

IPM for Wildlife

Urban Areas

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Agenda

Common Pest Species and
what we can do about them

1. CA ground squirrels
2. Gophers
3. Deer
4. Coyotes
5. Mountain lions



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1. CA ground squirrel

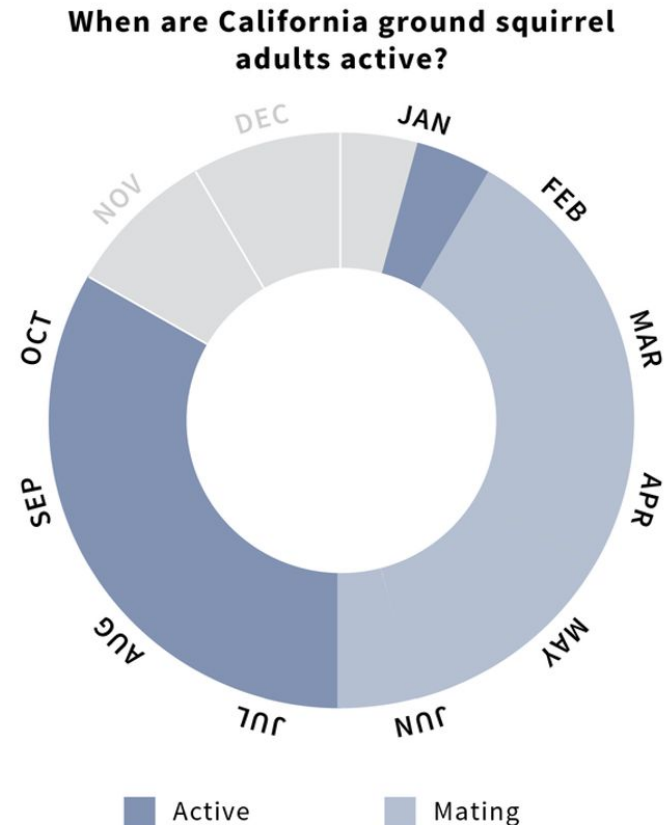


Current Control Strategies

Integrated approach

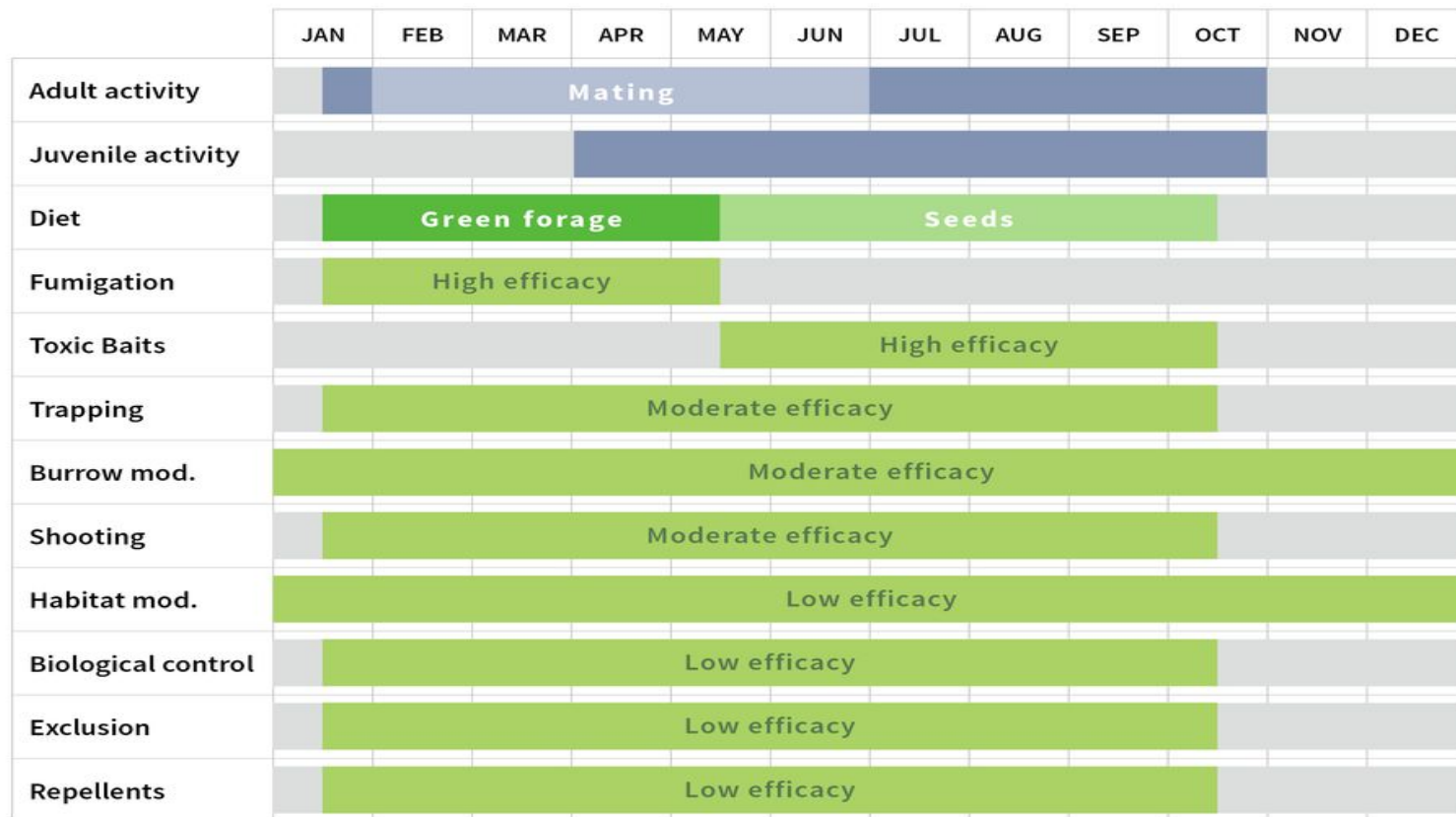
Decide on a threshold for action

Use ground squirrel biology/ecology to guide management decisions



California ground squirrel hibernation may differ by region

How to Time Management Efforts | California Ground Squirrels



■ Active
 ■ Feeding
 ■ Management window
 ■ Hibernation/Method ineffective

Note: Ground squirrel activity may vary by region. This variance may affect management windows.

