

# High rates of rodenticide exposure in Barred Owls are associated with the wildland-urban interface



Daniel F. Hofstadter

co-authors:

Nicholas F. Kryshak, Mourad W. Gabriel, Connor M. Wood, Greta M. Wengert, Brian P. Dotters, Kevin N. Roberts, Emily D. Fountain, Kevin G. Kelly, John J. Keane, Sheila A. Whitmore, William J. Berigan, M. Zachariah Peery



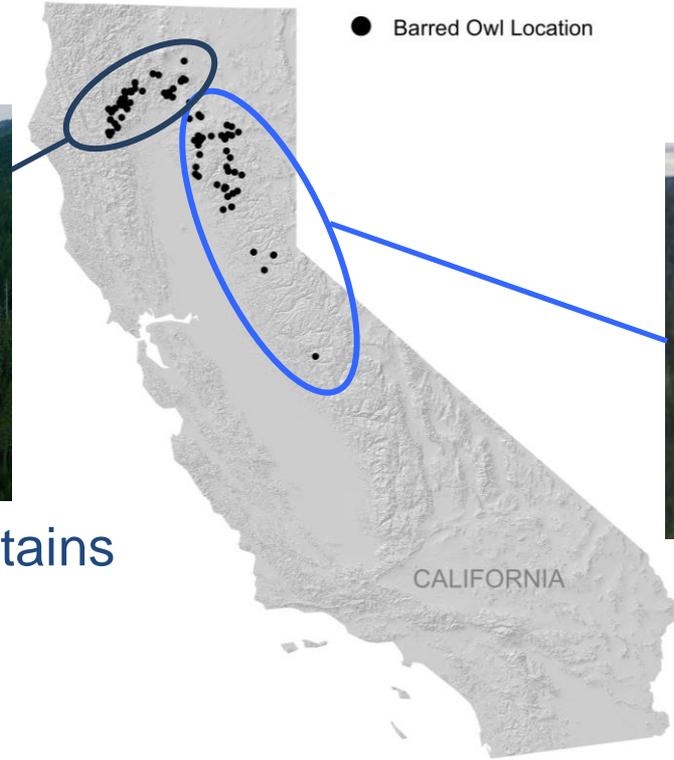
Do **ARs** pose a threat to spotted owls in the Klamath and Cascade Mountains and Sierra Nevada?



# Study Area and Objectives



Klamath + Cascade Mountains



Sierra Nevada

1. Quantify Barred Owl exposure to ARs
2. Evaluate associations between AR exposure and **biological** and **environmental** factors

# Biological Factors

Factor

Prediction

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**Species** (Barred vs. Hybrid)

Hybrids

**Age** (adult vs. sub-adult)

Sub-adults

**Sex** (female vs. male)

Females

**Body Condition** (fat level)

Owls w/ less fat

# Environmental Factors



## Illegal Cannabis Cultivation:

- Known grow sites
- Index of cannabis suitability  
(*Wengert et al. in review*)

## Wildland-Urban Interface (WUI):

- Distance to WUI – 2010 census  
(*Radeloff et al. 2018*)
- Proportion public vs private land

