

Plant It and They Will Come:
Vertebrate Pest Management in
the Garden
and
Landscape



Which animals have fared well
with European settlement?
Which have not?

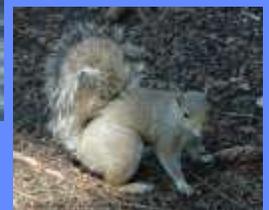


What's going on?



Historic development patterns and close contact between farms, natural areas and suburban developments have affected the distribution and types of animals found.

Introduced species



Fewer high level predators



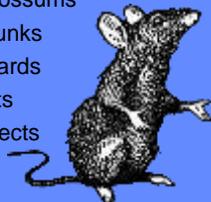
What is that Noise?:



The noisemakers could be

- Birds
- Regular mice
- Deer mice
- Wood rats (aka pack rats)
- Rats (two types)
- Ground squirrels
- Tree squirrels

- Chipmunks
- Raccoons
- Opossums
- Skunks
- Lizards
- Bats
- Insects



Why are they there???

- Food
- Water
- Shelter



General control strategies

- Physical exclusion
- Aversion strategies like repellents
- Landscape management
- Predator encouragement
- Non-lethal removal
- Lethal removal



Deer nibbling



Photo: Konrad Far North

More deer damage



Photos: Growing the Home Garden.com





Conifer damage

E. coli O157:H7 event with likely deer connections: Odwalla Juice

- Odwalla had been producing non-pasteurized juice.
- Juice was linked to a major E. coli outbreak.
- 65+ people affected, 12+ got kidney damage, and a child died.
- Source was contaminated fruit juiced at the Dinuba plant.
- Deer were suspected of contaminating windfall apples.
- They now flash pasteurize their juice products.



Photo: Business Insider

E. coli O157:H7 event with deer connections: Oregon strawberries

- In 2011, fresh strawberries produced near Newberg sickened 16+ people. One death & 4 with kidney damage
- Deer implicated in contamination
- Very challenging trace-back issues



A deer resistant landscape??

Available on-line for free – type exact title into search engine

Other lists e.g. in Sunset Garden Book

But deer don't read!!





Deer resistant gardens:

Lot's of nice plants but not much to for us to eat.

www.hiller.com.uk

Edible plants deer won't eat

- Winter squash plants (??)
- Potato foliage
- Fig leaves (but will eat figs)
- Persimmons
- Garlic story

Implications: These can be planted outside a deer fence



Herbs deer won't eat

- Rosemary
- Thyme
- Oregano & marjoram
- Mints
- Catnip
- Lavender
- Bay



Native plants deer won't eat

- Sitka spruce
- Grand fir (?)
- Cascara
- Vine maple
- Red elderberry
- Wild hazel
- Indian plum
- Pacific wax myrtle
- Rhododendron
- Red flowering currant (?)
- Salal
- Oregon grape
- Nootka/bald hip rose
- Wild strawberry
- Lupine
- Sword fern

More native plants

- Native columbine (?)
- Iris tenax
- Oxalis oregana
- Trillium
- Wild ginger
- Oregon ash
- Pacific yew
- Ceanothus (? but antler rubbing)
- Coyote brush (antler rubbing)
- Manzanita
- Madrone
- Bearberry



Other plants generally safe

- Smoke tree
- Japanese maple
- Korean dogwood
- Liquidamber
- Beech
- Some birch sp.
- Spruce
- Some oak sp
- Forsythia
- Honeysuckle sp.
- Clematis
- Rhododendrons
- Lilac
- Spirea
- Kerria
- English ivy (too bad!)

So what about roses?

- Most are preferred deer food
- Rugosa roses are less browsed
- It's all in the breeding (cultivars matter).