www.groundsquirlbmp.com



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Endangered Species Considerations

Consider potential impacts on
endangered species

PRESCRIBE



Toxic Baits

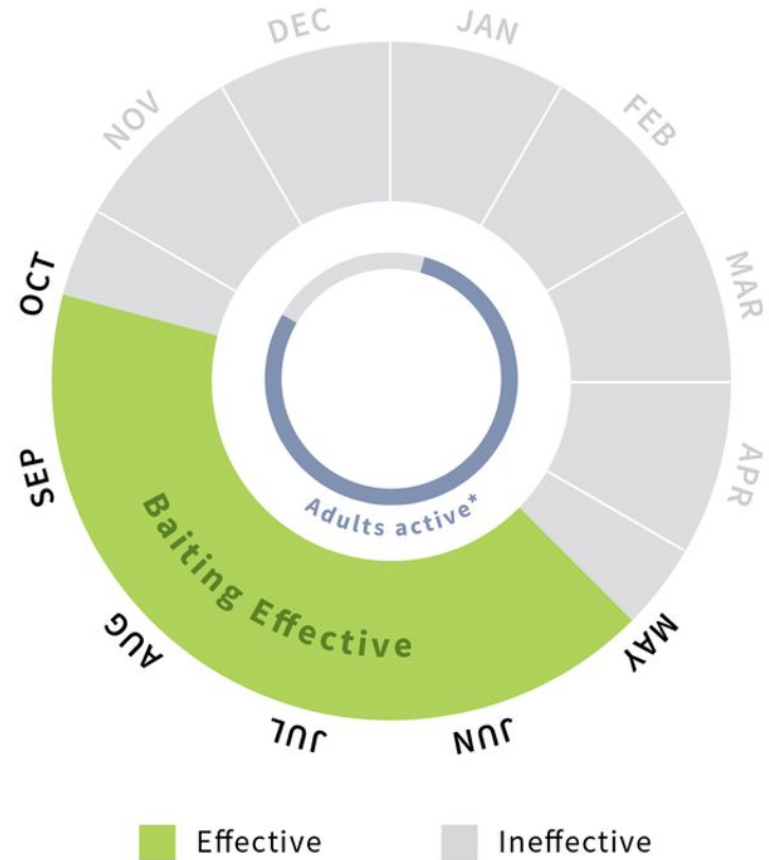
First generation anticoagulants

Diphacinone

Chlorophacinone

Acute toxicant (Zinc Phosphide)

When is baiting effective?



*California ground squirrel hibernation may differ by region

	FGARs	Zinc phosphide
Efficacy	Highly efficacious	Precipitation and other factors may influence efficacy
Bait acceptance	Good bait acceptance	Bait acceptance variable
Antidote	Antidote available	No antidote
Primary toxicity	Lower nontarget risk	Acutely toxic; risks can be high
Secondary Toxicity	Some potential for risk	Essentially no risk
Cost	Requires larger amount of bait, thus more expensive	Less expensive than anticoagulants
Time to death	Slower time to death than other toxicants	Short time from consumption to death provides quick control
Restrictions	<ul style="list-style-type: none"> • Available for residential use without restriction • Field use is restricted 	<ul style="list-style-type: none"> • Cannot generally be used in residential areas • Only one application allowed per year

Note for homeowners: FGAR options are limited for homeowner use. Some unrestricted products are available for use. Zinc phosphide can only be applied by licensed pest management professionals.

Rules and Regulations

Pesticides

Restricted materials permit

Required when applying a CA restricted material
(like Zinc Phosphide, Aluminum Phosphide)

Responsibility of owner of the property or
business operator

Applicator should check that the owner of the
property has the material listed on their permit



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Notice of Intent (NOI)

You must give a NOI to your County Ag Commissioner's Department at least 24 hours before application of a restricted use material

The applicator has up to four days after the planned application date (date on notice) to begin the application

If pesticide application is not started within four days, a new NOI must be filed



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Written Recommendation

Required if a pest control company is doing application for you or if applying on public land (any production or non production ag site)

Done by a Pest Control Advisor

One copy of each such written recommendation shall be signed and dated and shall be furnished to the owner of the property prior to the application

ALWAYS have a copy of the label with you!

[illegible]

Fumigation

Gas cartridges

Aluminum Phosphide

Carbon Monoxide

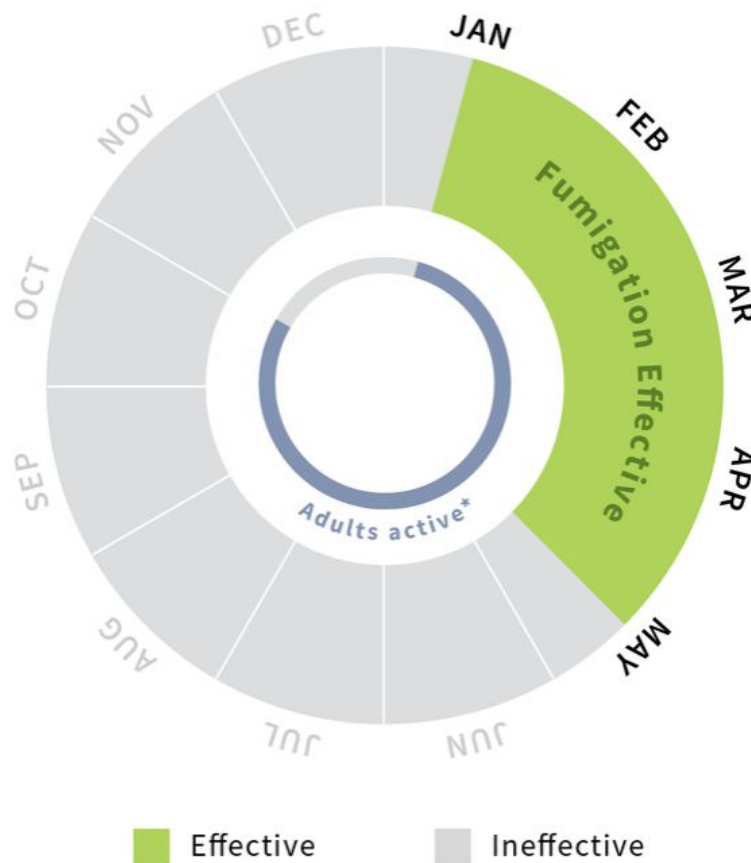
DANGER - PELIGRO
AREA UNDER FUMIGATION



FIELD NOT FOR USE
DO NOT ENTER - NO ENTRE

FUMIGANT: _____
REGISTRATION NO: _____
IN CASE OF EMERGENCY, PLEASE CALL: _____
(24-HOUR RESPONSE)

When is fumigation effective?



