An integrated approach to managing burrowing rodents

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Species Identification (Ground Squirrels)

- Gray-brown fur with semi-bushy tail.

  Are social.

- Damage includes girdling of vines, chewing of irrigation lines, and abundant burrow openings.

Species Identification (Ground Squirrels)

- Squirrels are active throughout the day and are frequently visible.

- They prefer to burrow next to buildings, on field edges, and alongside fencerows and roadsides.

Species Identification (Pocket Gophers)

- Burrowing rodent about 6-8 in long; rarely seen above ground.

- Gopher mounds are plugged and often fan-shaped.

Species Identification (Pocket Gophers)

- They feed on taproots weakening and/or killing plants.
- Then can girdle vines below ground.
- Mounds can also kill plants, can create weed seed-beds, and can increase erosion.

Species Identification (Meadow Voles)

- Have dark grayish brown fur and are 4-6 inches in length.
- Populations tend to cycle, exhibiting irruptive growth patterns.

Species Identification (Meadow Voles)

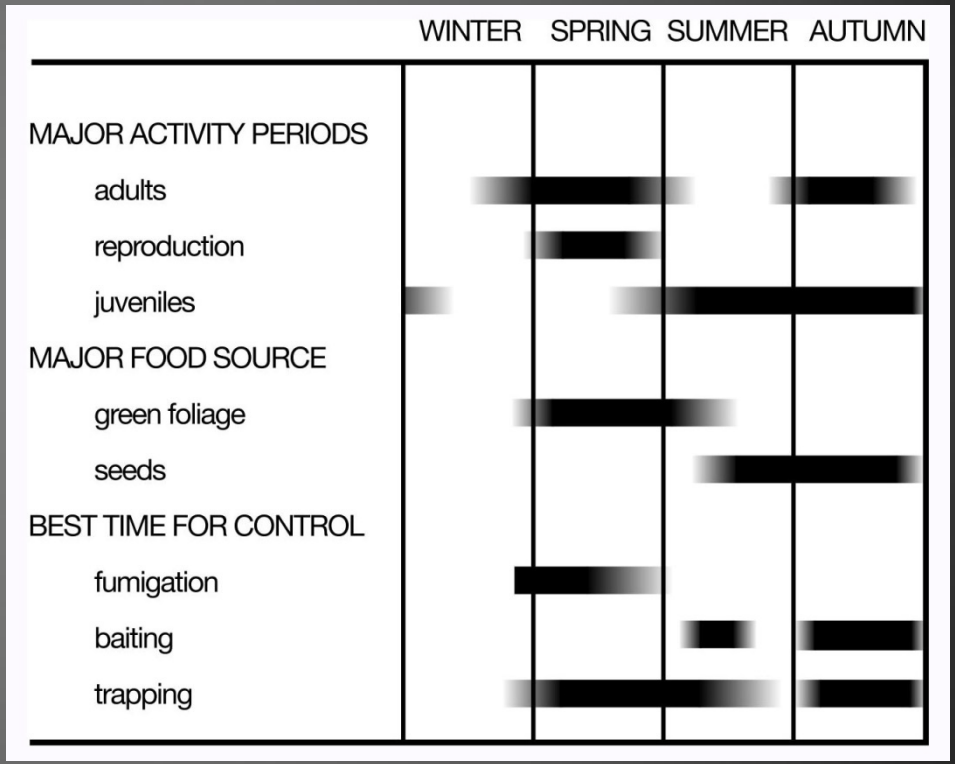
- Dig shallow burrows and leave well-worn trails. Fecal pellets are often present.
- Primary damage caused by girdling of stems, consumption of vegetation, and gnawing of cables, pipes, etc.

Current Control Strategies

- Currently, we focus on an integrated approach that utilizes a number of strategies and tools to control vertebrate pests.

