



# BLUEBIRDS IN VINEYARDS

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# INTRODUCTION



- Studies looking at ecosystems services
- Studies looking at bluebirds in vineyards
- Nest boxes



# BIRDS PROVIDE PEST REMOVAL SERVICES

- Codling Moths in California Apple Orchards (Baumgartner 1999)
- Caterpillars in Dutch Apple Orchards (Mols and Visser 2002)
- Herbivorous Insects in Malaysian Oil Palm Plantations (Koh 2008)
- Coffee Berry Borers in Jamaican Coffee Farms (Johnson et al. 2010 and Kellermann et al. 2008)



## CALIFORNIA VINEYARDS

- Fiehler et al. 2006
- Nest boxes in vineyards and oak savannah
- >50% occupancy
- Habitat not associated with nest survival
- Clutches larger and initiated earlier in vineyards
- NOT remedy for habitat loss/degradation
- Ecological trap?



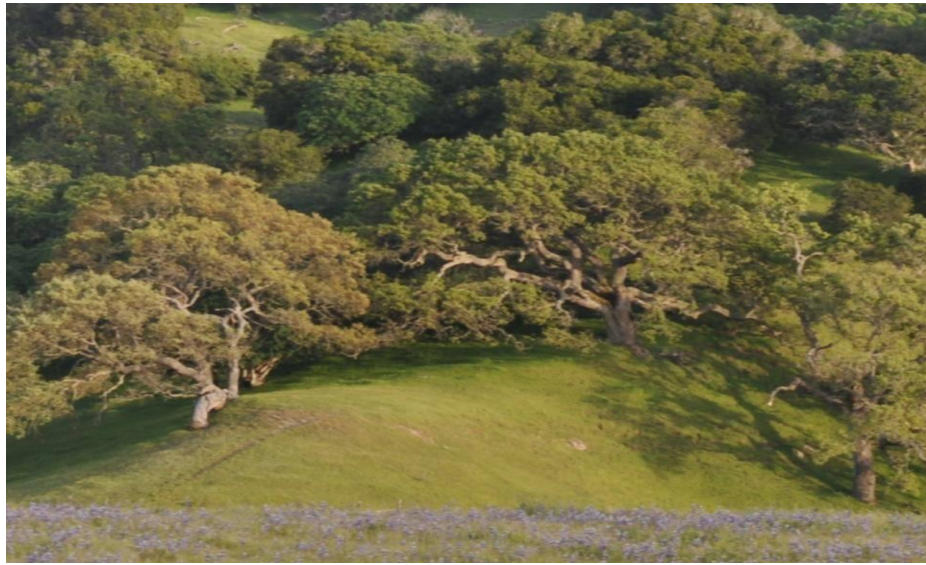
# CALIFORNIA VINEYARDS

- Jedlicka et al. 2011
- Songbirds DO offer wine-grape growers pest-removal services
- Nest boxes increased avian species richness and density (tenfold increase in bluebirds!)
- Sentinel pest study showed 2.4x more pest removal near nest boxes





