



Managing for beneficial raptors and increased pest control

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1. Barn Owl nest boxes
2. American Kestrel nest boxes
3. Raptor habitat and perches



Photos: Ryan Bourbour



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

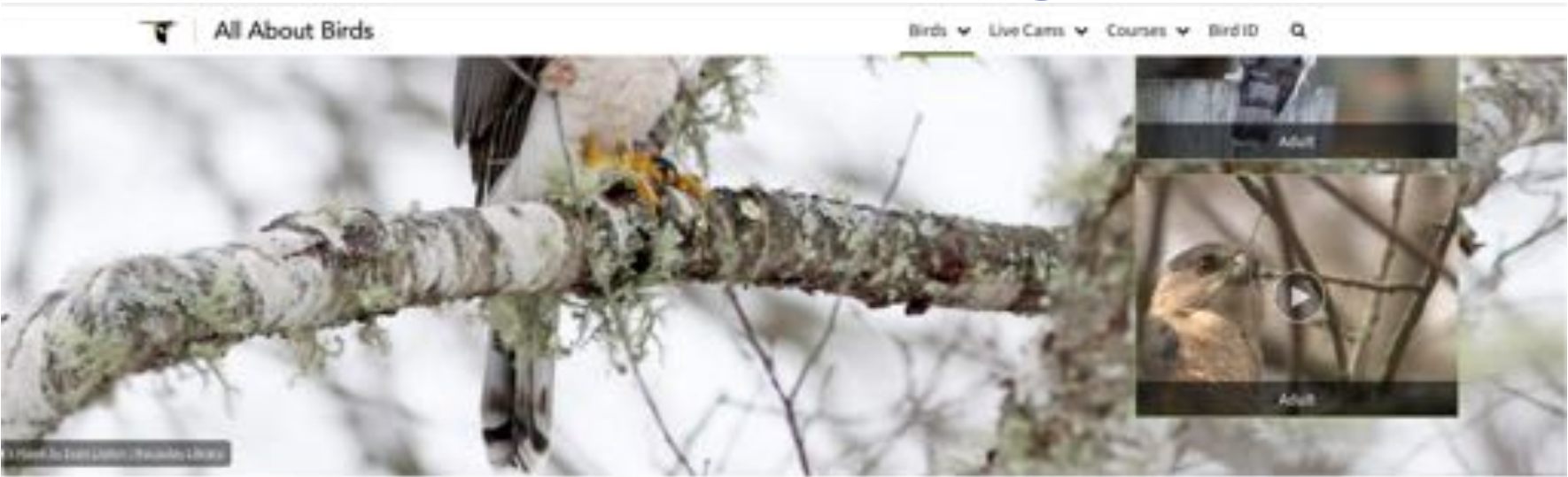
Ground squirrels & rabbits

Harriers & Kites

Northern Harrier & White-tailed Kite

Small rodents

allaboutbirds.org



Cooper's Hawk
Accipiter cooperii
(NACC: Accipiteridae)
(MNCN: Accipiteridae)

Accipiter

- Habitat: Forests
- Food: Birds
- Nesting: Tree
- Behavior: Aerial Forager
- Conservation: Low Concern

BASIC DESCRIPTION

Among the bird world's most skillful fliers, Cooper's Hawks are common woodland hawks that tear through cluttered tree canopies in high speed pursuit of other birds. You're most likely to see one prowling above a forest edge or field using just a few stiff wingbeats followed by a glide. With their smaller lookalike, the Sharp-shinned Hawk, Cooper's Hawks make for famously tricky identifications. Both species are sometimes unwanted guests at bird feeders, looking for an easy meal (but not one of sunflower seeds).

[More ID info](#)





Photo: Ryan Bourbour

Landscape of fear

Benefits of increased predators are not limited to what raptors directly consume.

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

Do raptors help with pests?