*California ground squirrel hibernation may differ by region

Carbon monoxide machines

Potential Advantages:

- Safer to use

- Multiple applications

Downsides:

- Expensive

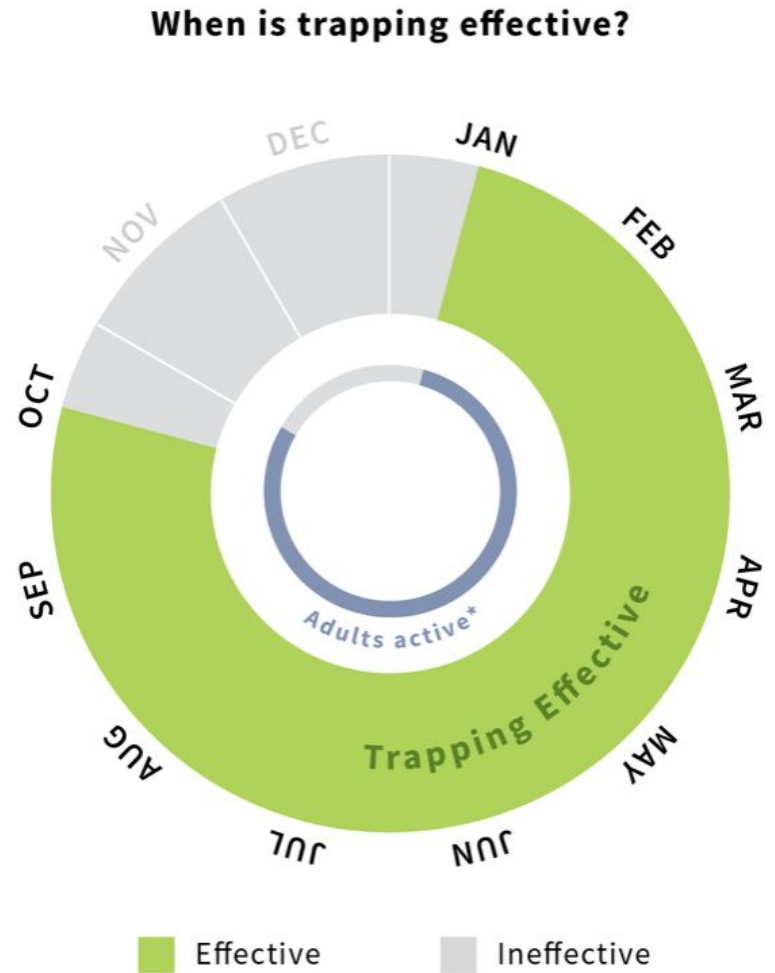
Keep eye out for new CDPR regs



Trapping

Control of small populations of ground squirrels is possible with traps

Effective during times of year when ground squirrels are not hibernating



*California ground squirrel hibernation may differ by region

Trapping

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

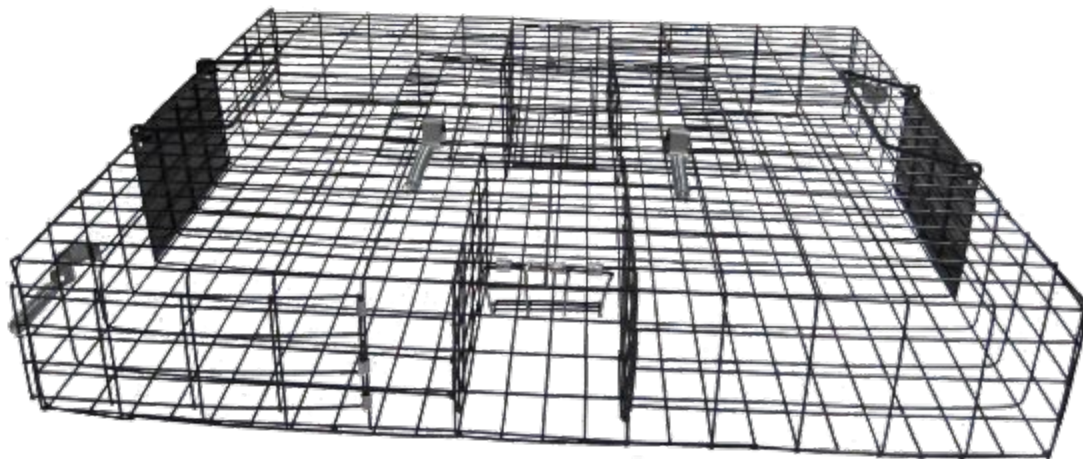
Wire cage traps are common live traps.

Live traps require euthanization of vertebrate pests. No drowning!

Wear gloves



Trapping



Trapping

Conibear traps can be placed at burrow entrances.

Conibear traps can also be placed inside boxes to bait ground squirrels in while excluding larger animals.



Control methods--Biocontrol

- Natural predators have been used to control vertebrate pests.
-
- Owl boxes are not appropriate for ground squirrels.
-
- Raptor perches appear ineffective.