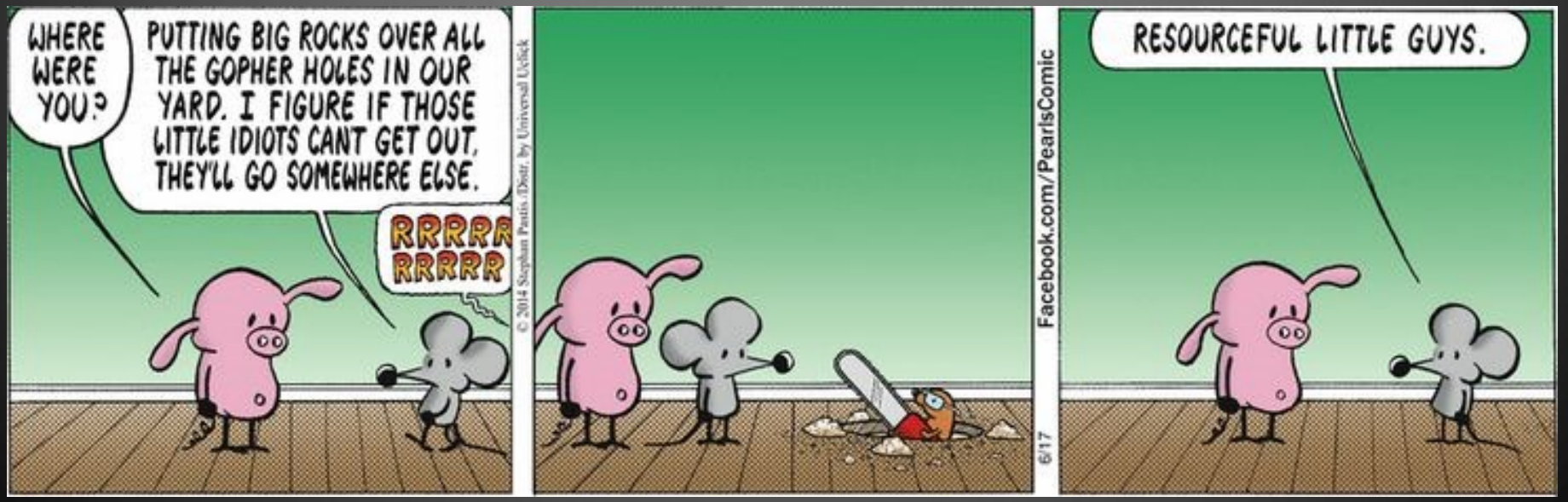
Importance of Biology/Ecology

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



What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Ground squirrel	yes	yes	yes	yes				yes
Pocket gopher	yes	yes	yes	yes		unknown		
Vole	yes	yes		unknown	yes			



Control Options—Biocontrol

- Natural predators have been used to control vertebrate pests.
- Owl boxes have shown some success for gophers; raptor perches appear ineffective for ground squirrels.

Control Options—Habitat Modification

- Involves altering habitat to reduce the desirability for pests.
- Example:
  - destroy old burrows
  - remove or reduce cover for voles

Control Options—Exclusion

Voles

- Tree protectors can eliminate damage caused by voles

Control Options—Repellents

Protec-T registered for use against pocket gophers in SDI

- ~41% reduction in gophers
- perhaps effective in reducing damage

Control Options—Trapping

Ground squirrels

- Body-gripping traps, tube traps, and box-type squeeze traps are common kill traps.

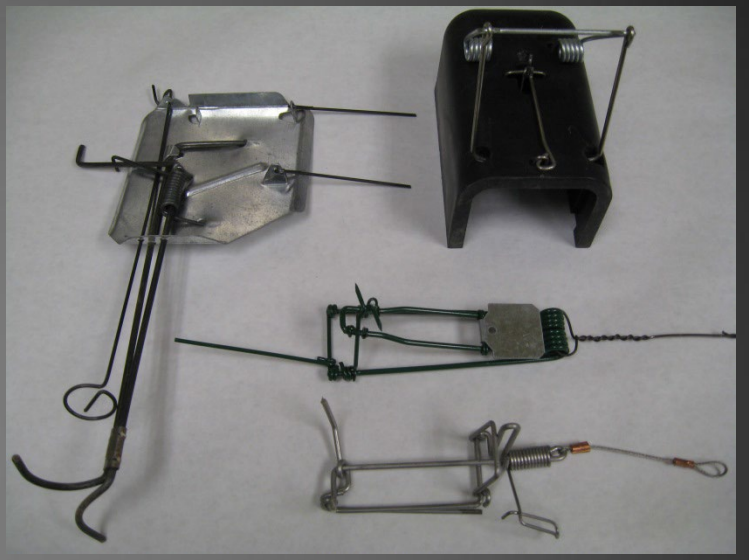
Control Options—Trapping

Ground squirrels

- Wire cage traps are common live traps.

- Live traps require euthanizing target animals.

Control Options—Trapping



Pocket gophers

- Gophinator trap was more effective.
- Covered sets yielded slightly higher capture rates in spring-summer, but not autumn.
- Efficacy was offset by setting time.
- We did not observe a difference in the number of captures across attractants.
- Human scent had no effect.

Control Options—Baiting

- Involves use of poison baits to control vertebrate pests.
- Essentially all restricted-use products except for a few homeowner options for gophers.

	Anticoagulants	Zinc phosphide	Strychnine
Ground squirrels	yes	yes	
Pocket gophers	yes	yes	yes
Voles	yes	yes	

Control Options—Baiting

Anticoagulants

- used for spot treatments, broadcast, or in bait stations

- require multiple feedings

Control Options—Baiting

Zinc phosphide

- is an acute toxin.

- potential bait shyness, therefore not reccomended with bait stations.