The presence of Barn Owls is correlated with decreased pest activity and increased yields

In Israel, alfalfa fields with higher Barn Owl presence had a 3% increase in yields (Motro 2011)

In the Sacramento Valley, Barn Owl diet consisted of 99% rodent pests. Diet changed depending on the common pest species (Kross et al. 2016)

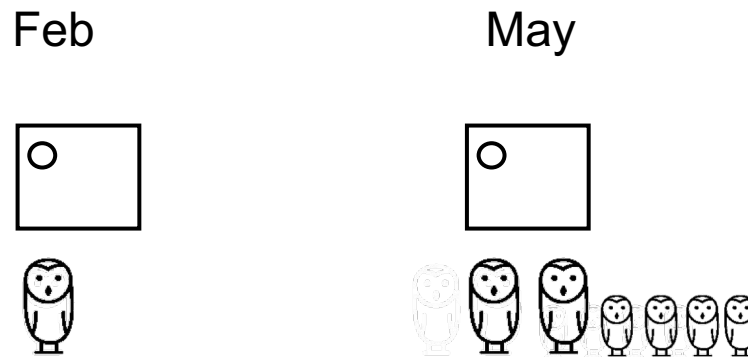
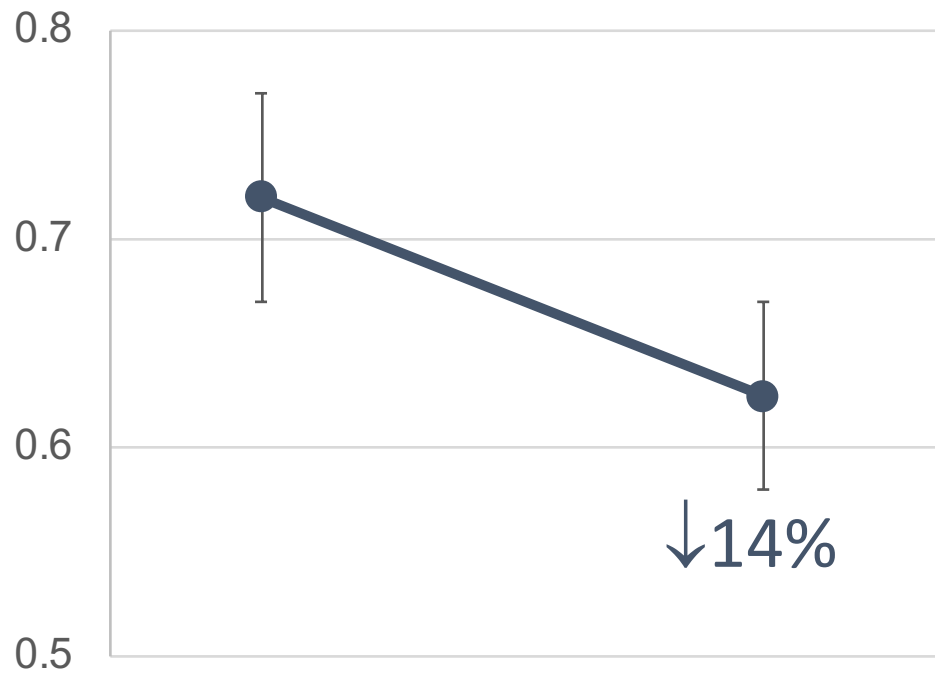
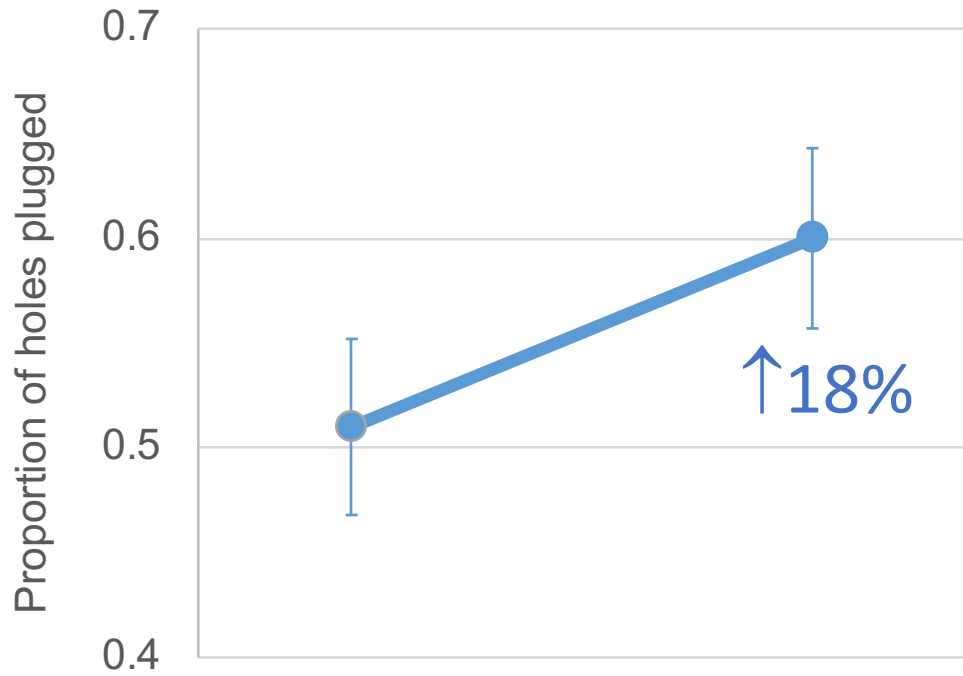
A nesting pair and their young estimated to consume over 220 lbs of prey in a single year (Kross and Baldwin 2016)



