

Progress on the Fire Ecology of Native Game Birds



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Six galliform species of the Sierra Nevada

Three natives:



Sooty (Blue) Grouse



Mountain Quail



California Quail

Three introduced:



Wild Turkey



Chukar



White-tailed Ptarmigan

Scientific knowledge re: fire ecology mostly lacking

No prescriptions offered today

My research is laying the groundwork

Mountain Quail Overview

Commonly believed to proliferate after burns

Composition & structure of vegetation advantageous?

Topic never studied with scientific rigor



Population and habitat methods are poorly developed

Inadequate or too labor-intensive for research

E.g., strip transect and line intercept methods

Lots of methods work remains to be done



My Research

Vocalization behavior

Loud calls of territorial males are countable

But relationship of call count to actual number or density is unknown

Requires knowledge of:

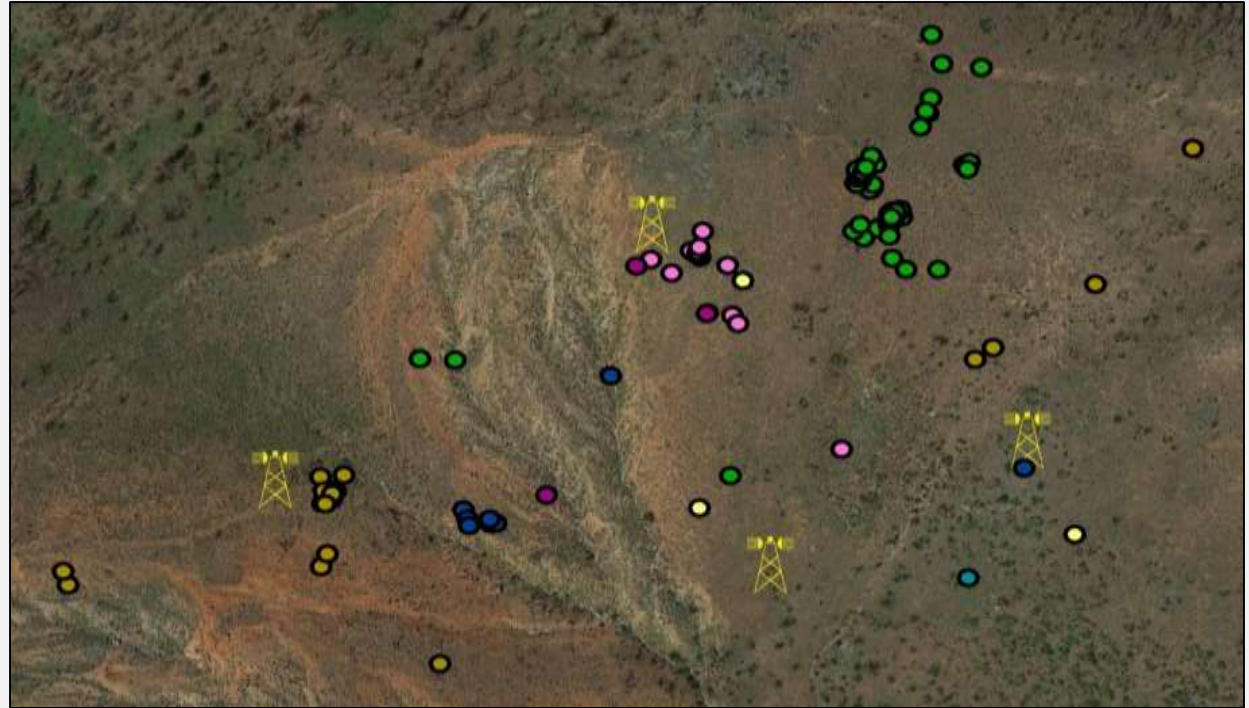
- individual calling rates @ given time of day
- audible distance of calls
 - influence of vegetation, terrain, wind

Required for all auditory surveys:

- call count “index”
- point counts
- autonomous recorders



Objective: use microphone arrays to quantify vocalization behavior



4-ARU-arrays

- accurate locations
- time-synched via. satellite

Calls arrive later at more distant ARUs

= “difference in detection time”