Nontarget impacts of pesticides

Secondary exposure from anticoagulant rodenticides

Research on mountain lions by CDFW in 2016: FGARs detected in 73% of sampled mountain lions; SGARs detected in 92%

AB1788: Reevaluation of SGARs; many exemptions

2. Gophers



Typical Gopher Mounds



Gopher mounds



Mole mound



Management options

An Integrated Approach

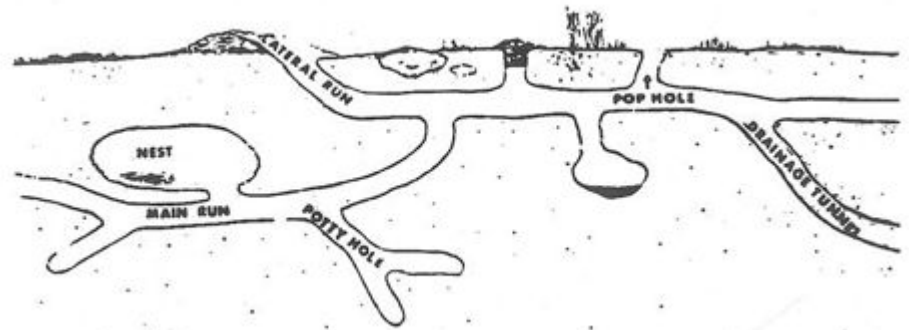


Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
✓	✓	✓	✓	✓	✗	✗	✗

Habitat Modification

Deep disking/ripping

Not generally an option in urban areas



Exclusion

Baskets around particular plants

Underground fencing

Hardware cloth

Wire mesh $\frac{1}{2}$ - $\frac{3}{4}$ inch



Baiting

- Mostly restricted use in CA (unless used by homeowner)

- Anticoagulants

- Zinc phosphide

- Strychnine

- Avoid in gardens with root veggies; only place bait underground

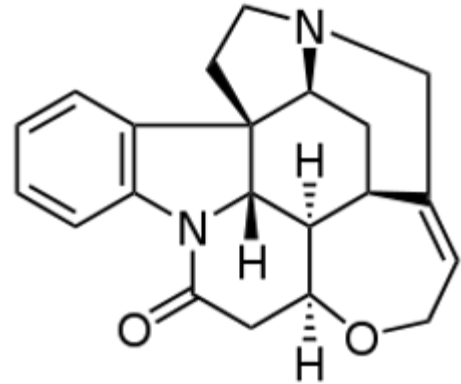


Anti-coagulant rodenticides

- Diphacinone and Chlorophacinone
- First generation anticoagulant rodenticides
 - Multiple feeding
- Use when worried about primary toxicity from other products
- Risks of secondary toxicosis
 - Low

Strychnine

- Acute toxicant
- Preferred bait for controlling gophers given its acute toxicity
- More palatable flavor than zinc phosphide
- Very effective
- Behavioral resistance to strychnine baits
- Current shortage of strychnine baits in the United States



Zinc Phosphide

- Need license
- Acute toxicant
- Can also be effective
- Gophers can develop bait shyness
- More readily available than Strychnine

Bait application

Using a bait probe or metal rod, probe 6-12 inches deep to locate the main tunnel.

Drop 1/2 cup (CHECK LABEL) into the tunnel and cover the hole so that no light enters the tunnel system.

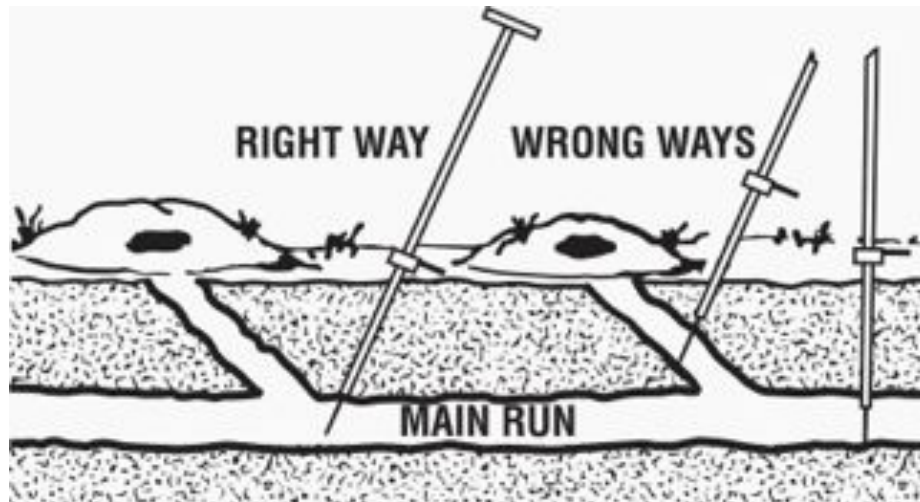
Make 2-3 treatments per burrow system (CHECK LABEL).

Maintain a constant supply of bait in the burrow system for as long as there is gopher activity.

Do not apply bait on the surface of the soil.

Bait application cont'd

Be sure that bait is in the main runway - not in the laterals or imbedded in the bottom of the runway.





Step 1. Open the burrow.



Step 2. Bait the burrow



Step 3. Close the burrow

Fumigation

- Gas cartridges

- Effective for ground squirrels (62–86% control).
- Not effective for gophers.

- Aluminum phosphide

- Highly effective for gophers (90-100%).
- Is a restricted use pesticide.

- Carbon monoxide

Fumigant	Efficacy (%)	Study
Aluminum phosphide	90	Baker 2004
Aluminum phosphide	81	Baldwin et al. 2016
Gas cartridge	17	Matschkte et al. 1995
PERC	56	Orloff 2012
PERC	56	Baldwin et al. 2016
PERC	68	Baldwin & Meinerz 2016

Trapping

RESEARCH

Macabee vs Gophinator

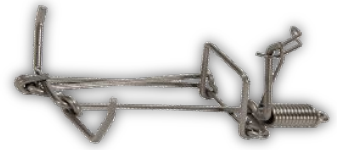
- Covered vs uncovered
- Attractant vs no attractant
- Trained vs untrained
- Gloves vs no gloves