# Tissue Analysis

- 127 owl livers tested
- 7 ovaries from AR-positive owls

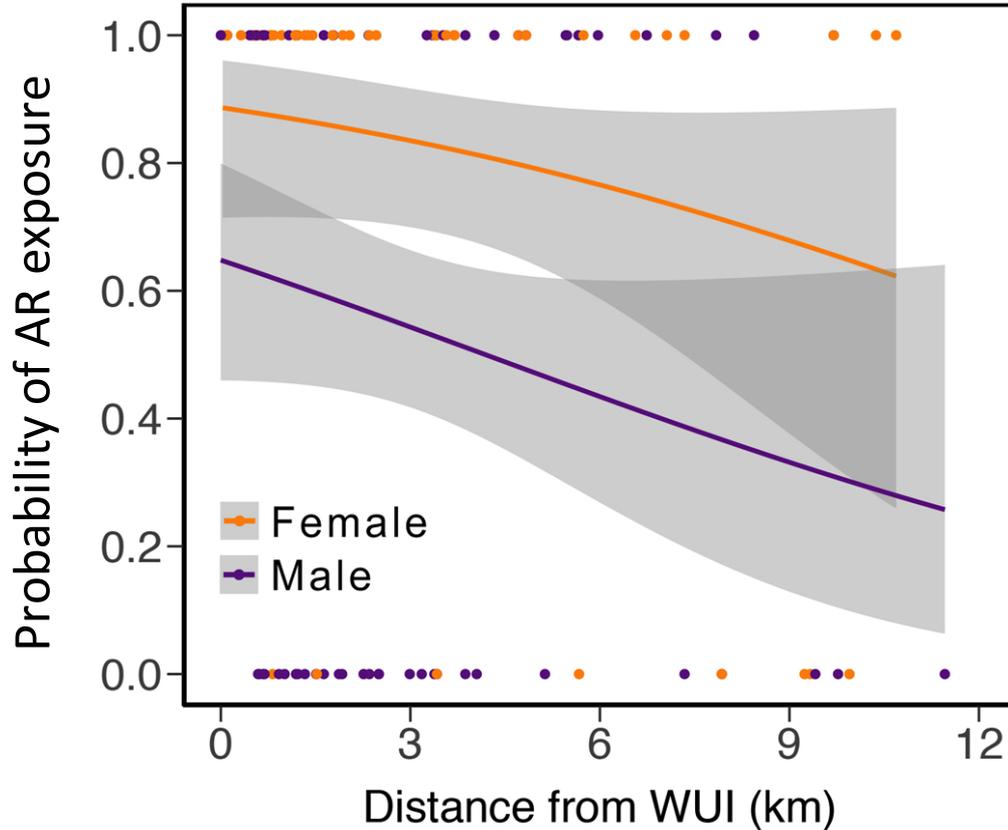
<b>First-gen AR (<u>FGAR</u>)</b>	<b>Second-gen AR (<u>SGAR</u>)</b>
warfarin	brodifacoum
diphacinone	bromadiolone
chlorophacinone	difethialone
coumachlor	difenacoum



