



# Managing for beneficial raptors

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Attracting raptors to nest and hunt on farms can boost biological control of rodent pests.



Photos: Ryan Bourbour, Sara Kross, Jessica Schlarbaum



Photos: Ryan Bourbour

Attracting raptors is a long-term ecological strategy that is one part of an Integrated Pest Management program.



Well maintained  
nest box networks

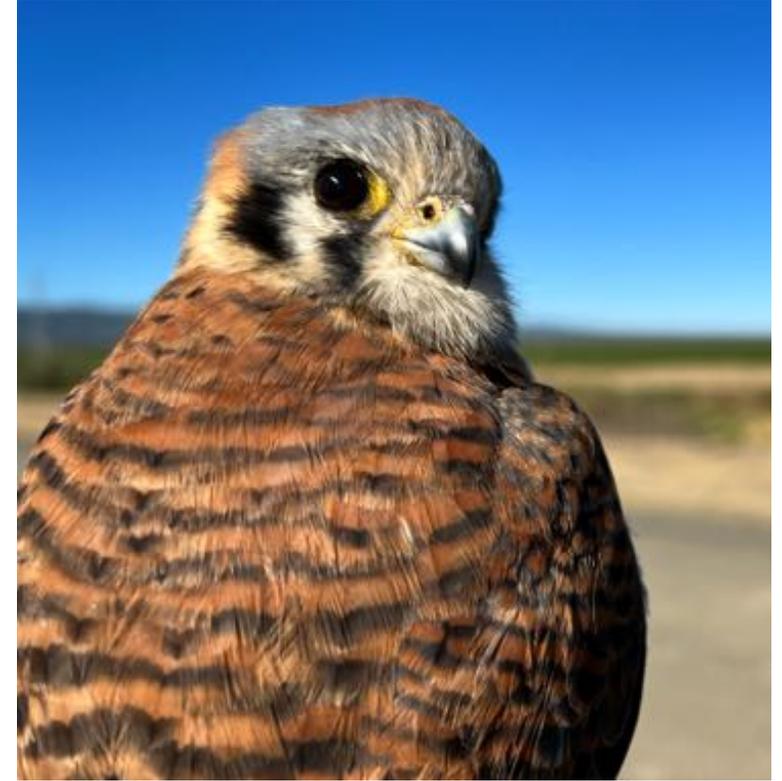
Habitat modification, cultural  
practices, **biological control**,  
exclusion, lethal removal, etc...



**Barn Owl**



**Red-tailed Hawk**



**American Kestrel**

**Three of the most common local raptor species**



## Raptor Species

## Diet



### Hawks

**Red-tailed Hawk**, Swainson's Hawk,  
Red-shouldered Hawk, Cooper's Hawk

Small rodents (voles, gophers, mice, rats)  
rabbits, ground squirrels, some reptiles & insects  
*Cooper's Hawks are bird specialists*

### Owls

**Barn Owl**, Great Horned Owl,  
Western Screech-Owl

Small rodents, rabbits, some insects

### Falcons

**American Kestrel**

Small rodents, birds, reptiles, & insects

### Eagles

Golden Eagle

Ground squirrels & rabbits

### Harriers & Kites

Northern Harrier & White-tailed Kite

Small rodents

# How many rodents do they kill?

In CA agricultural regions, Barn Owl diet consists of > 99% rodent pests. Diet changes depending on the common pest species (Kross et al. 2016)

A nesting pair and their young estimated to consume over 220 lbs of prey in a single year (Kross and Baldwin 2016)

Studies monitoring nests with cameras documented nests consuming 3,000 to 4,000 rodents (St. George & Johnson 2021)