Macabee vs. Gophinator

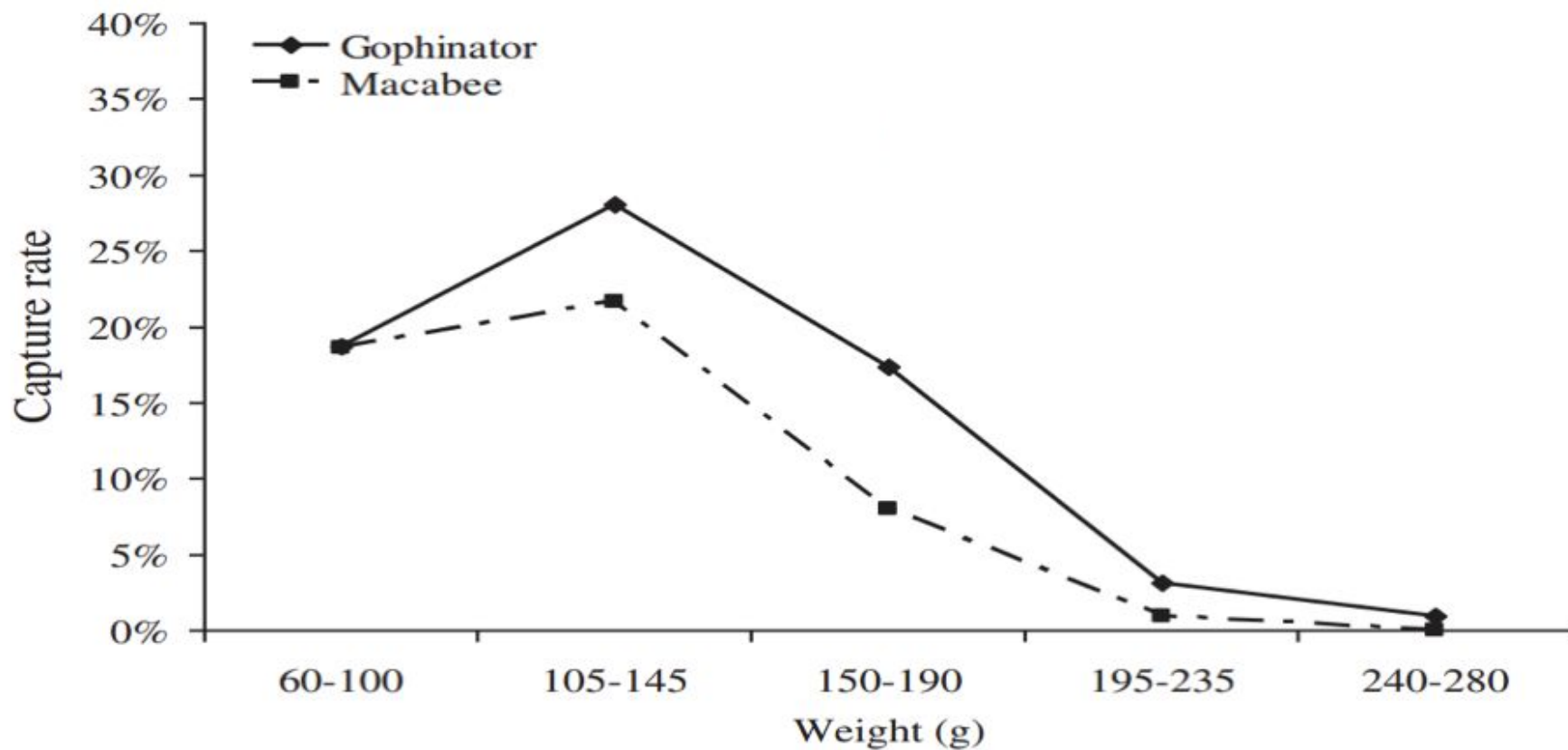


Gophinator

- Powerful trap
- Grips the animal high on the body
- Trigger arm offset to prevent upward pressure on gopher
- Rotating pincer arm that clamps to stationary arm
- More secure capture



