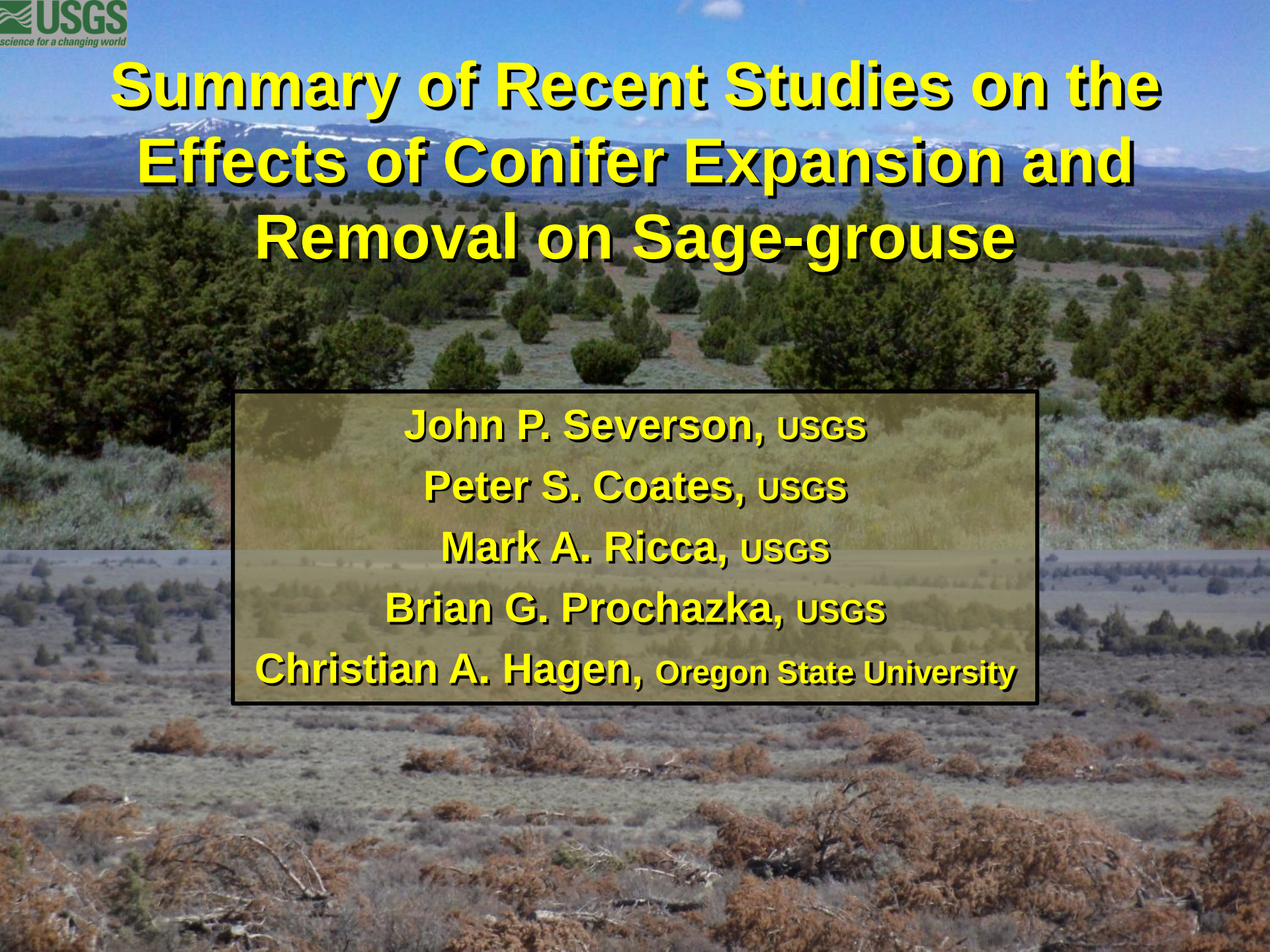


Summary of Recent Studies on the Effects of Conifer Expansion and Removal on Sage-grouse