- can be used for spot treatments and broadcast baiting.

- not to be used in or around buildings.

Control Options—Baiting

Pocket gophers

- Strychnine works best.
- Use probe to find tunnel.
- Dispense bait in tunnel.

Control Options—Fumigation

- Involves use of poison gas in burrows to control vertebrate pests.
- Works best when soil moisture is high (late winter early spring for gophers and after ground squirrels emerge in spring).
- Fumigants should not be used around buildings.

Control Options—Fumigation

Gas cartridges

- Effective for ground squirrels (62–86% control).
- Not effective for gophers.
- Caution must be used to prevent fires.

Aluminum phosphide

- Highly effective for both ground squirrels (97-100%) and gophers (90-100%).
- Is a restricted use pesticide.

Control Options—Fumigation

Control Options—Fumigation

Species	Device	Authors	# of fields	Efficacy
Pocket gopher	PERC	Orloff	3	56%
Pocket gopher	PERC	Baldwin & Orloff	3	62%
Pocket gopher	PERC	Baldwin & Orloff	2	68%
Belding's GS	PERC	Orloff	2	76%
California GS	PERC	Baldwin	2	66%
California GS	PERC	Baldwin	2	100%
California GS	Cheetah	Baldwin	3	-7%

Control Options—Fumigation

Carbon dioxide

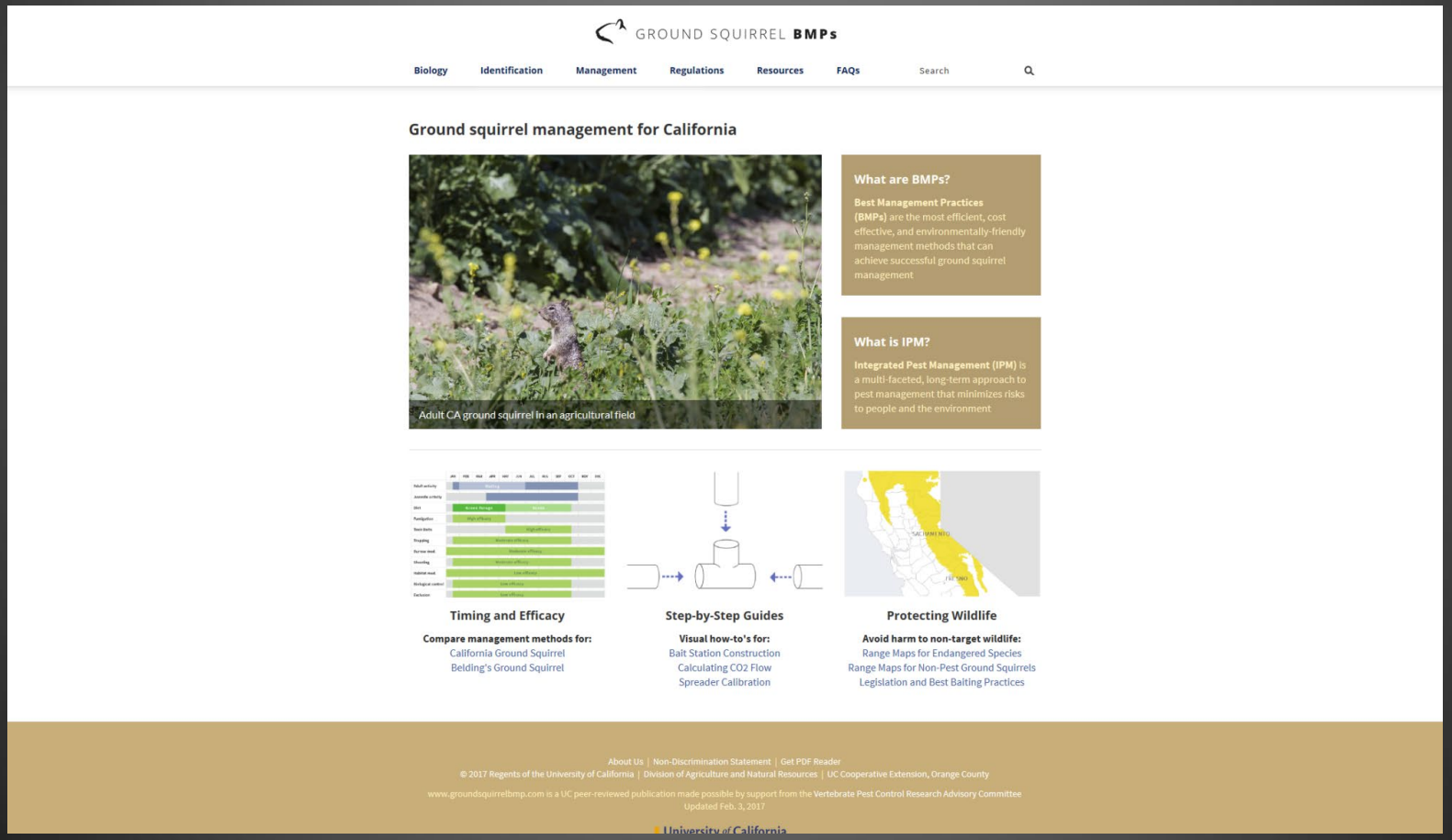
- The Eliminator by IGI, LLC recently approved for use.