Spring--Trap Type



Types of trap

- Turf damage

- Gophinator

- Maccabee

- Black hole and box

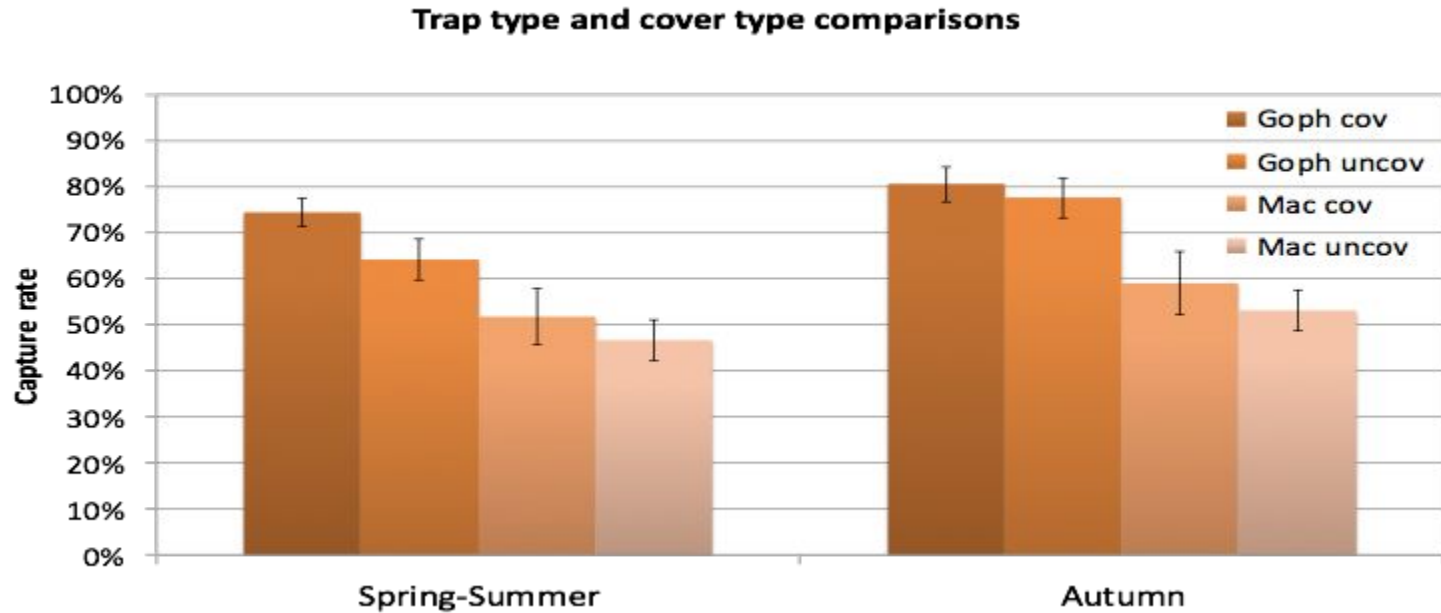
- Less turf damage

- Cinch trap

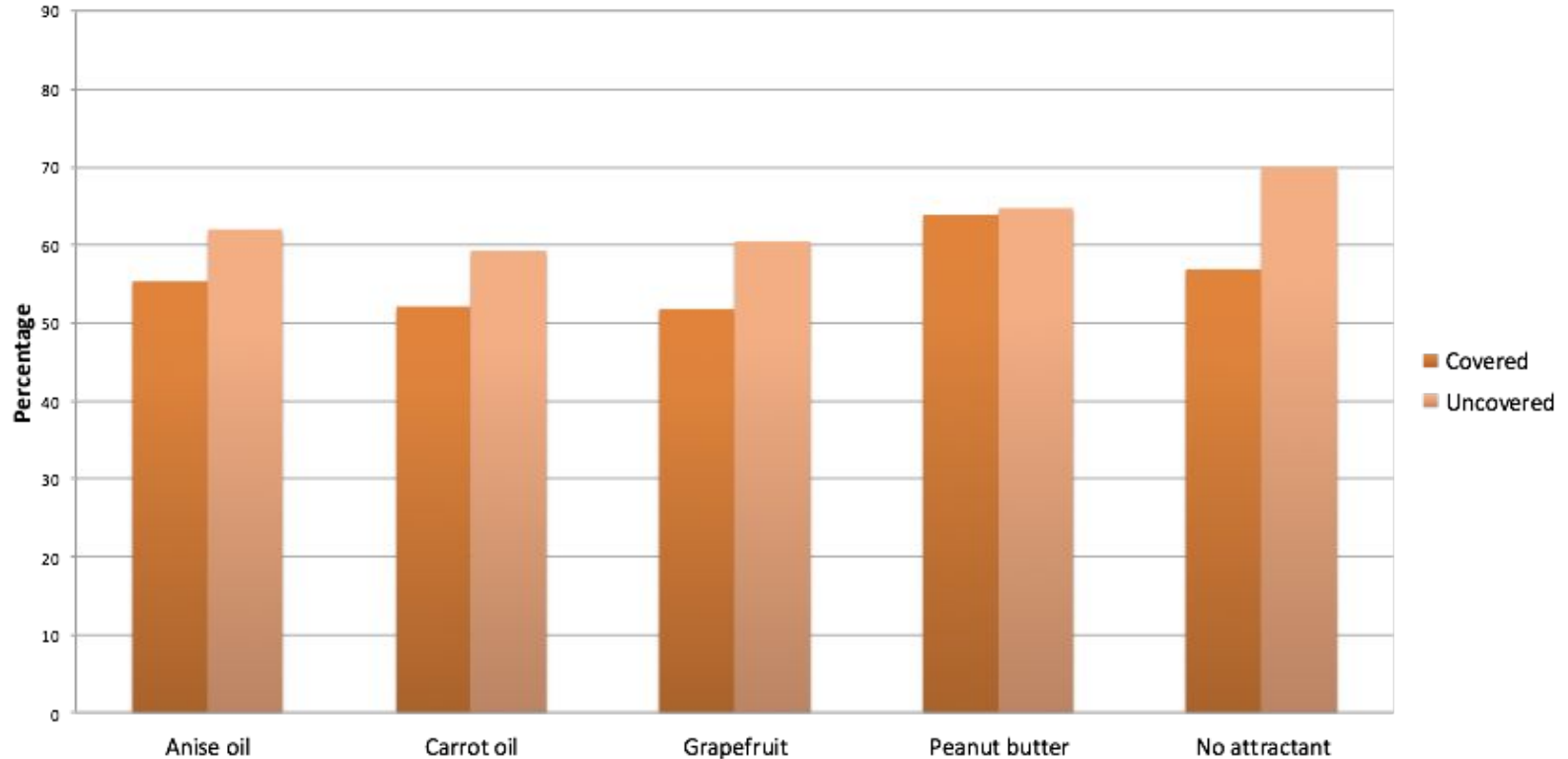
- Gopher Hawk

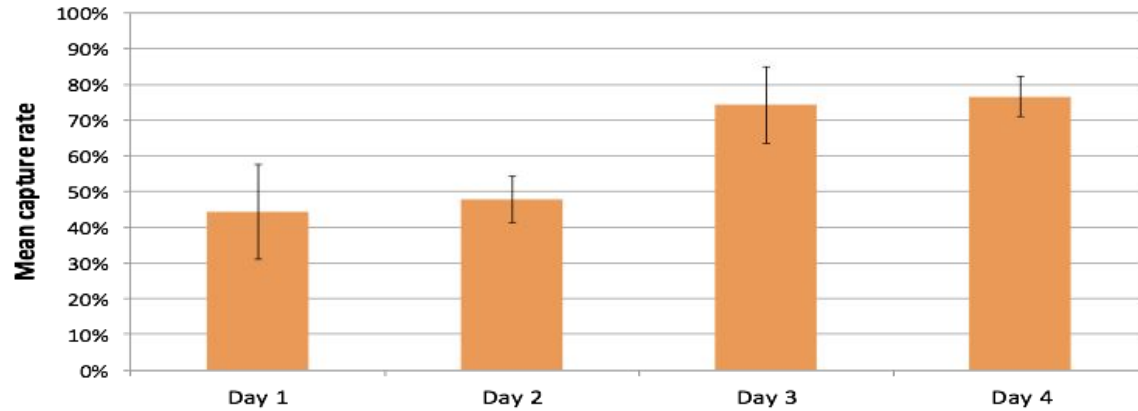
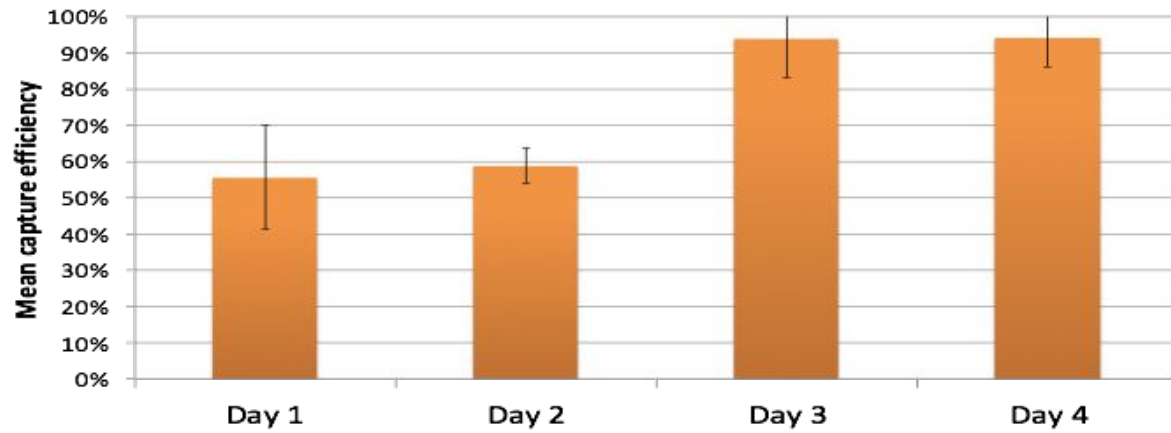


