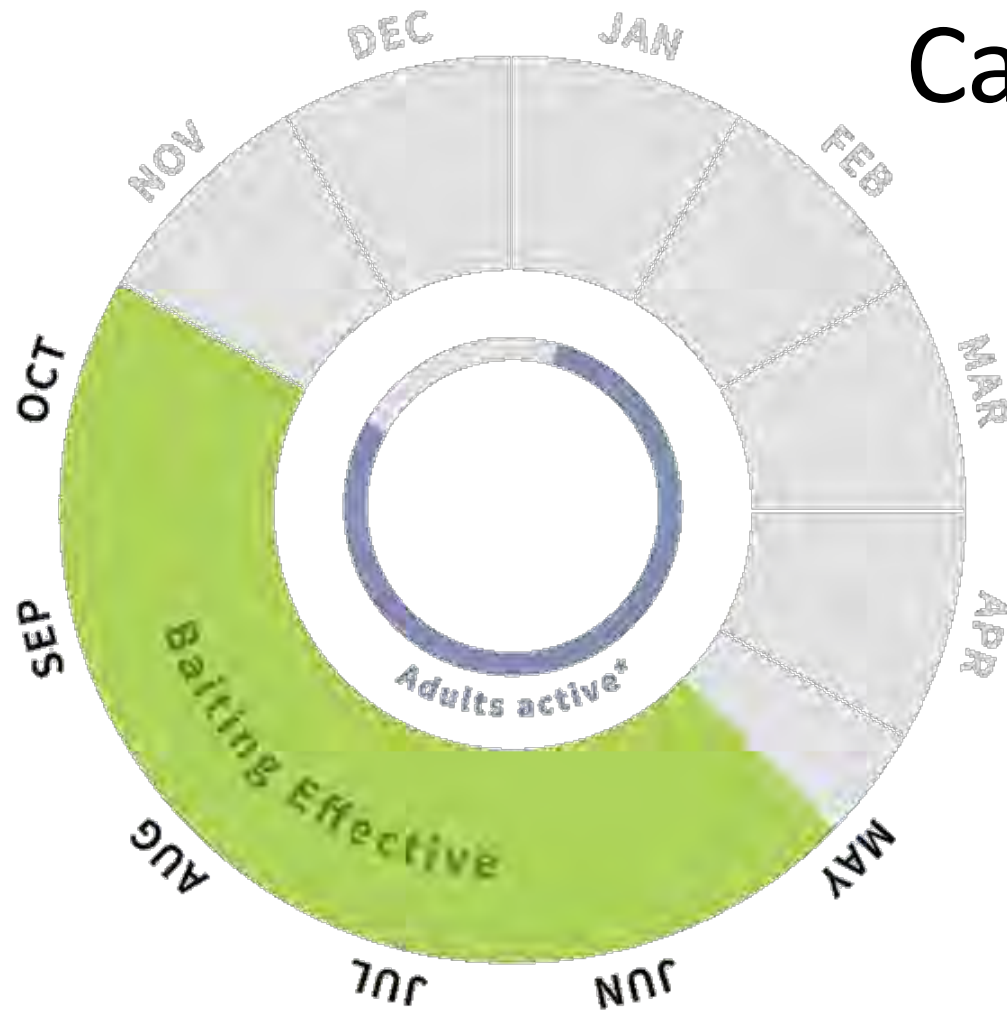


Biology

- Activity
 - Active night or day
- Niche level
- Neophobic
- Life cycle
- Diet



When is baiting effective?