**UCDAVIS**

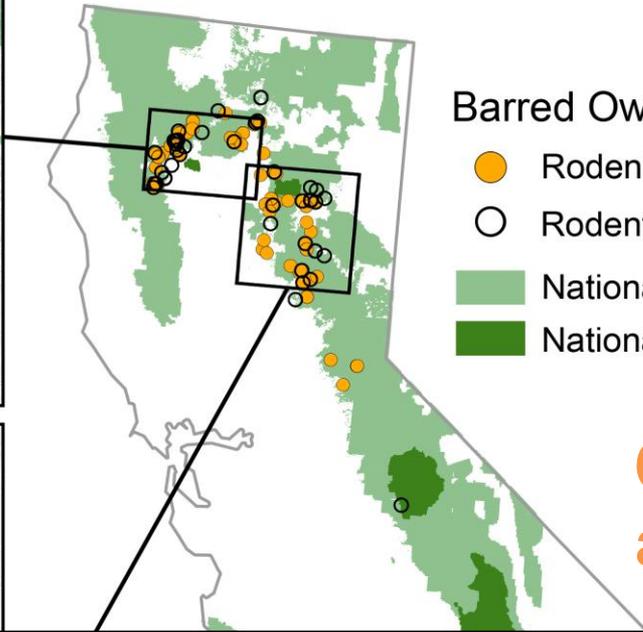
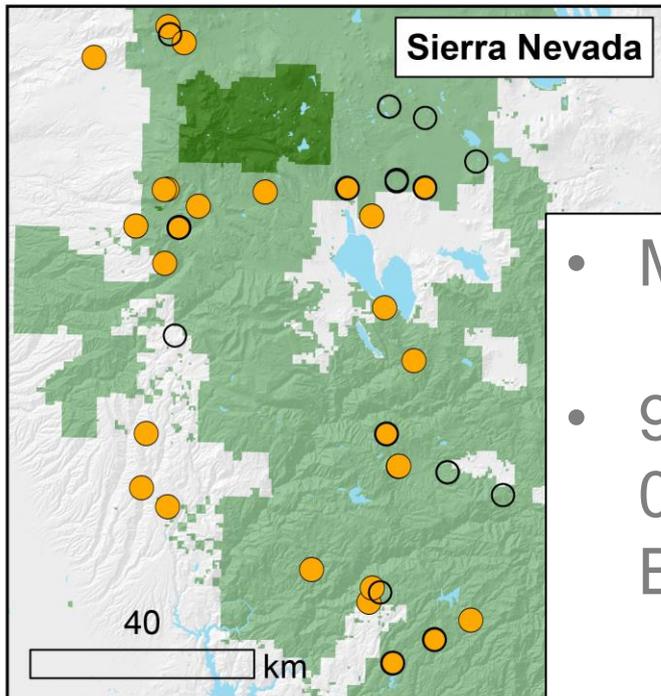
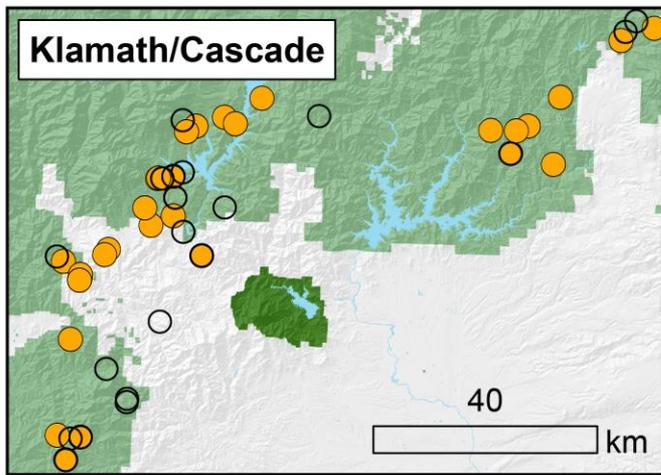
**VETERINARY MEDICINE**

Barred Owl



## Owls with higher concentrations:

- 2 km closer to WUI than trace exposure
- 3 km closer to WUI than no exposure
- 7 of 9 owls w/ higher concentrations female