How many rodents do they kill?



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



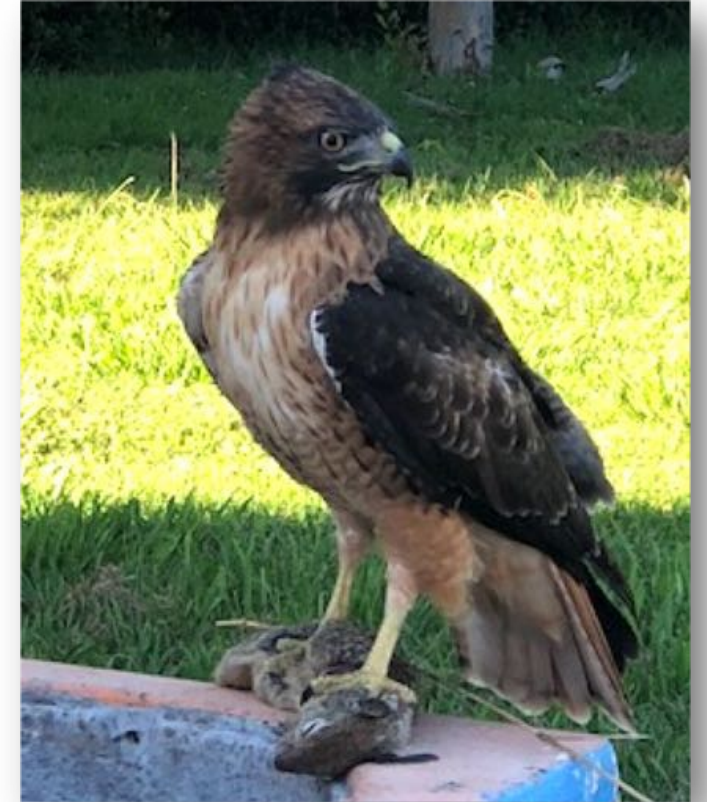
Do raptors help with pests?

Enhancing natural pest control can be more cost-effective than purchasing and applying rodenticides

On a levee system in southern California, rodent damage decreased in areas with Barn Owl nest boxes and perches more than areas with rodenticides (Novak and Torfeh 2017)

In Malaysia, nest box networks were cheaper and similarly effective as rodenticides in reducing crop damage (Abidin et al. 2021)

Growing appeal for brands that have 'Sustainable' or 'Wildlife-friendly' certifications (Barber et al. 2009; Delmas and Grant 2014; Foti et al. 2019)



Do raptors help with pests?