Hansa: top
Therese Bugnet: bottom



Temporary fish line fences rarely work very long

Conventional fencing

- Effective (if you close the gates)
- Long-lasting
- Expensive
- People/equipment movement slowed
- May lose some crop area
- Usually 7' tall
- Watch for ground dips



Dig It blog Eileen Schapiro



Electric fencing

- Much cheaper
- More active maintenance
- Psychological deterrent that some deer will breach
- Usually 6' tall
- Moveable/expandable
- Don't work without power
- Not guest friendly





Photo: JTA

Electric deer fences



Repellents

- Rotten things (rotten eggs, blood meal, ammonium fatty acids)
- Bitter or burn (capsaicin, quinine)
- Where the wild things are (cougar scat, etc.): complications can ensue



Using repellents

- Early and often
- Rotation
- Send animals to the neighbors as you change their behavior



More “rotten” repellents



Can you confuse deer?

- Radios- not useful
- Lights – not useful
- Sprinklers – yes with good planning



Technology marches on



Mole heaven





Moles are not rodents!!

They have sharp, earthworm slashing teeth. They rarely eat plants.

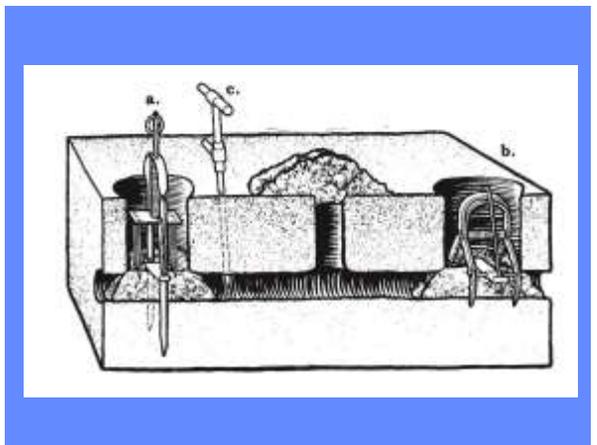


Mole damage:

- Excessive aeration
- Mounds
- Access for voles



Trapping moles
(don't try this
in Washington?)





Talpirid mole trap - use foot to set



Sold by Bell Laboratories to retail stores

Baits for moles

- Inconsistent results in Oregon (western). Possible issues with distribution of various baits
- Some evidence that this bait formulation is more effective. Uses bromethalin in a worm-like base with an attractant. Follow all label placement instructions!!



Less (or non) effective mole controls

- Gassing/flooding (rarely)
- Gum (any flavor)
- Mole plant (Euphorbia)
- Sharp objects
- Cat feces ??? Human health issues
- Sonic devices



Photo: TNC



Shrew mole *Neurotrichus gibbsii* Photo: J. Regan



Pocket gophers



Mole or Gopher mounds



Gopher vs mole

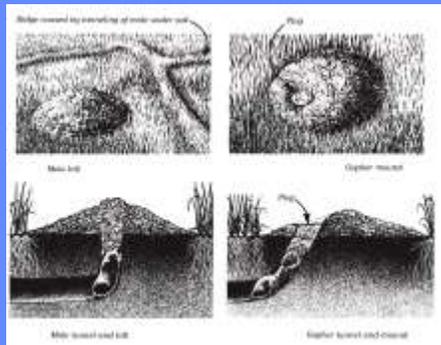




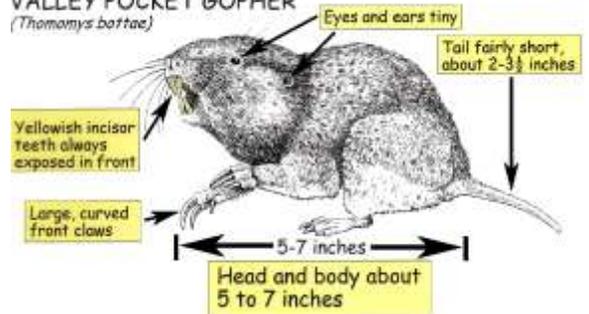
Photo: Marinrose.org

Gophers are rodents-note teeth.

They eat plants! Also irrigation systems.