John P. Severson, USGS

Peter S. Coates, USGS

Mark A. Ricca, USGS

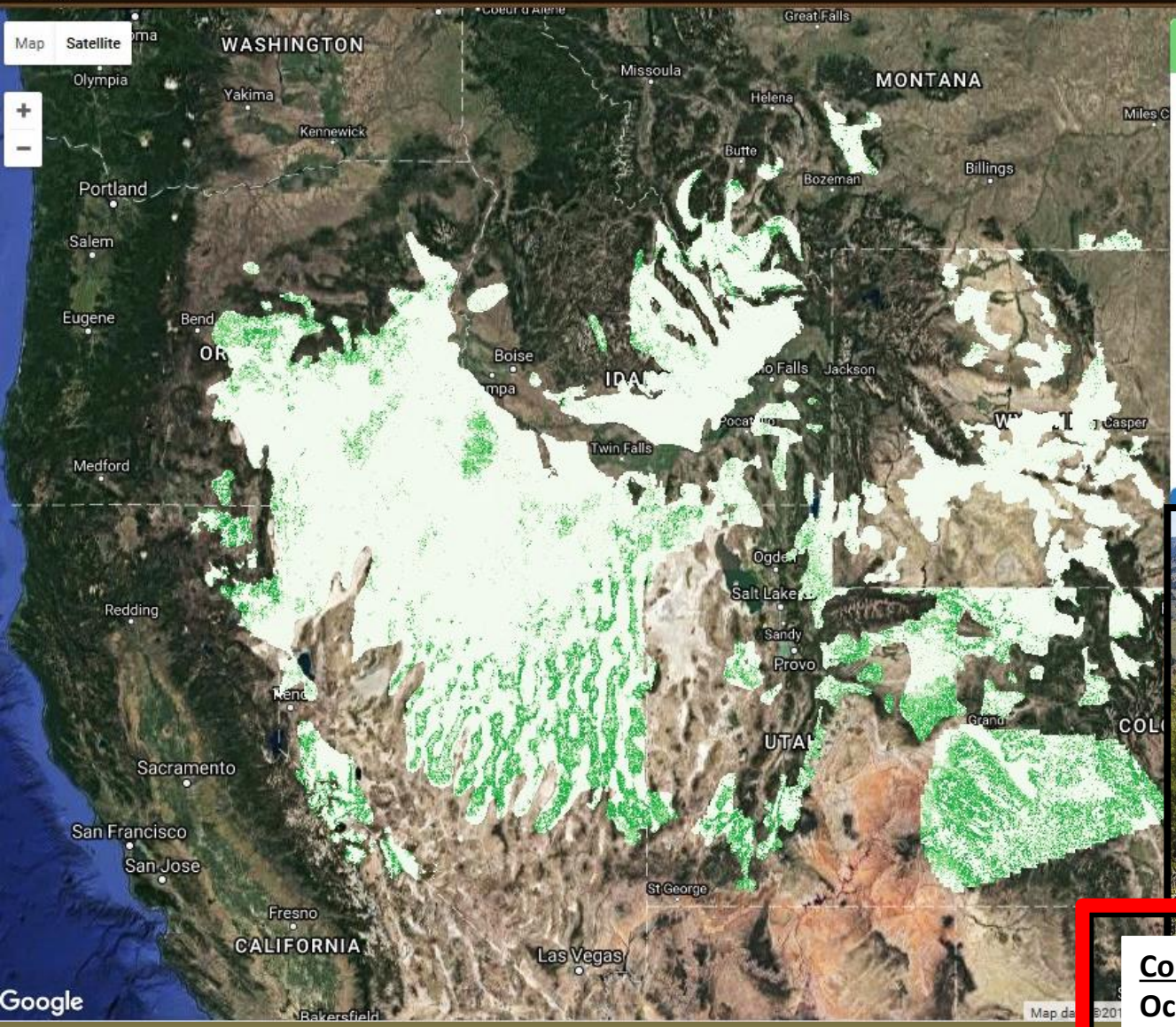
Brian G. Prochazka, USGS

Christian A. Hagen, Oregon State University

USGS
science for a changing world

SAGE GROUSE INITIATIVE
Wildlife Conservation Through Sustainable Ranching.

TREE COVER | ECOSYSTEM R & R | FENCE COLLISION | CULTIVATION RISK | REFERENC



TREE CANOPY COVER

TREE CANOPY COVER
High-resolution map of tree canopy cover across sage grouse habitat.

< 1	1 - 4	4 - 10	10 - 20	20 - 50	> 50

Canopy cover / acre (%)

TREE CANOPY DATA DOWNLOAD
Click on a county to download a raster GeoTiff of tree canopy cover. State level data are also available.

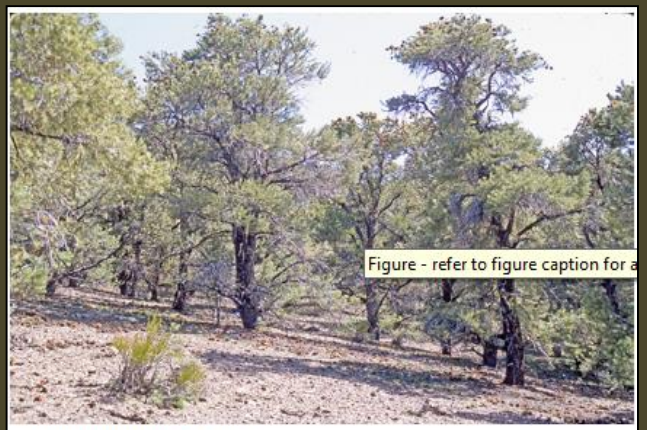
Conifer Area
Occupied Range: >27M ac (26%)
Within PACs: 12.6M ac (25%)
(Falkowski et al. 2017)

http://map.sagegrouseinitiative.com/

Pinyon and Juniper Phases of Encroachment

(a) **Subordinate – Phase I**
A subordinate piñon-juniper site with up-slope woodland expansion into mountain big sagebrush.