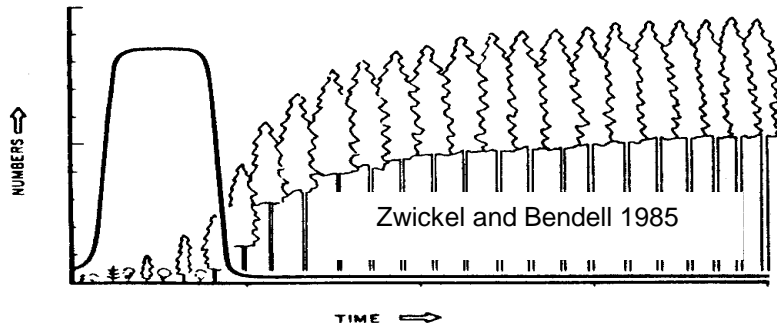
- used to estimate source location via. triangulation

Intended outcomes:

- characterize individual calling behavior
- detectability coefficient to correct for individuals undetected

Sooty Grouse Overview

Widely believed to be early-successional



But habitat associations differ regionally

Most-studied in coastal Pacific Northwest

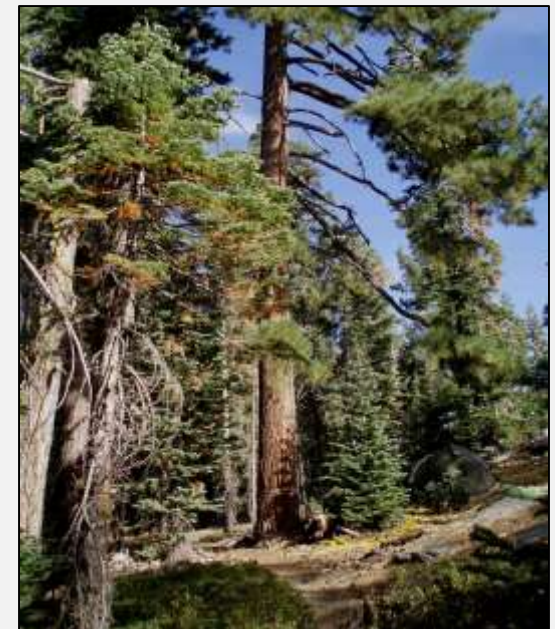
Inland: high vertical & horizontal heterogeneity

No prior habitat studies in CA

Habitat methods are well developed (for plot scale)