They are a pain.

VALLEY POCKET GOPHER (*Thomomys bottae*)



USA1464143

Gopher damage

Roots are chewed off.
Gophers are vegetarians!!

Certain plants are favored
and gophers may move down
the rows.

Will go through plastic
irrigation pipe and T-tape.



Gopher control



Cinch trap

Other controls:
Gopher "gassers"
Gopher baits

The vole, also known as the meadow mouse





Vole facts

- Very high reproductive rate
- Field voles are not good climbers
- Average 25-100/acre but can exceed 1000-2000 in ideal conditions
- They don't hibernate and are active day and night



Vole damage

- Gnawed roots and bark of trees 6-8" above the soil line or below the ground.
- Like Malus, Prunus, roses and Emerald Green Thuja
- Worse after periods of snow.
- Edges near fields worse.
- Rodent tooth marks often evident.





Vole management

- Keep cover/vegetation down
- Tillage
- Plant vulnerable species away from field edges.
- Encourage predators?
- Traps (for small garden problems)
- Baits (**not many labeled & last resort**)



First-generation Anticoagulants:

- Warfarin, diphacinone, chlorphacinone
- Less acutely toxic than 2nd gen+
- More rapidly metabolized and/or excreted
- Multiple feedings needed
- Baits directly toxic to non-target animals. Can be moved by mice to unsafe locations. **Any rodenticide label must cover intended use – i.e. garden and/or residential. Read and follow label instructions.**

Bait stations

- Must keep non-target animals out. Pin down so it can't move. Dogs most at risk.
- Check often



The non-anticoagulant rodenticides (2 different chemical classes):

- Bromethalin
- Cholecalciferol
- Lethal dose from a single feeding
- Less likely to be retained in body tissues, therefore lower secondary risks to birds and mammals than anticoagulants



Vole predators



Coyotes



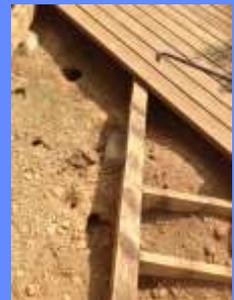
Photos by John Rakestraw

Ground squirrel (aka "grey digger")



Ground squirrel damage

- Prefer succulent vegetation and seeds. Will eat road-kill and insects
- Can eat roots
- Tunnels and holes undermine construction
- Will climb and create damage like tree squirrels (pictures to follow)



Ground squirrel management

- Reduce cover
- Bait (same cautions as for voles and gophers) plus problems with feeding locations.
- Trap
- Encourage predators

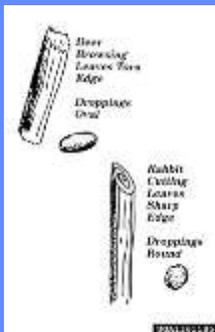


Rabbits

Includes jack rabbits, brush rabbits and feral domestic rabbits



Rabbit damage



Beaver



Beaver damage



Beaver



Beaver management

- Beaver on private property are now considered a nuisance rodent and can be removed without a permit.
- However, beaver create salmon smolt resting pools so work around them if at all possible.



Mountain
Beaver
aka
"Boomers"





Rats and house mice



Beatrix Potter

European house mouse

- Native of India
- Followed agricultural spread to Mediterranean (8000 B.C.), Europe, North America, and rest of world
- Damage crops
- Spread disease
- Damage wiring
- Cat domestication



House mouse

- Mature at about 6 weeks
- Can breed all year if warm
- Pheromones and ultrasonic communication
- Strong olfactory
- Fair climbers
- Use existing holes
- Don't like rats
- Easy to trap
- Exclusion



Deer mouse (*Peromyscus maniculatus*)

- Very common in Oregon, especially in rural areas
- Similar behaviors to the house mouse
- Vector of the hanta virus (inhaled viral particles from feces)
- Easy to trap
- Exclusion



Rat facts

- Major public health problem
- Vector a number of diseases
- Disrupt natural systems
- Direct injury by biting
- Damage to electrical wiring
- Very smart!