Control Options—Shooting

- Shooting can be effective for controlling ground squirrels although it is labor intensive.
- Lead bullets are banned statewide.

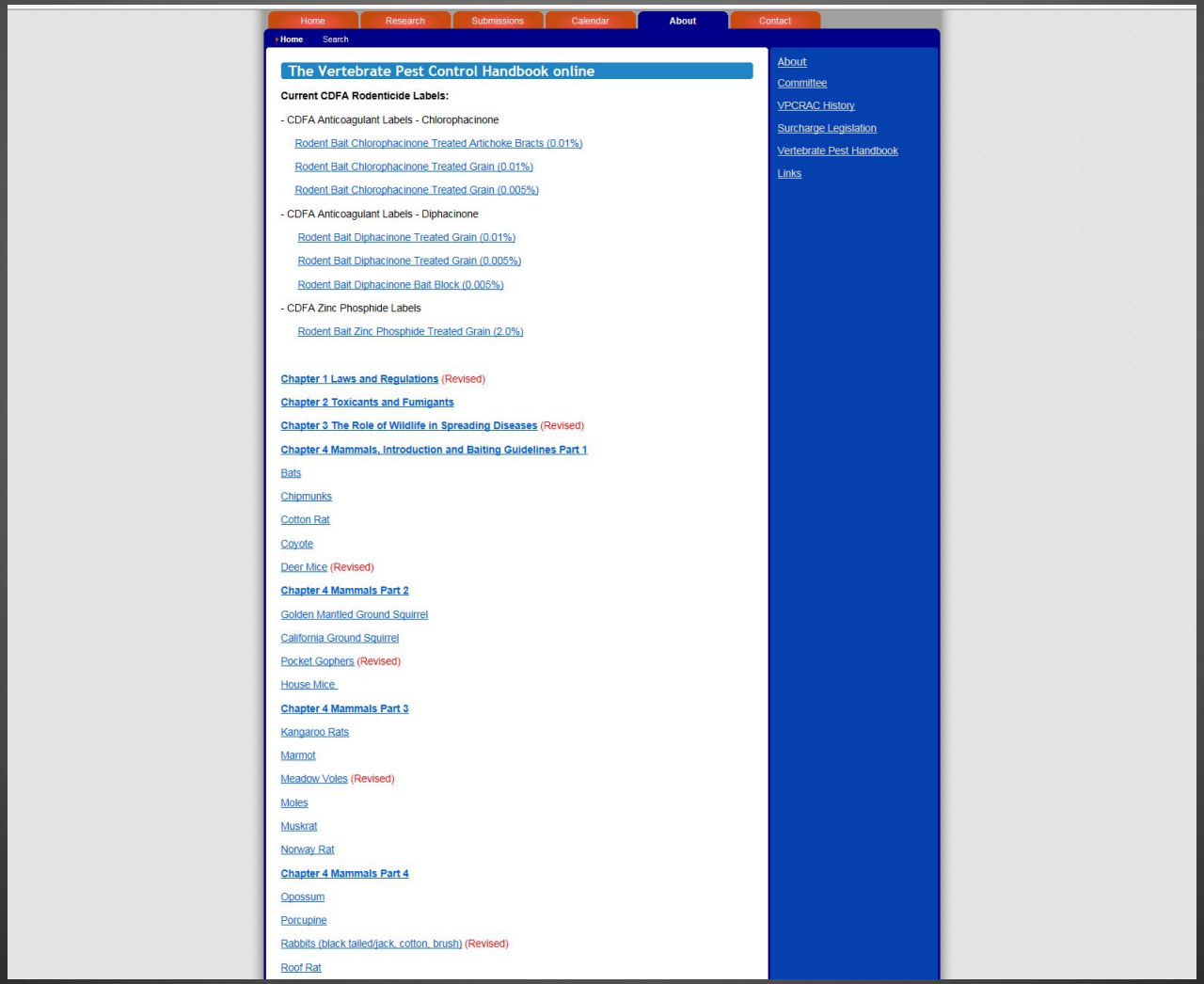
Ground Squirrel BMP website

http://www.groundsquirrelbmp.com



Vertebrate Pest Control Handbook

http://vpcrac.org/about/vertebrate-pest-handbook/




Questions?
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