Photo: Jaime Carlino

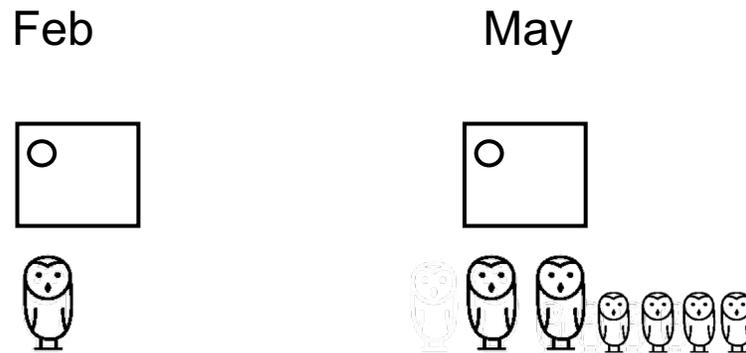
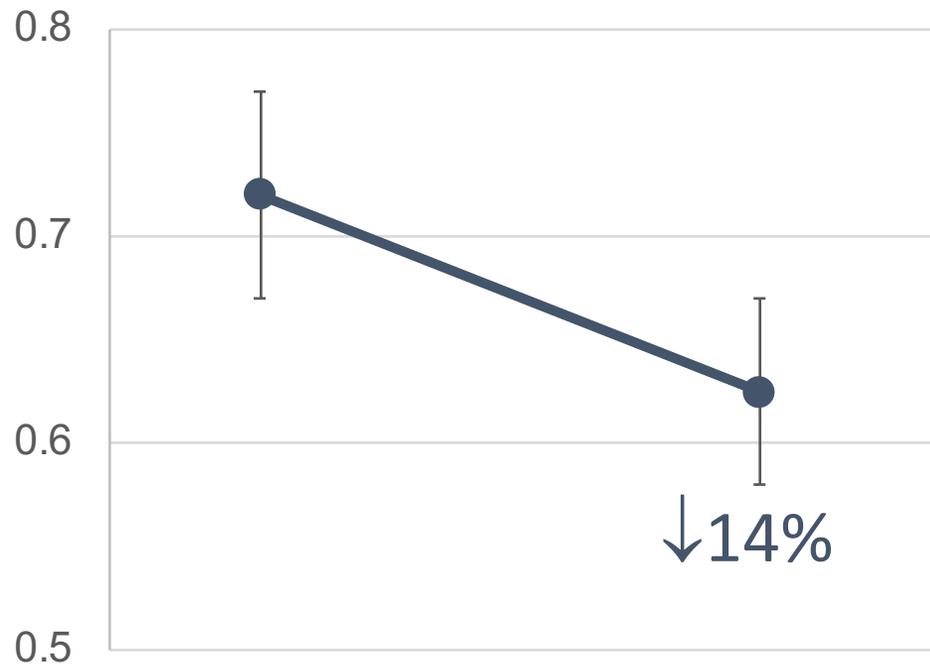
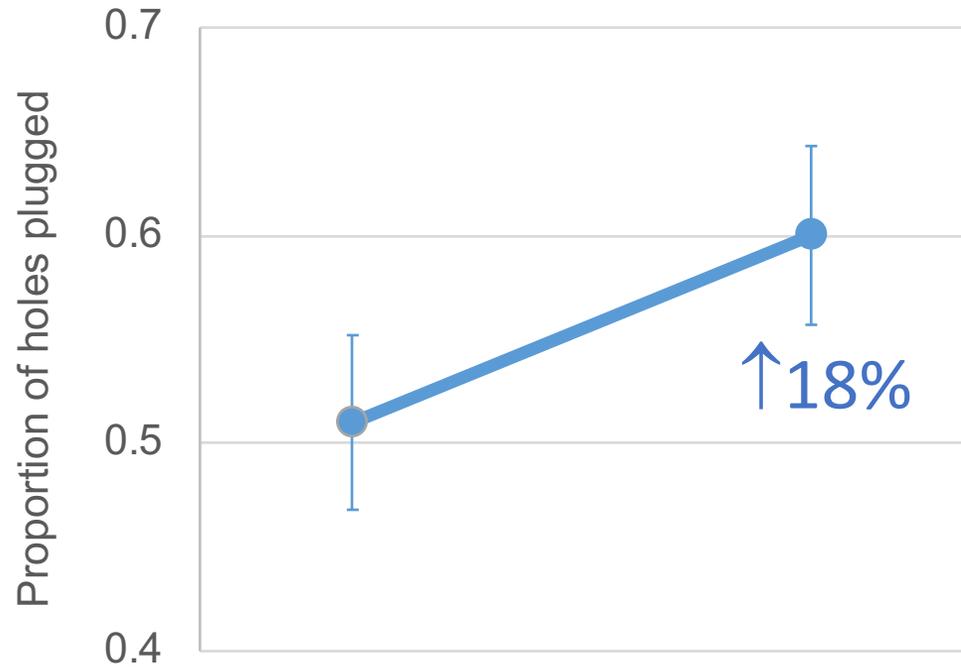


## Landscape of fear

The benefit of raptors is not limited to what they directly consume.

The presence of a predator can shift prey behavior and reduce pest activity.