Covered trap vs uncovered



Attractant vs no attractant





Trained vs
untrained

Trapping cont'd

- Traps should be staked in the ground with a flag indicating the presence of a much larger hole
- Informing members of the community?
 - Could lead to vandalism of trap sets
 - Health and safety issues

Trapping vs. Fumigation

- Aluminum phosphide has a very short application time
- PERC machine allows for a lot more applications though due to the ability to treat multiple burrows
- Trapping and aluminum phosphide are more efficacious than the PERC machine.

- For small scale management efforts, Aluminum phosphide is very efficacious and cost effective
- For a greater number of treatments, trapping was the most effective management strategy
- However, in urban settings, Aluminum phosphide may not be permitted and trapping is an excellent alternative.

Trapping

- Materials

- Traps
- Probe
- Gloves
- Wire
- Flags
- Kneepads



- Active mounds
- Probe for tunnel
 - Watch out for back-filled tunnels
- Leave probe in mound
- Dig hole
- Examine burrows for
 - Size
 - Turns
 - Divides

3. Deer



Deer

Fencing (at least 8 feet high, made of wire or electrified; mesh or with low wire close to ground)

Bait electrified fence

Netting and tubing for seedlings

4. Coyotes



Coyote biology

Solitary or in packs

Territory size varies based on resource availability and sex

Lifespan: 8-10 years in the wild



Coyote biology

The ultimate opportunistic omnivore

Primarily small rodents and mammals

Also: vegetation, fruits, nuts, berries, insects, eggs, birds, amphibians, reptiles, carrion, deer, pets

Feral cat colonies



Coyote biology

Urban behavior

Generally shy around humans but in some areas have lost or are losing their fear of humans

When begin associating humans with food, may start acting aggressive

Coyote Reproduction

Breed once per year (Jan-March)

Excavate den but will use culverts, hollow logs, rock piles, etc.

Gestation ~ 60 days

Litter size avg 6

Pups born March-May

Coyotes may defend their den area from perceived threats

Coyote reproduction

Both first year male and females are reproductive

Can adjust litter sizes based on food availability and population density

When the public doesn't want their neighborhood coyote

It is illegal to capture and relocate wildlife in CA

Why not?

Moving animals only moves the problem

Disease

Territorial disputes

Unknown area, food sources, shelter

Remove attractants (**compost**, **bird seed**, trash, fallen fruit, pet food)

Remove ground-level shrubbery coyotes can hide in

Coyote Roller on top of fence; bury no-dig skirt for fence

Air horn, can with pebbles/coins

DO NOT RUN AWAY

If a person is attacked, immediately contact CDFW or law enforcement

Hazing?

5. Mountain lions

Proposed to be listed as threatened species



Protect livestock, pets from carnivores

Enclosed at night

Appropriate fencing

Motion Activated Alarms?

Foxlights?

Fladry?



Livestock guardian animals

Help protect animals during the day AND night



Selecting a Livestock Guardian Dog Puppy

By Dan Macon, *Livestock and Natural Resources Advisor (Placer-Nevada-Sutter-Yuba)* and Carolyn Whitesell, *Human-Wildlife Interactions Advisor (San Mateo-San Francisco)*

Adapted from "How to Select an LGD Puppy" by Bill Constanza, Livestock Guardian Dog Research Specialist, Texas A&M AgriLife Center



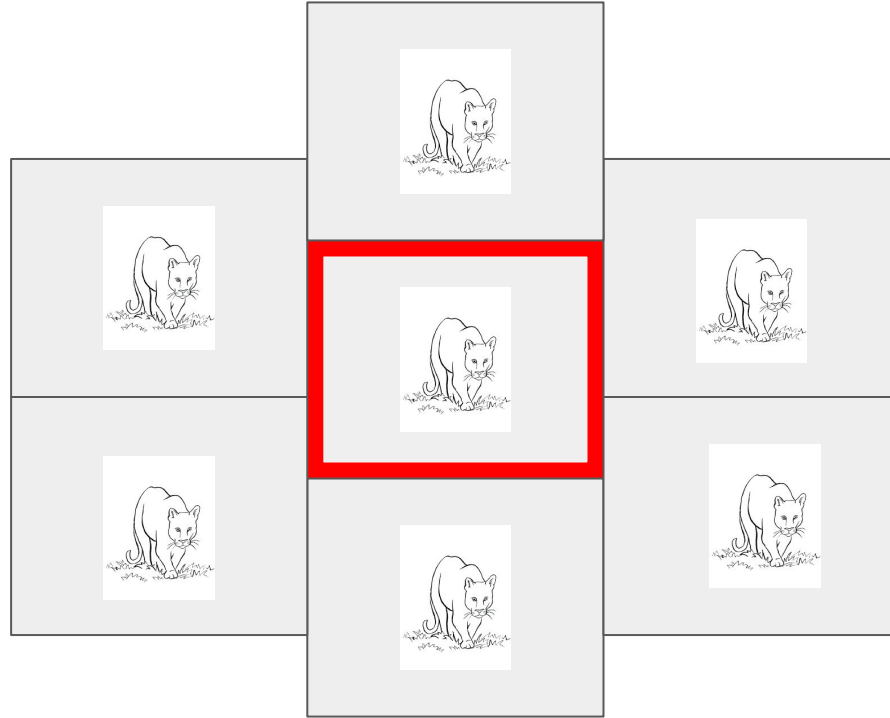
Which individual did it?