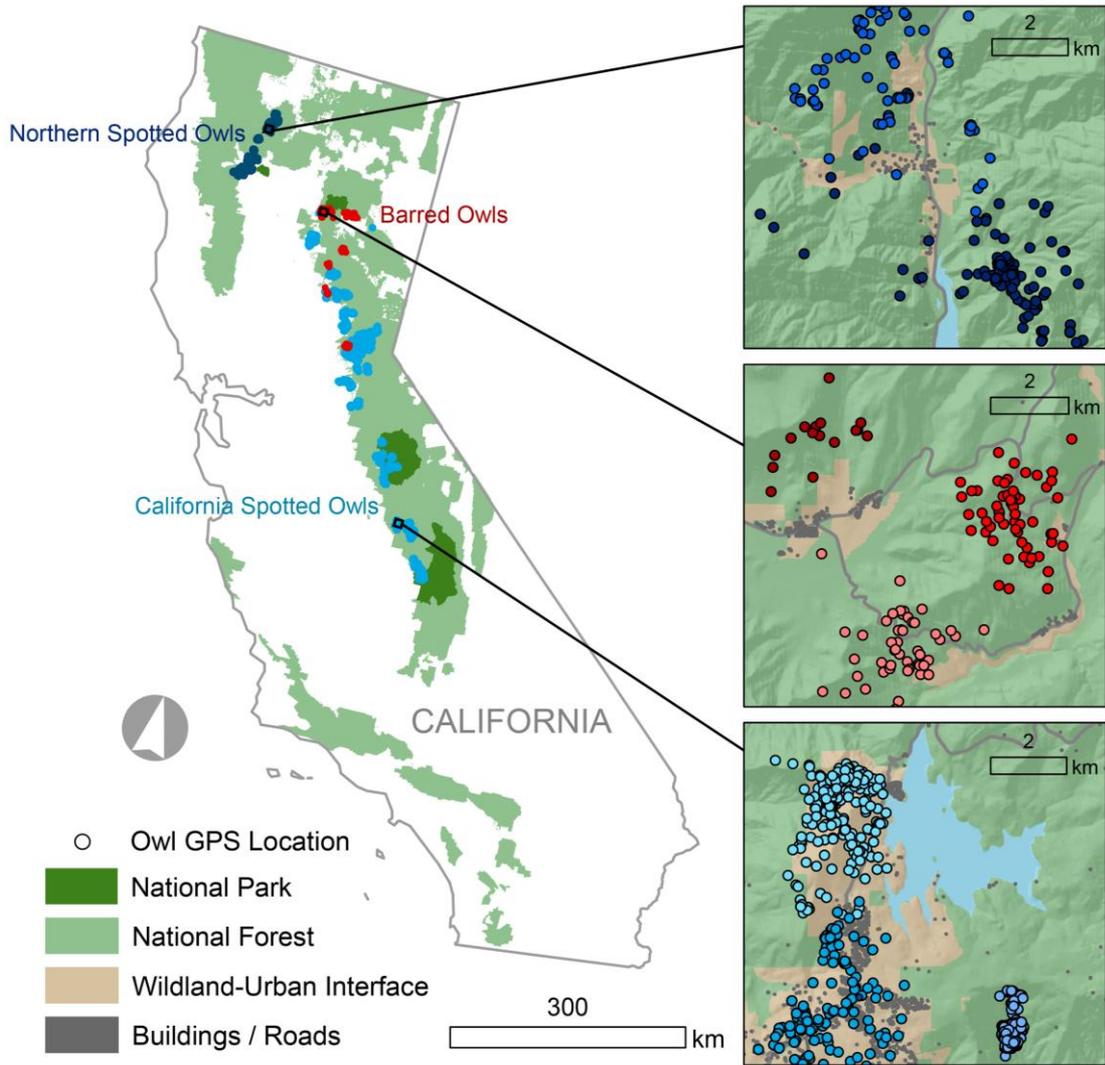


**Barred Owl Location**

- Rodenticide Positive
- Rodenticide Negative
- National Forests
- National Parks

**62% positive  
all SGAR**

- Majority exposures at trace levels
- 9 owls with concentrations up to  $0.3\mu\text{g/g}$  (above  $0.1\mu\text{g/g}$  threshold for Barred Owl mortality)



Owls with at least one location in WUI:

Northern Spotted Owls: 33%

Barred Owls: 50%

California Spotted Owls: 22%

**No associations** between exposure and:

- Species
- Age
- Body condition
  
- Illegal cannabis
- Public vs. private land

# Maternal transfer of AR – legacy effect?

- 7 of 7 (100%) ovaries positive
- Possible transfer of sub-lethal doses through generations?
  - transfer via milk in fishers  
(*Gabriel et al. 2012*)
- Tested 4 juveniles – negative  
BUT, they came from AR-negative mothers



# AR not associated with illegal cannabis



Carbofuran (neurotoxin)

# Conclusions

- High rates of AR exposure in both Barred and Hybrid owls suggest Spotted Owls are also potentially at risk
- WUIs appear to serve as a source for AR exposure in forest-dwelling owls
- Strong potential for maternal transfer of ARs – similar to legacy effect of DDT in Bald Eagles?

# Thank you!

Email: [hofstader@wisc.edu](mailto:hofstader@wisc.edu)