# In Napa vineyards, gopher activity decreased when breeding owls were nearby (Hansen MS thesis)



# Barn Owl nest box networks



# Barn Owls have a long breeding season!

Egg laying can begin as early as January



Nestlings may use nest boxes until late summer



Eggs (~4 weeks)

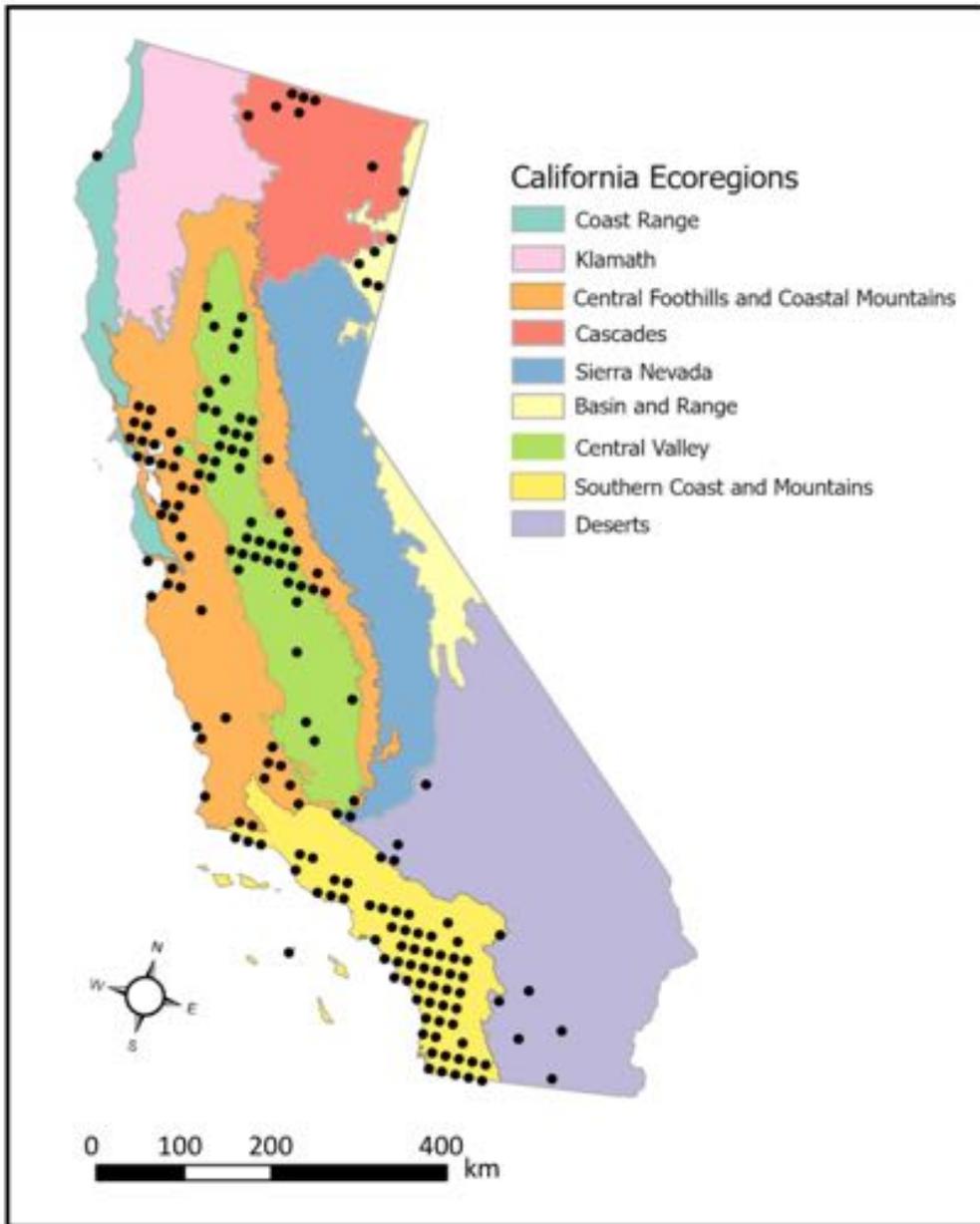
Nestling development (~8 weeks)

Many experienced pairs will fit in two nesting cycles in one year!

# Timing of Barn Owl nesting

Mean egg laying begins in mid to late February but prospecting nest boxes can happen much earlier

Coast Range (orange) egg laying is later, typically late February to early March



# Barn Owl nest box installation

## Timing:

Install new boxes by late summer/fall, may take 2-3 years for colonization, depending on location

## Placement:

Open areas with natural habitat nearby such as grasslands or oak savannahs, nest boxes can be as close as 100-300 feet apart, ~9-10 feet high

## Avoid:

Dense forests, busy roads, fast speed limits, houses, loud pumps and generators, lights



# Barn Owl nest box installation

There is no set density for optimal number of nest boxes per acre – the goal is to create a network of nest boxes that supports a breeding population of owls