Norway rat (*Rattus norvegicus*)

- Largest of our rats
- Most widely found mammal in the world
- Adapted to cooler climates: N. China origin
- Well-adapted to urban environments.
- Very smart!!!
- Omnivorous
- Disease vector



More on Norway rats

- Not a great climber (in comparison to the roof rat)
- Ultrasonic calls
- Preferred foods: Mac & cheese, cooked corn, and scrambled eggs
- Least favorite foods: peaches, raw beets, raw celery
- 1.3 Norway rats/person in Great Britain

Roof or black rat (*Rattus rattus*)

- May have been in prehistoric Europe, then disappeared in the Ice age.
- Thought to have originated in Southeast Asia
- Got to Italy via trade with India and/or Egypt



More black rat biology

- Preference for fruits and nuts but are generalists
- A danger to nesting birds
- Disease vectors
- Preference for warmer areas or cities (West and SE)
- More rural than Norway rats
- Great climbers
- Very damaging in some native landscape

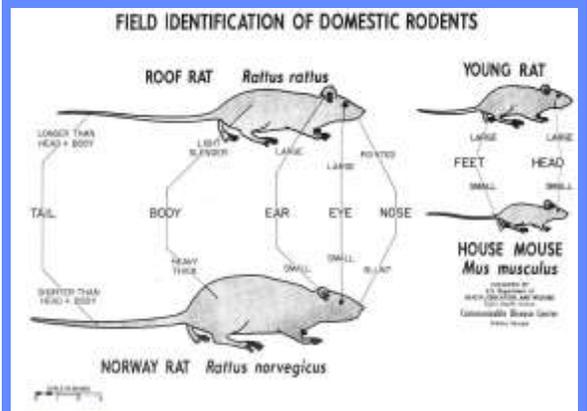


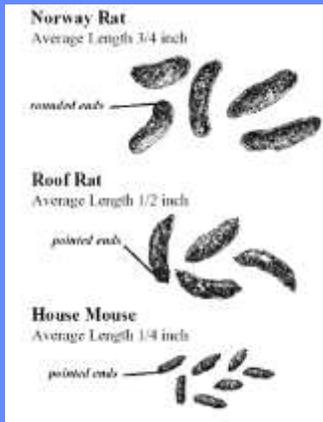
Pet (aka "Fancy") rats

- Highly inbred
- Lots of color and pattern variation
- Both Norway and roof rat versions
- May escape or be released
- Can vector diseases if exposed to wild rats



Bushy-tailed woodrat (also known as the pack rat)





Rat Olympics

- Can get through .5 inch opening
- Climb inside of pipes 1.5-4 inches diameter
- Climb outside of pipes 3 inches or less
- Climb outside of any pipe if against a wall
- There's more.....

More rat Olympics

- Jump vertically 36"
- Jump horizontally 48"
- Jump horizontally 8 feet if 15 feet up
- Drop 50 feet without injury
- Burrow > 4 feet
- Swim 1/2 mile
- Come up through pipes in houses

Still more

- Somewhat odd eyesight (independent eye movement)
- Incredible sense of
 - Smell
 - Hearing
 - Touch
 - Balance



Rat reproduction

- Mature in five weeks
- Peak breeding in spring and fall
- Estrus every three days until bred
- Generally 5-12 young
- Born 21-23 days after breeding
- No nursing estrus depression



It takes a village to raise some rats



Rat holes

- Generally 2.5-3.0 inches
- May connect to a shallow runway system with multiple openings.



Cover for rats

- Ivy
- Juniper
- Other "bulky" ground covers
- Debris piles
- Structures



Rats+cover+food



Rats/mice and compost



Compost pile with snakes as rodent control agents.

Rat gnawing

- Can get behind cabinets or interior walls and expand access.
- Can get through some metal and wire given time. Still is a barrier to entrance.