Standard forestry metrics

Census methods are poorly developed

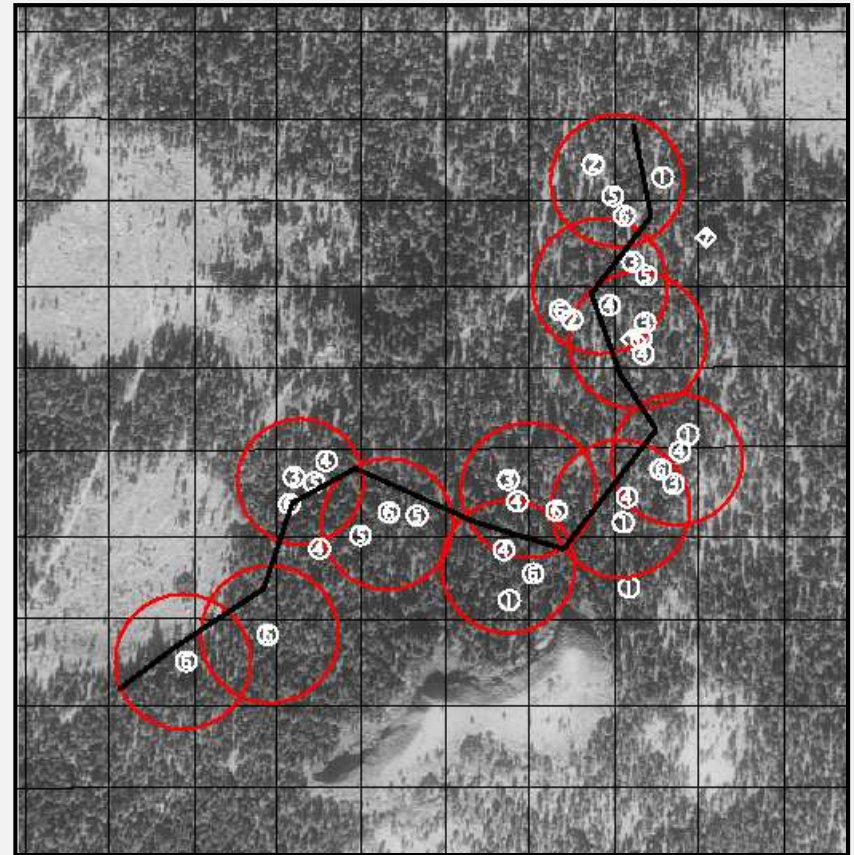


My Research

Census technique

ESTIMATING THE NUMBER OF TERRITORIAL MALES IN LOW-DENSITY POPULATIONS OF THE SOOTY GROUSE *Western Birds* 44:279-293, 2013

- based on territorial spot-mapping
- first CA density estimate: 0.6 male/km²
 - vs. >200/km² in British Columbia



Habitat associations

CA populations are associated with old forest
-previously more or less unrecognized

Multi-scale habitat associations (Pinecrest)

Patch scale:

Habitat suitability models based on radiotelemetry data



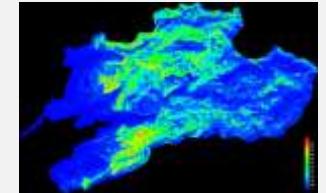
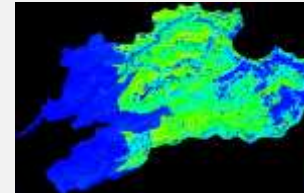
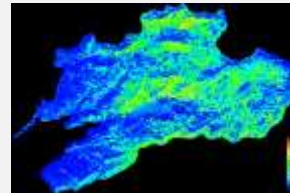
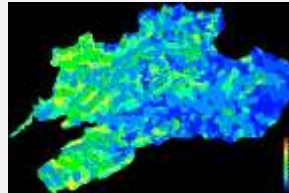
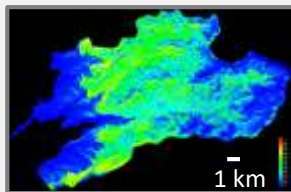
Male breeding

Nesting

Brood-rearing

Post-breeding

Winter



Most-discriminatory variables (aggregate):

Physical

- Elevation (2075-2750 m)
- Solar radiation (incl. aspect)

Vegetation

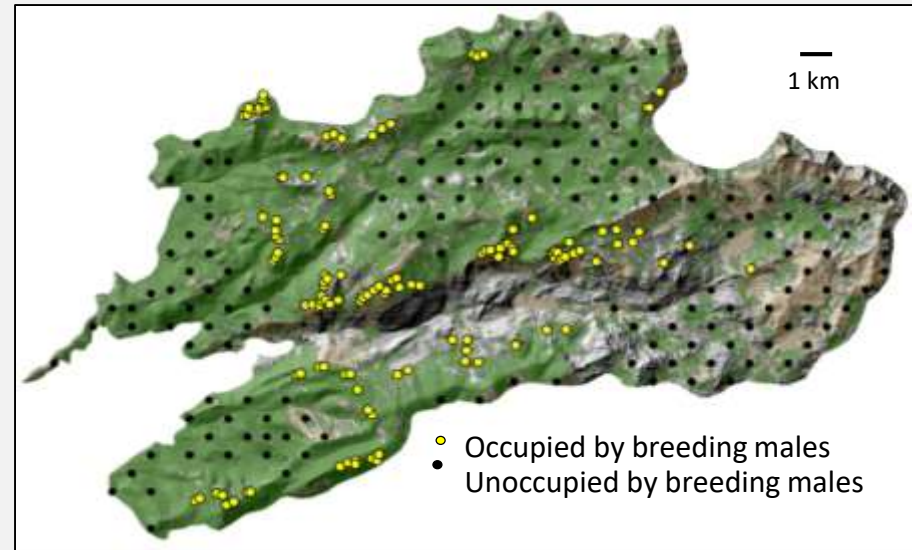
- Canopy density (mod vs high)
- Fir & Meadow WHR cover types (pres/abs)
- Timber harvest history (pres/abs)
- Overstory trees 51-76 cm dbh (pres/abs)