California ground squirrel



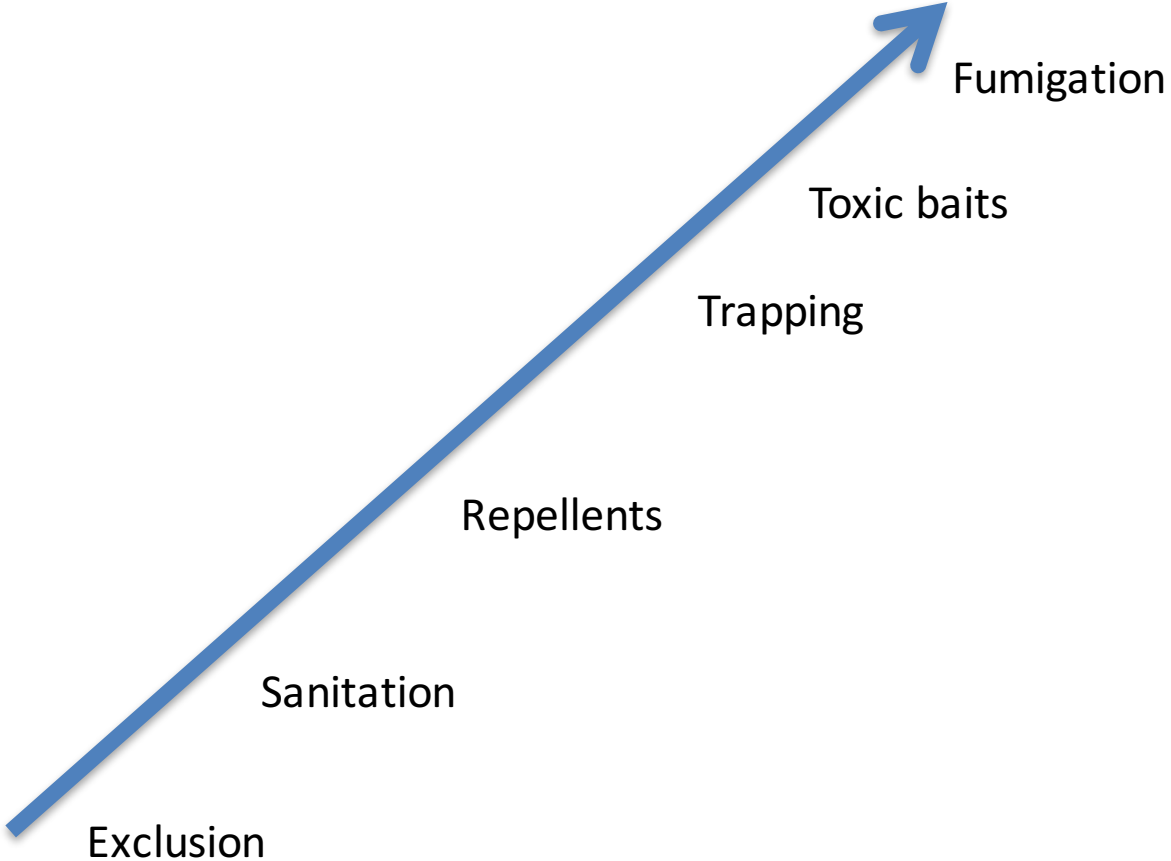
Effective

Ineffective

*California ground squirrel hibernation may differ by region

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Management



OPOSSUM

Integrated Pest Management for Home Gardeners and Landscape Professionals

The opossum (*Didelphis virginiana*) is the only native North American marsupial. Marsupials are distinguished by their abdominal pouch used for carrying their young. The opossum is not native to California, but was introduced many years ago from the east coast of the United States and has now become well established throughout much of the state. It is about the size of a house cat, has coarse grayish fur, a pointed face, and hairless, rounded ears (see Fig. 1). With its long hairless prehensile tail, the opossum can carry things such as nesting materials and even hang upside down from a tree branch. Opossums are about 2 to 3 feet long, including the tail, and weigh up to 15 pounds. Males are usually larger than females. Their feet resemble hands with five webbed toes (see Fig. 2). All of the toes, except for the outer toe of the rear foot. Opossums are good climbers. The hind foot assists in climbing by grasping a branch or similar structure.

ranges that allow high populations to develop when food is plentiful. In its foraging, the opossum is a true omnivore, eating fruits, nuts, green plants, snails, slugs, frogs, birds, mice, and small mammals. It also eats meadow voles, mice, and other small mammals. Opossums often seem feeding on dead animals, a habit that makes them important in the ecosystem.

BIOLOGY AND BEHAVIOR
While their natural habitats are diverse, ranging from arid to moist and from open fields, opossums are commonly found near streams and take shelter in brush and dense vegetation.

CLIFF SWALLOWS

Integrated Pest Management around the Home
Cliff swallows are not seen on the ground. They are birds that live in mud nests built on the sides of buildings. They are common in California and are known for their ability to fly very fast. They are also known for their ability to catch insects in flight.



PEST NOTES

University of California
Agriculture and Natural Resources
Publication 74124
June 2005

DEER

Integrated Pest Management for Home Gardeners and Landscape Professionals

Deer are browsers and can eat almost anything. Physical exclusion is the most reliable method to prevent damage to gardens, orchards, and lawns from deer.



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RATS



Rats are one of the most troublesome pests in the home. They are known for their ability to gnaw through almost any material. They are also known for their ability to spread disease.

POCKET GOPHERS

One gopher can cause several thousand dollars of damage in a year. They are known for their ability to tunnel through the ground and eat crops. They are also known for their ability to spread disease.

WOODPECKERS



Woodpeckers will also peck at wood siding on a house. They are known for their ability to tunnel through wood and eat wood. They are also known for their ability to spread disease.

PEST NOTES

University of California
Statewide Integrated Pest Management Program
Agriculture and Natural Resources



PEST NOTES

University of California
Agriculture and Natural Resources
Publication 74116
June 2004

Know your pest

resources

What is missing?