Maintaining infrastructure for beneficial birds can increase predation pressure in years with pest outbreaks

Predators naturally fluctuate and move due to abundance of prey, more infrastructure can support more raptors in good years

In the Czech Republic, fields with raptor perches had higher raptor densities than those without perches during years with vole outbreaks (Machar et al. 2017)

Barn Owl nest box occupancy fluctuates, more nests in good years can maximize breeding and predation pressure in those years



1. 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)

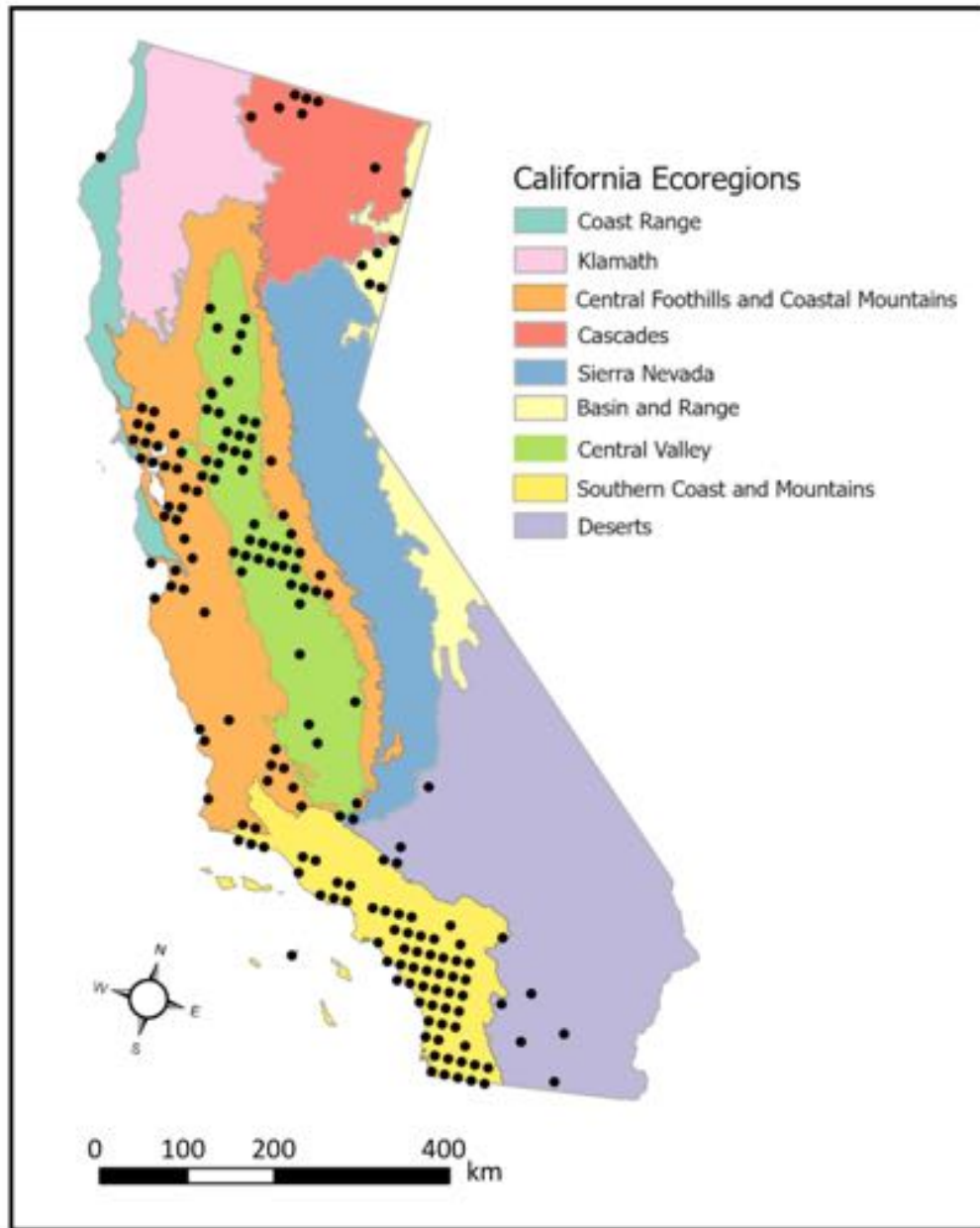
Nestling development (~8 weeks)