Perhaps little or no fire signature at patch scale

Micro (plot) scale (breeding territory, nest site, winter roost)
E.g., male breeding territories vs. random unoccupied points

Occupied territories have:

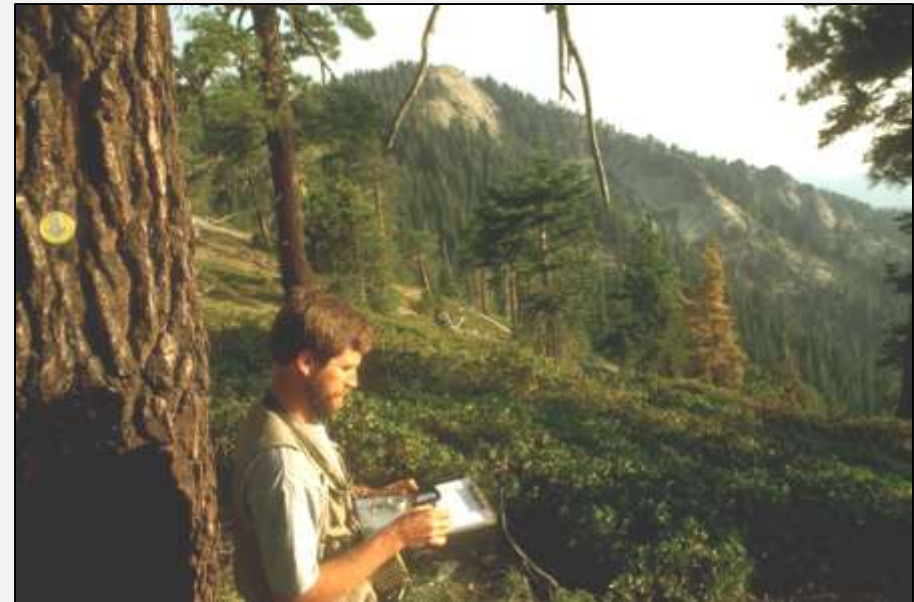
- More forest edge
- More fir trees >62 cm dbh
- Fewer tree seedlings
- More logs



Other studies / personal observation:

-patchy understory (Martinka 1972)

(Occupied vs unoccupied approach didn't capture)



Regarding large conifers:

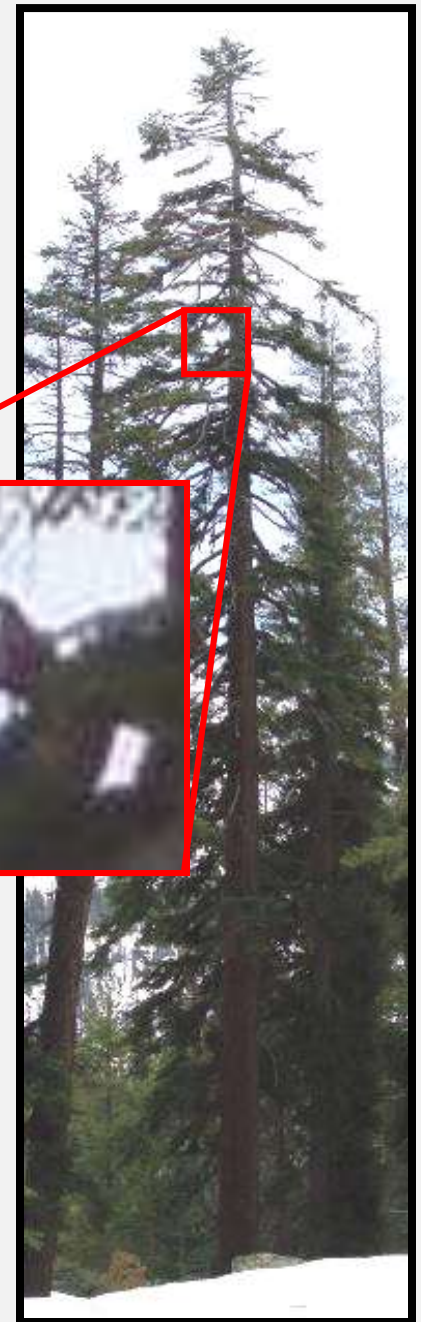
Territorial males use as songposts

Pinecrest study: avg. dbh = 1.0 m



At micro scale, natural fire regime probably:

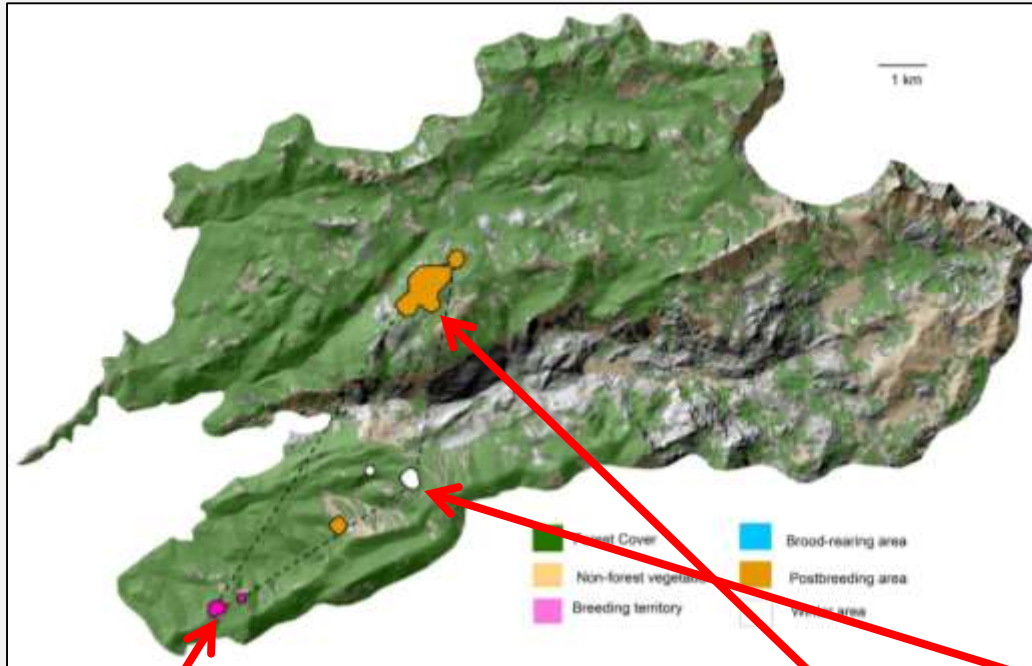
- maintains patchy forest canopy (edge)
- thins mid-story
- maintains patchy understory
- thins seedlings
- reduces resource competition for big trees



Landscape scale

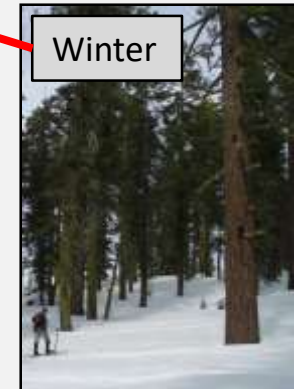
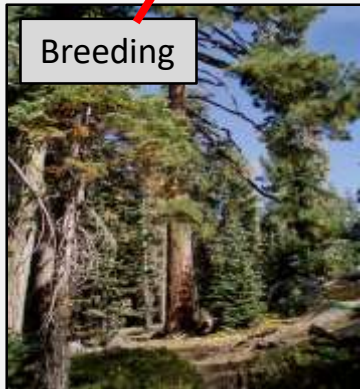
Not yet analyzed – sample area insufficient