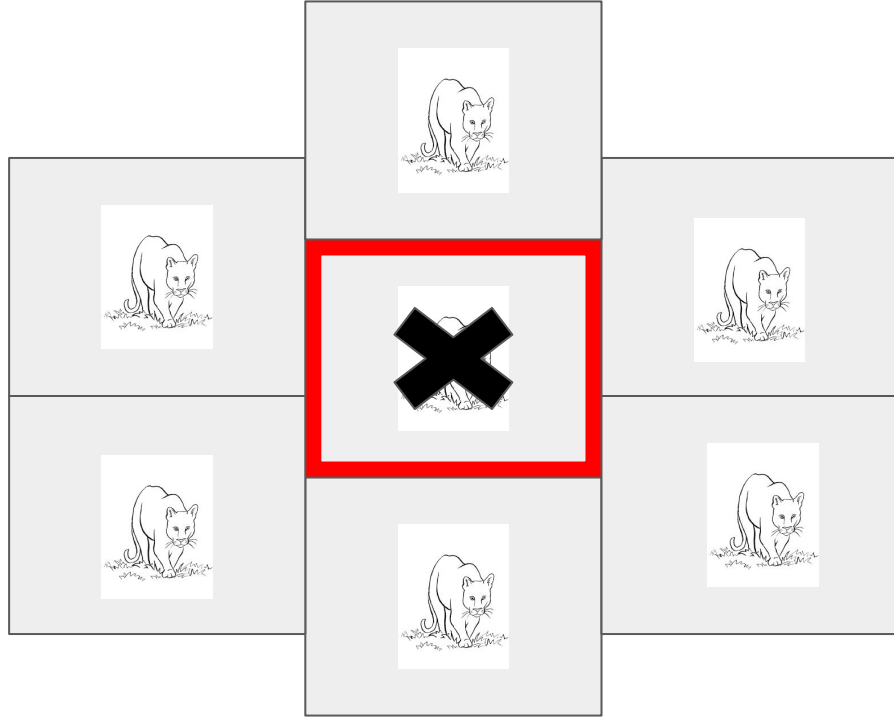


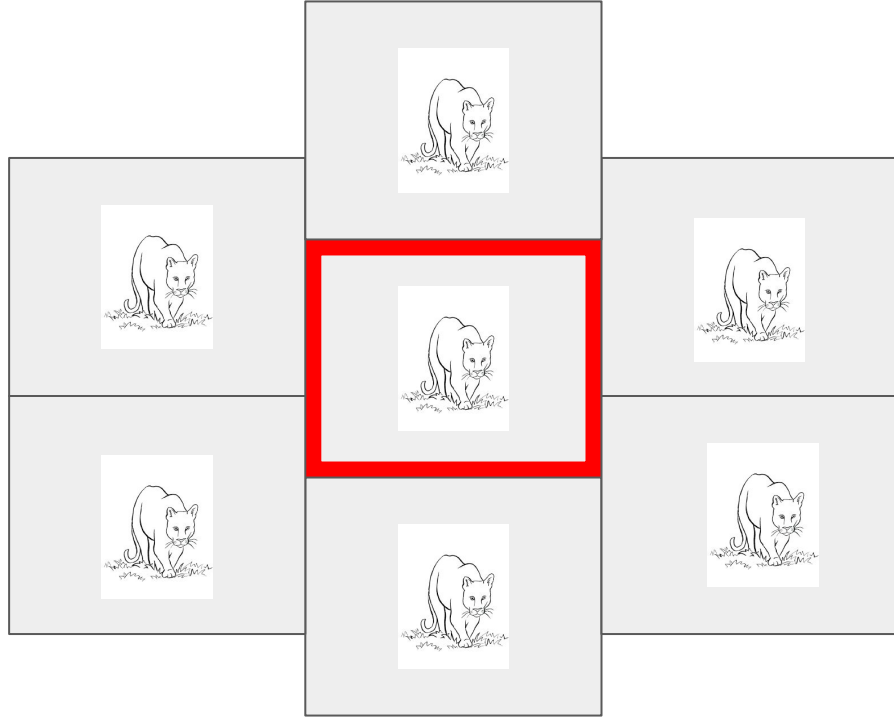
Effects of lethal control

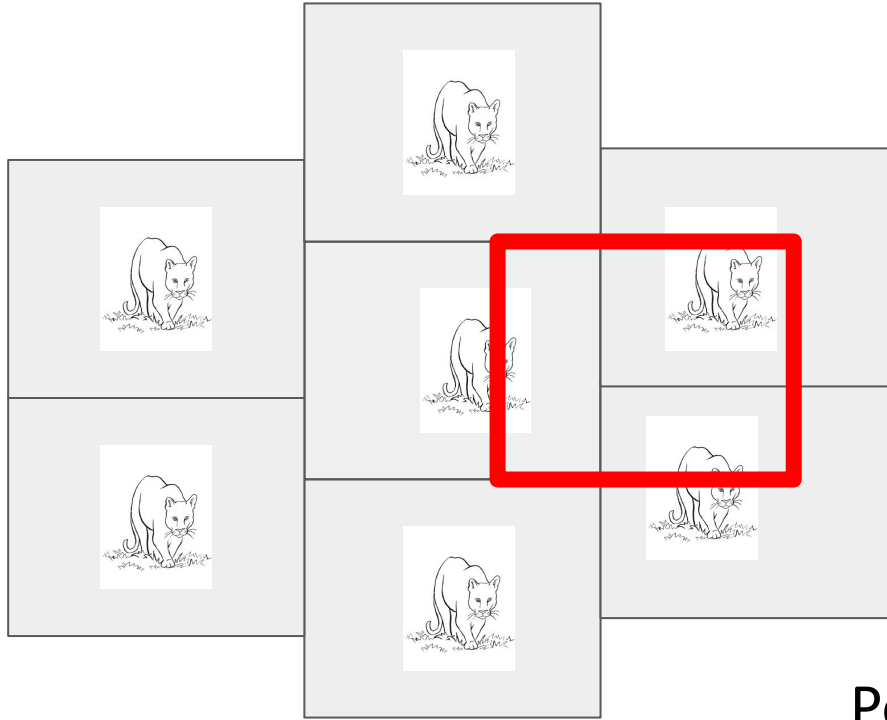
Biological perspective

Effects of lethal control









Potential unintended
consequences of altering
population dynamics

Thank you!

Questions?

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