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

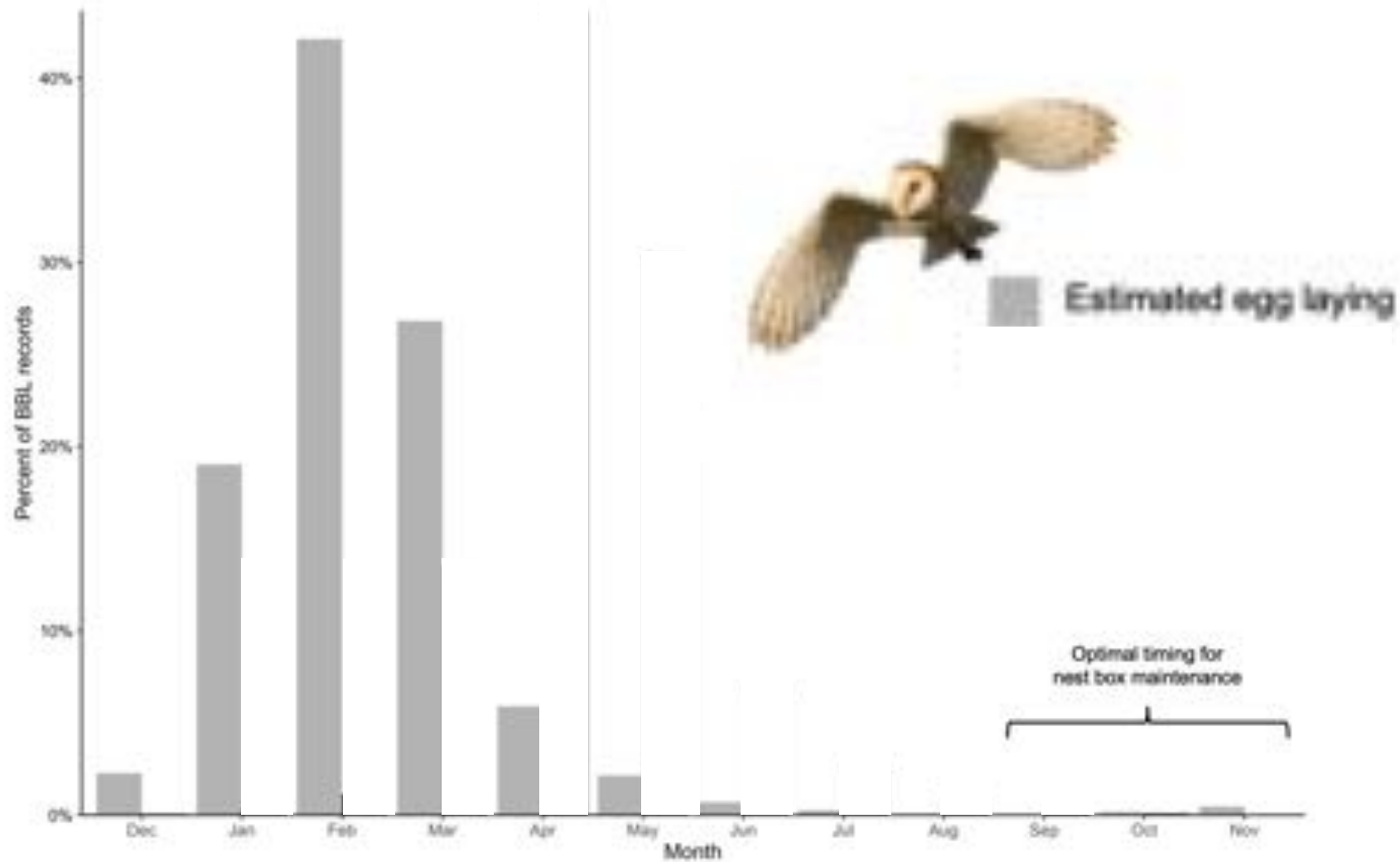
Regional differences in nest initiation

Mean egg laying begins in mid-late
February in CA

Central Valley (green) and Southern CA
(yellow) begin laying 2-3 weeks earlier
than the Coast Range (orange)



Barn Owls commonly begin to lay eggs in winter