But annual home ranges encompass season-specific patches



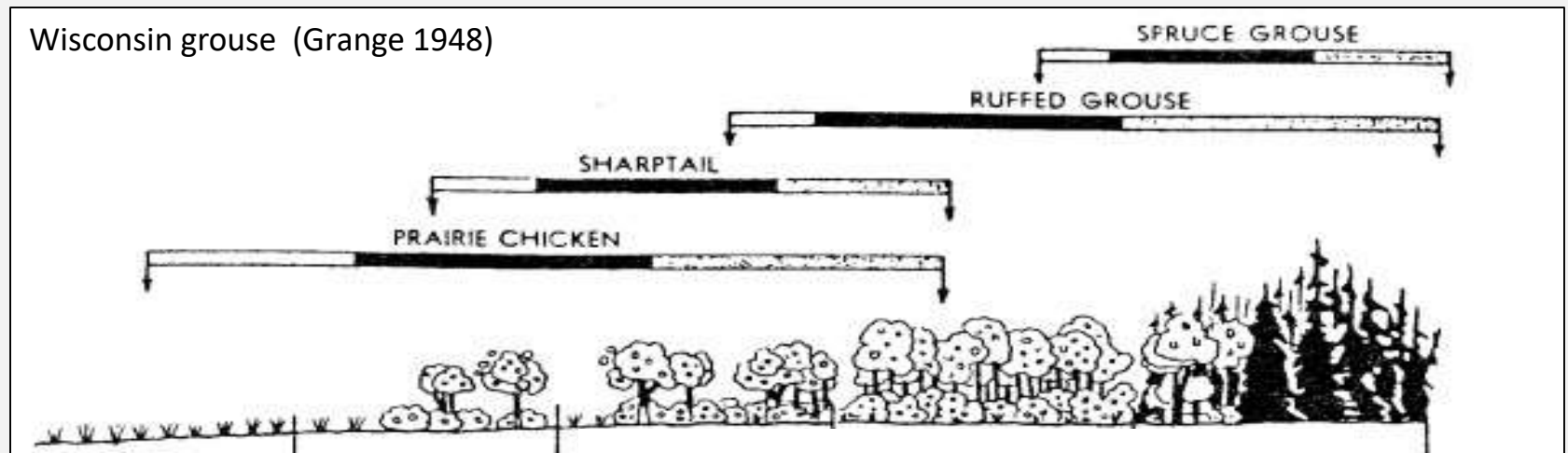
Natural fire regime probably creates:

- fine-scale patch heterogeneity
- small groves of big trees
- distribution of old forest elements

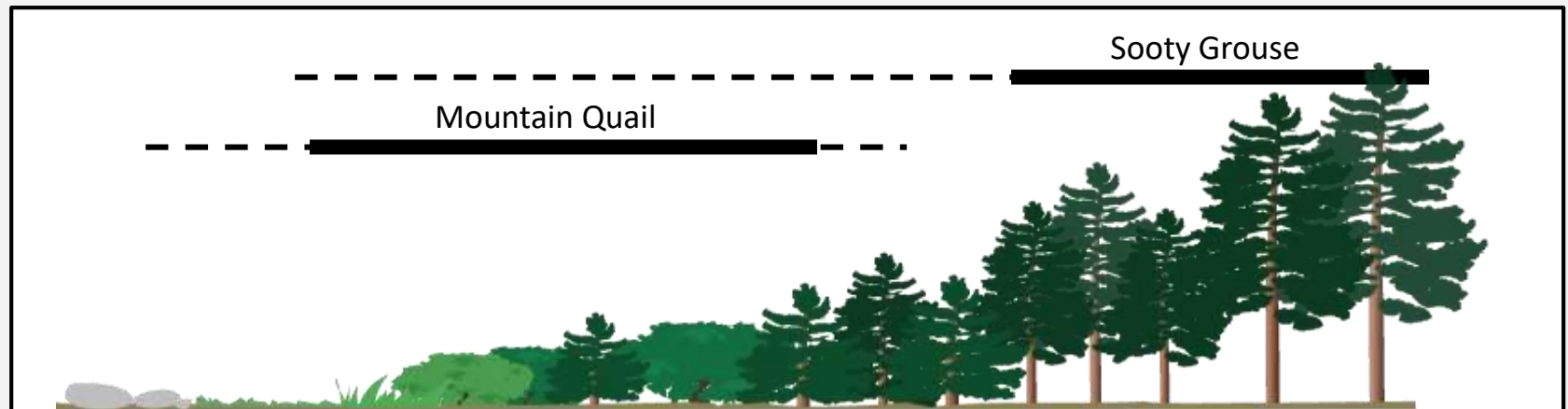


Game bird diversity and secondary (post-fire) succession

Sympatric species partition landscape by seral stage



Lower diversity in the Sierra Nevada, but still more or less partitioned:



Both exhibit strong population responses to a broad range of post-fire seres
Should be utilized to greater effect in managing Sierra Nevada National Parks

Support

California Department of Fish and Wildlife

US Fish and Wildlife Service, State Wildlife Grants Program

US Forest Service, Get Wild Program