- Feral cats 
- Canada geese
- Seagulls
- Wild turkey 
- Information on diseases of commensal pests

Vertebrate pests in San Diego County

- Rats and mice
- Gophers



Rats and mice



*Ola! Je suis Jaque.
I make ladies go crazy and dance on chairs.*

Ik ben that goed!





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What aspects of rodent biology make them so successful and difficult to control?

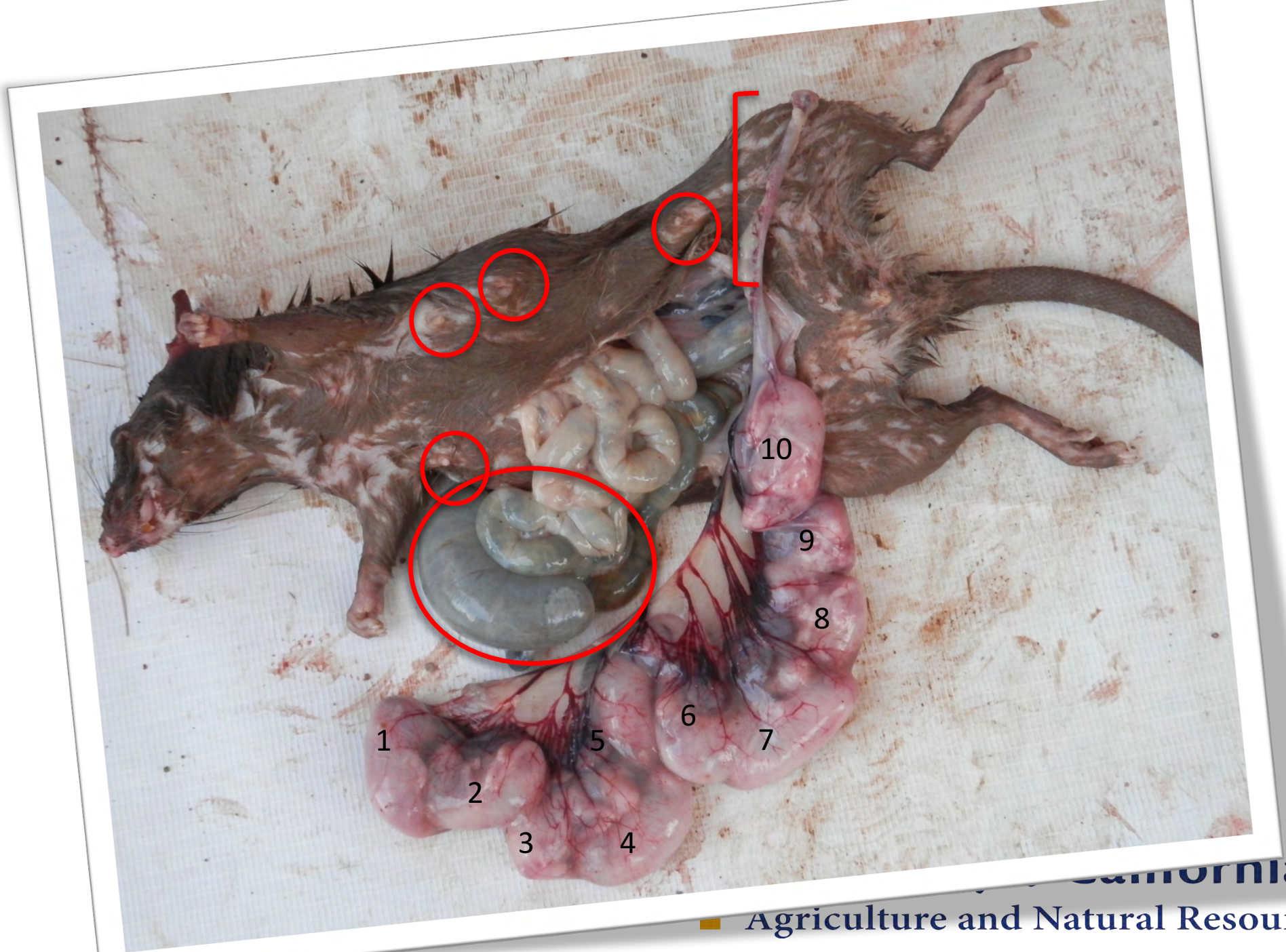
- Adaptability
- Diet
- Size
- Reproduction
- Behavior



Reproduction- Why are rodents so successful?



- Roof rat is slightly less prolific than the Norway rat
- Sexually mature at 12 weeks
- 5-8 young
- Adults live for 5-18 months





- One rat
 - Breeds 4 times in a year having about 8 pups per litter
 - $4 \times 8 = 32$
 - 50% are female and breed only once a year
 - » 8 pups by four females/litter
 - $8 \times 4 \times 4$
 - Plus the original 32 rats

160 rats!



Pa Tajar Burrows F
18/2/13





“Biowars”

Using biology to help control
commensal rodents