Estimated egg laying time across seasons:



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

Maintenance in an unoccupied box can
happen at any time of the year



Barn Owl nest box design

Prevent predators:

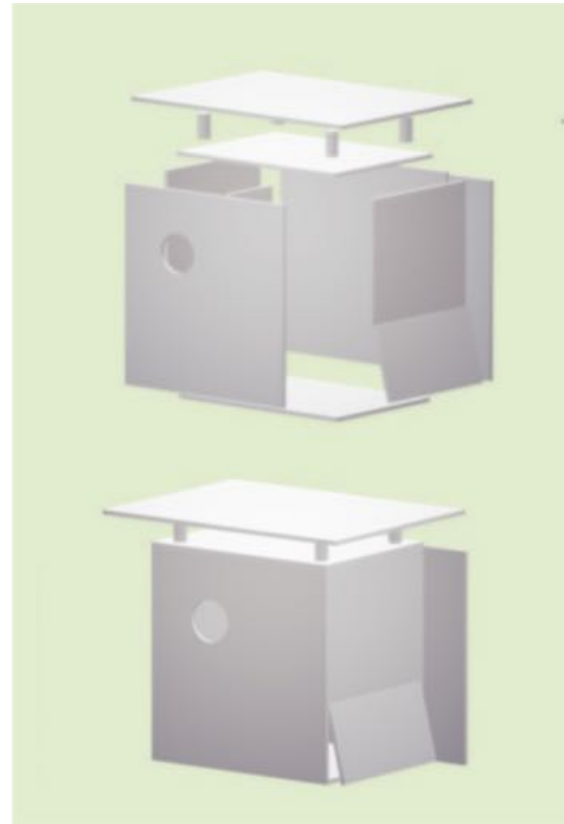
Installed on a (metal) pole, grooves, with appropriately sized opening, partition near entrance

Nestling safety:

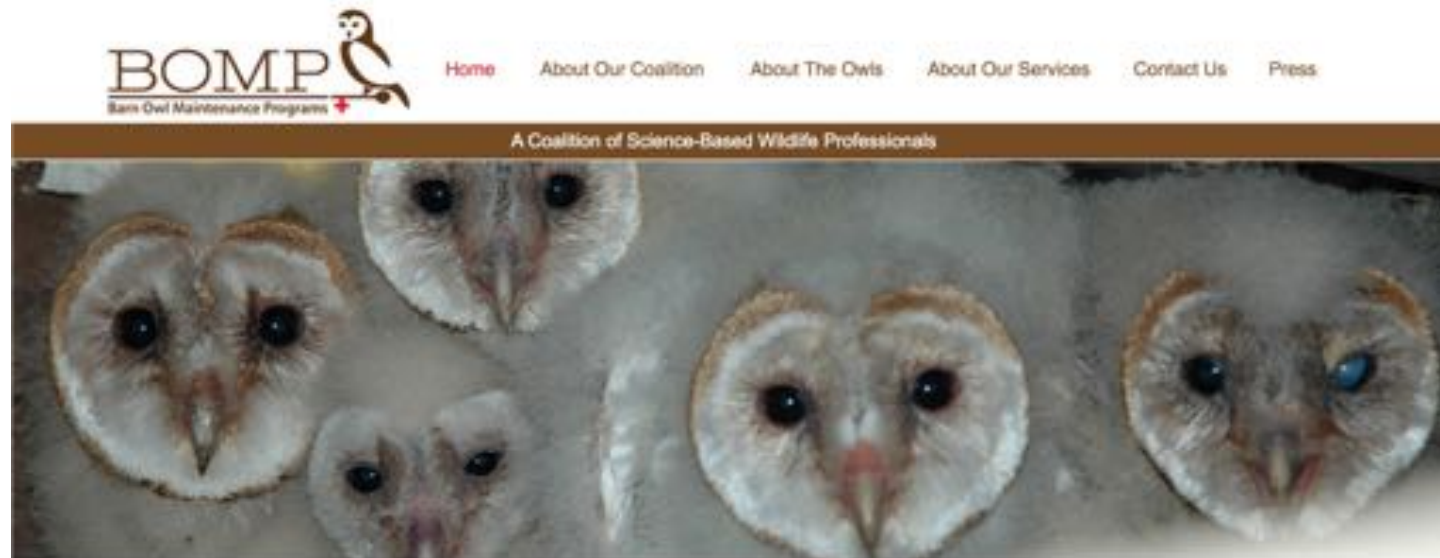
Hole closer to the top of the box, larger boxes allow more room, mitigate heat in hot climates

Heat:

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



Barn Owl nest box services and plans



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](#)



Top: Inside view of box.
Bottom: Outside view of box.
Both images show top and back heat shields.

Bompcoco.org

wildfarmalliance.org/barn_owl_nest_box_plans

Barn Owl nest box installation

Timing:

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

Location:

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, create a network of boxes that support a breeding population

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

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



2. American Kestrel nest boxes

American Kestrel Partnership is a good resource:
kestrel.peregrinefund.org/



American Kestrel Partnership Information Community Research Donate Sign in

The Peregrine Fund's American Kestrel Partnership is a network of citizen and professional scientists working to collaboratively understand kestrel demographics and advance kestrel conservation.

Where are the partnership nests?
The number on each pin shows the number of nest records registered with the AKP near that location. Nest records do not incorporate occupancy or observation data.*

By the numbers:

- 1,943 partners
- 4,265 nests registered
- 37,418 observations recorded

You're invited!

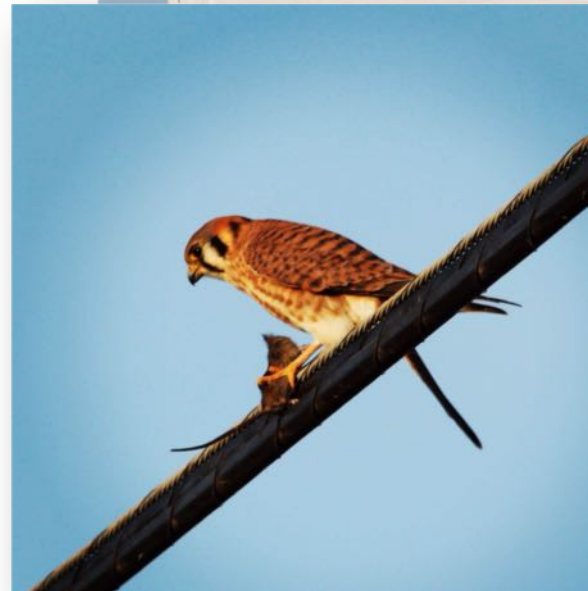
Interested?