Rats and wiring

- Can be a major fire risk with electrical and cable connections
- Mice and squirrels also culprits



Exclusion is the best control (after you take away the food).

Mice can get through a hole the size of a penny.



Photos: www.batguys.com





Bait issues:

- Mice/rats die in wall or under house
- Non-target injury

However, rats get trap shy and baits may need to be part of the solution.

Bait must be labeled for home use! Follow label instructions!!

Bait stations

Douglas squirrel (aka Chickaree)



Two squirrels: one is native



Western grey squirrel



Eastern grey squirrel

Squirrel damage



More squirrel damage



More ground squirrel damage



Compare to sapsucker damage



Photo: antecopest.com

Raccoons

- Don't feed them!
- Very adapted to humans
- Nocturnal
- Vector diseases
 - Rabies
 - Balyascaris
 - Others
- Hurt pets
- Trash your house
- Dine from your garden, compost bin, hen house, or koi pond



Non-lethal removal

The basic live trap



Skunks

- Two species: spotted and striped
- Nocturnal
- Can be beneficial
- Management like raccoons:
 - Tighten
 - Food sources?
 - Smell deterrents
 - Sprinklers
 - Live trapping??



Skunk odor removal

- 1 quart hydrogen peroxide
- 1/4 cup baking soda
- 1-2 teaspoons liquid dish soap

Work thoroughly into dog or cat fur and then rinse. Not useful on insulation. Removal the only option.



Opossums

- Mainly nocturnal
- Not native to Oregon - moved from east of Rockies through California to Oregon by the early 1900's.
- Manage feed and cover
- Cyclic populations



Birds

- Starlings
- House sparrows
- Finches
- Swallows
- Pigeons and doves
- Woodpeckers
- Concerns
 - Droppings from roosts/nests
 - Disease and external parasites
 - Structural damage
 - Fruit loss
 - Strange noises



Starlings

- Introduced to NYC in 1880's. Moved across N. America
- Colonial roosting
- Fruit eaters
- Huge dropping load if nesting in street trees
- Prey on native birds
- Management
 - Try to run them from roosts (send them to the next town)
 - Cover fruit w/ nets
 - Encourage predators
 - Reduce other food sources (hard to do)





Bird Management Options

- Netting
- Propane cannons
- Bird alarms
- Repellents (no good ones, yet)





Swallows

- Very beneficial - great mosquito control
- Droppings
- Build specific places for them to nest
- Migratory



House sparrows and finches

- Very human adapted - rarely found in deep woods or wild areas
- Can nest outside or inside house in holes in wall. Tighten house.
- Droppings and bird lice
- Noises



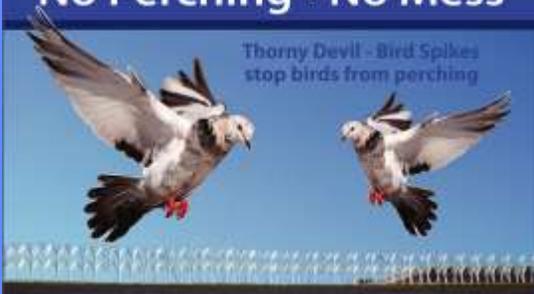
Pigeons (Feral rock doves)

- Eurasian species
- Farm and urban problem, mostly
- Droppings damage structures and cars
- Food contamination
- Management: Predators, roosting aversion techniques



Permanently keep roosting birds away
Healthier & Cleaner Living
No Perching • No Mess

Thorny Devil - Bird Spikes
stop birds from perching





Pileated woodpecker



Sapsucker



As with rats and mice, exclusion is the best control

Little brown bat migrates away November-February. Tighten up houses then

Bats next to chimney

Photo: www.batguys.com



Western Oregon bat house placement

- Where it warms up during the day – here cool temperatures are limiting.
- Twelve feet high or higher if possible.



www.attractbats.com