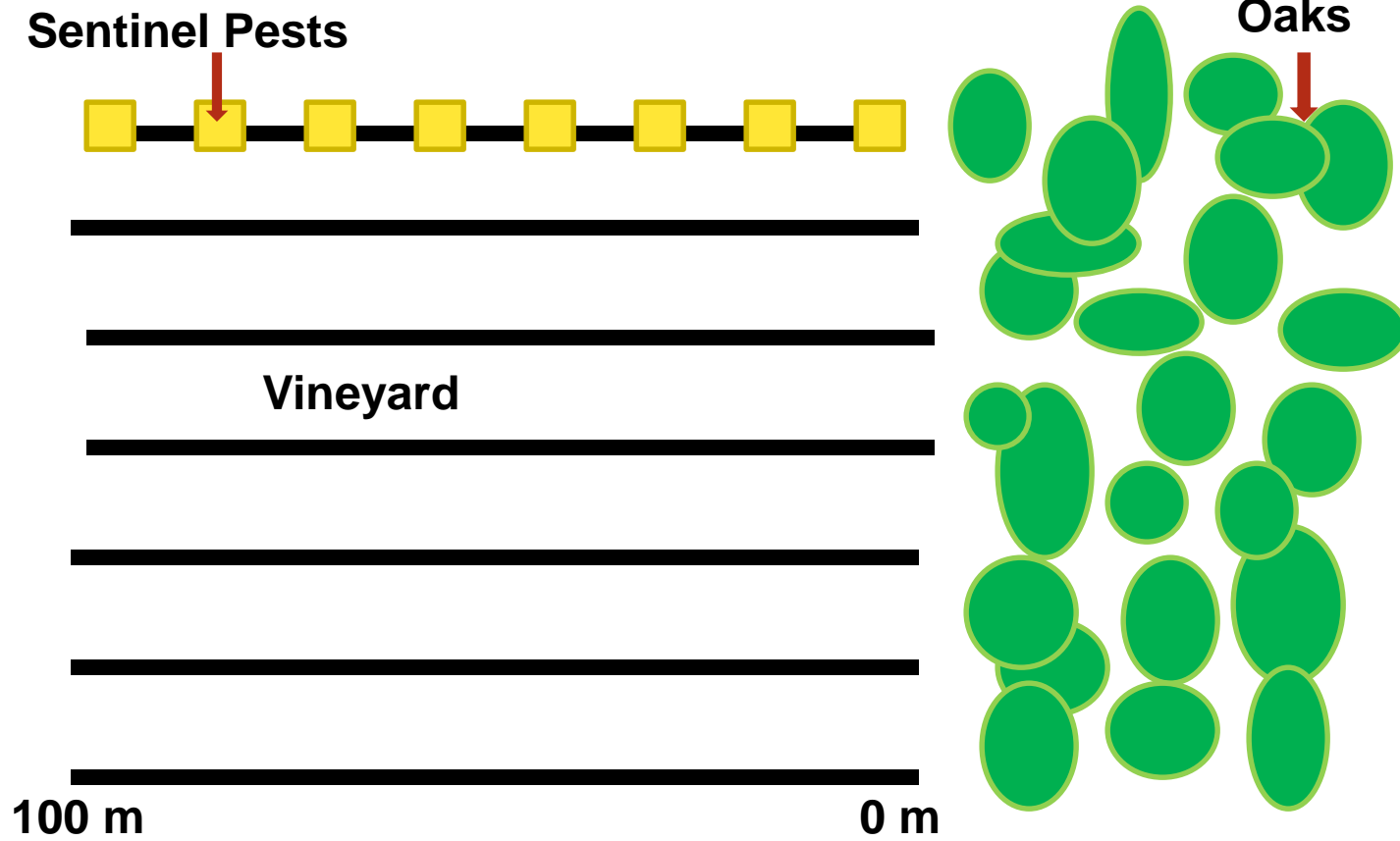
# MY PROJECT



- Connect pest removal to natural oak woodland habitat
- Natural habitats adjacent to vineyards as source of insectivorous birds?
- Test prediction that predation rates are higher close to oak habitat and lower in the vineyard interior



# SENTINEL PEST LAYOUT





# RESULTS

- July replicates had higher predation than May/June
- No relationship between distance and predation rate
- One site higher predation rate than others
- Area Surveys
  - Birds foraging in habitat
- Cameras
  - Western Bluebirds  
(*Sialia mexicana*)



## DISCUSSION

- Abundance of birds more than doubled late in breeding season
- Fledglings observed foraging alongside their parents
- Presence of juvenile birds may explain increased predation rates



## MORE STUDIES



- Jedlicka et al. 2014
- Do riparian areas in vineyards support the same species composition of birds found in natural oak woodland habitat and/or vineyards?
- Do nest boxes in vineyards alter species composition?
- Species composition of birds using riparian different than that of vineyards
- Nest boxes not a factor; habitat *is*
- Maintaining natural habitat within vineyards is critical!



# MORE STUDIES



- Jedlicka et al. 2017
- So there's bluebirds; great! Do they eat what we want them to eat?
- Bluebirds consumed a broad diet comprising 66 unique arthropod species from 6 orders and 28 families
- *Aedes* spp. (mosquitoes) found in 49.5% of samples!
- Herbivorous Hemipterans and Lepidopterans represented over half (56%) of the prey items in bluebird diets
- Consumption of beneficial predator or parasitoid arthropods only 3% of diet



# CONCLUSIONS

**Provision of nesting habitat for bluebirds by managers can increase biological pest control in vineyards during the summer months**



# CONCLUSIONS

- Nest boxes should *not* be considered a substitute for maintaining natural habitats
- Boxes should be maintained every year; cleaning them out and making sure the entrance hole diameters don't get widened to admit starlings or house sparrows
- Placement should avoid heavily trafficked areas and busy roads
- Violet-green swallows will also use them, and that's ok! They eat mosquitoes too.



# REFERENCES

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# QUESTIONS!