We recommend starting with a reasonable number, monitoring, and adding more nest boxes once you see 60-80% occupancy



# Barn Owl nest box design

## Prevent predators:

Installed on a (metal) pole, grooves, with appropriately sized opening, partition near entrance

## Nestling safety:

Hole closer to the top of the box, larger boxes allow more room, mitigate heat in hot climates

## Heat:

Opening facing north or east, holes drilled for ventilation, recommend sun shields in hottest areas



# Nest box maintenance most effective *before* winter

Breeding activity is lowest in fall months-- Less likely to disturb pairs close to nest initiation

Prevents owls from initiating nests in overfilled or unsafe nest boxes



# Annual inventory for cleaning and maintenance

**Commitment of time and money to ensure proper construction, installation, and maintenance**

Inspect boxes yearly in late summer-fall, fix normal deterioration, check hardware

**Songbird:** Clean out old nests and leave empty (you can identify the types of species by the nest!)

**Barn Owl/kestrel:** Clean out built up pellet debris so box does not become over filled, replace with non-treated wood chips (Wear an n95 mask)

Don't disturb boxes with birds

Keep a log!



# Barn Owl nest box services and plans



**BOMP**  
Barn Owl Maintenance Programs

Home About Our Coalition About The Owls About Our Services Contact Us Press

A Coalition of Science-Based Wildlife Professionals

**Our Mission**  
To encourage the use of barn owl boxes to aid in the control of rodents, thereby reducing the use of rodenticides and advancing  
... [Show More](#)

**Vision**  
The BOMP Coalition will become the recognized authority and standard of wildlife professionals who will run profitable, sustainable,  
... [Show More](#)

**Goals**  
• Help barn owls thrive by increasing the number of safe barn owl boxes deployed on the landscape, and maintain them for future use  
... [Show More](#)

Bompc.org

Napa Wildlife Rescue

Sonoma County Wildlife Rescue



[https://cenapa.ucanr.edu/Napa\\_County\\_Programs/Wildlife/](https://cenapa.ucanr.edu/Napa_County_Programs/Wildlife/)

Evaluate efficacy of actions;  
modify as needed; keep records  
for future to communicate to  
your group and to the  
community.

Habitat modification, cultural  
practices, **biological control**,  
exclusion, lethal removal, etc...

Considerations such as:  
Cost, effort, consumer demand,  
ecological sustainability.



# Raptor habitat and perches

Large trees & edge habitat provide perching and nesting substrate for many raptor species

Can provide multiple benefits, but should seek regional specific advice

Different habitats attract different raptor species



Great Horned Owl nest



Red-shouldered Hawk



Swainson's Hawk

# Increased habitat complexity

Woody field margins can attract beneficial species that increase pest control without increasing pest damage.

(Heath & Long 2019; Kross et al. 2020, Garcia et al. 2023)



# Attracting raptors with perches

A variety of diurnal and nocturnal raptor species will be attracted to perch on and hunt from artificial perches in and around fields



# Raptor perch construction

Variety of constructions will work, they do not need to be as sturdy as nest boxes

- Galvanized steel poles, as small as 3/4 inch
- Wooden crossbeam ~18 inches – double cross beam not necessary (Kross et al. 2018)
- 15 feet high is optimal (Kross et al. 2018)
- Typically seat in concrete ~3 feet deep or attach to existing secure fence posts



# Raptor perch placement

- Install in open tree-less areas
- In and around crop fields (ie, younger orchards or vineyards)
- Place in highest areas, such as hill tops and ridgelines

Can focus on problem areas, such as areas with ground squirrel colonies

Create a network of perches:

~2 per acre (Machar et al. 2017)















Photos: Ryan Bourbour, Sara Kross



## Announcing the Napa-Solano Kestrel Nest Box Initiative

We are launching a long-term American Kestrel nest box monitoring program in Napa and Solano counties.

We are looking for agricultural and open spaces to join the network. Contact us if you have existing Kestrel nest boxes or are interested in installing new ones.

For more information please contact:

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UCCE Napa, Lake & Solano counties



American Kestrel populations are declining across California, and scientists are working to figure out why.

Through long-term monitoring we can learn about local Kestrel population health, inform conservation and management, and increase biological control of agricultural pests.

**Nest box installation:** October – February. We can advise on nest box placement, plans, and suppliers.

**Nest box monitoring:** Two planned visits per month April – July by UCCE research associate.





Thank you!

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[https://cenapa.ucanr.edu/Napa\\_County\\_Programs/Wildlife/](https://cenapa.ucanr.edu/Napa_County_Programs/Wildlife/)



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