American Kestrels

Prey upon mice, voles, insects, birds, and reptiles

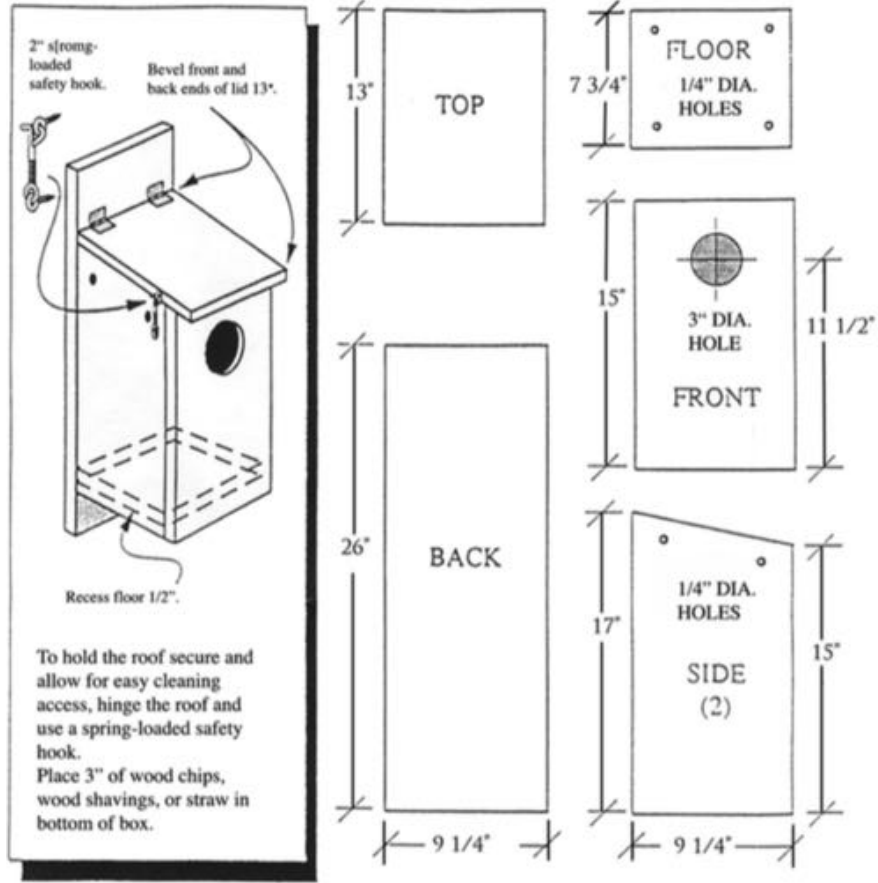
Fewer studies conducted on their pest control capabilities—Cherry orchards with nesting Kestrels had lower fruit-eating bird abundance and measurable economic benefits (Shave et al. 2018)

The presence of a predator can shift prey behavior



Photos: Ryan Bourbour

American Kestrel nest box design



Photos: Jessica Schlarbaum

American Kestrel nest box installation

Timing:

Install new boxes by late summer/fall, colonization may depend on local Kestrel population (consult with local bird experts)

Location:

Open areas of natural habitat such as grasslands or oak savannahs adjacent to agricultural fields, more territorial and secretive— install boxes at least 1/2 mile apart, ~9-10 feet high

Avoid:

Dense habitats or forests, more sensitive to human disturbance, install away from roads and areas with high human disturbance



Photo: Jessica Schlarbaum

Kestrel nest boxes may attract other bird species



Beneficial species

Western Screech Owls, Northern Flickers, other native songbirds



Pest species

European Starlings

Nest box 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

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 owls

Keep a log!



3. 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 and can increase pest control without increasing bird damage (Heath & Long 2019; Kross et al. 2020, Garcia et al. 2023)



Facilitating 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

The presence of a raptor can reduce activity and damage by prey species—

Raptors can respond and may act to reduce the severity of pest outbreaks



Raptor perches construction and installation

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

Install in open tree-less areas, in and around crop fields, at the highest point on the landscape

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

Create a network of perches:

~2 per acre (Machar et al. 2017)



Raptor perch construction

- 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
- Place in highest areas, such as hill tops and ridgelines
- Trees are natural perches













Photos: Ryan Bourbour, Sara Kross



Thank you!

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https://cenapa.ucanr.edu/Napa_County_Programs/Wildlife/



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