(b) **Co-Dominant – Phase II**
A co-dominate piñon-juniper, Wyoming big sagebrush site with moderately deep soils.



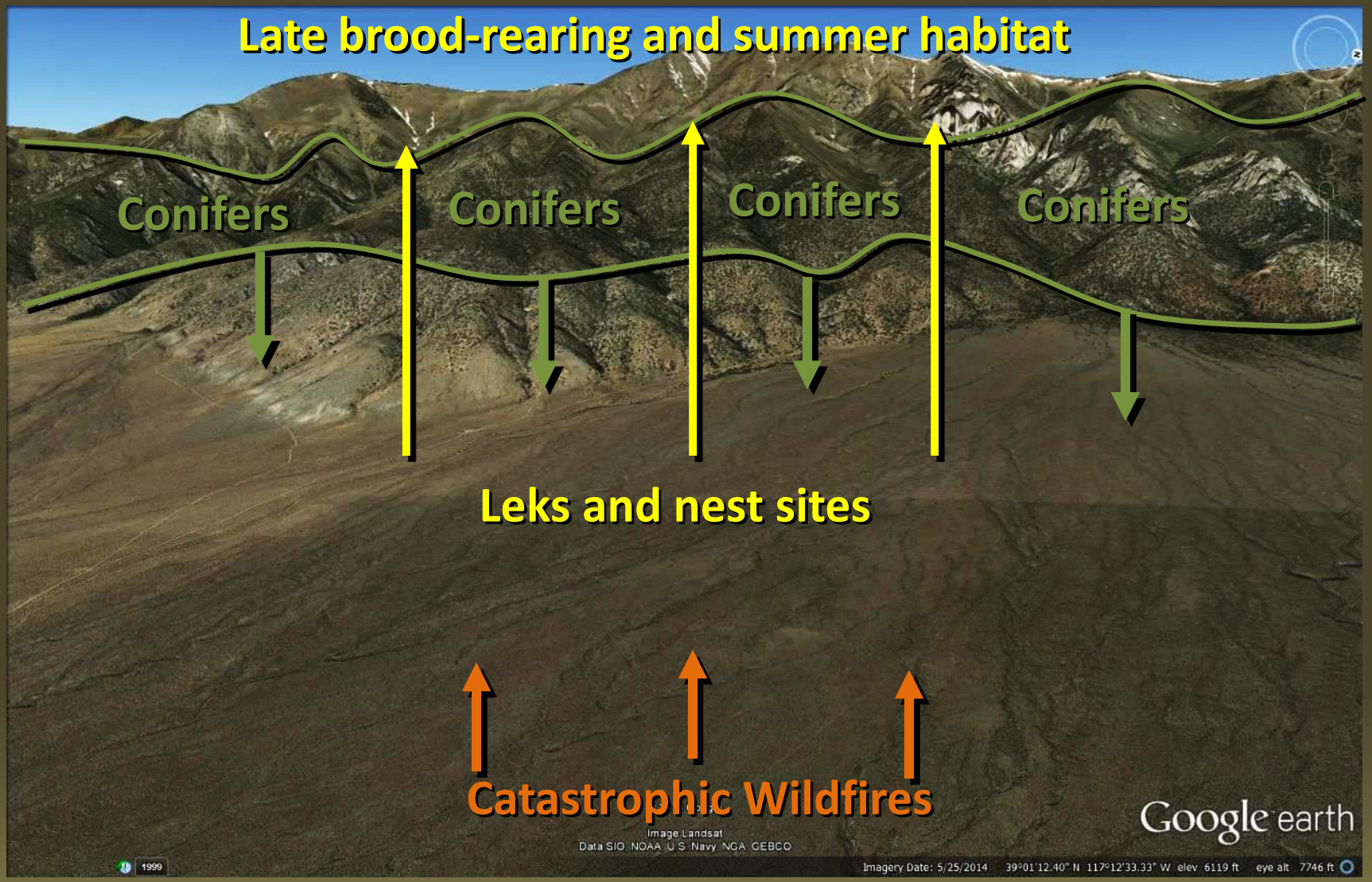
(c) **Dominant - Phase III**
A dominant piñon-juniper site with Wyoming big sagebrush and moderately deep soils.

Phase I
CC1 = >0 – 10%

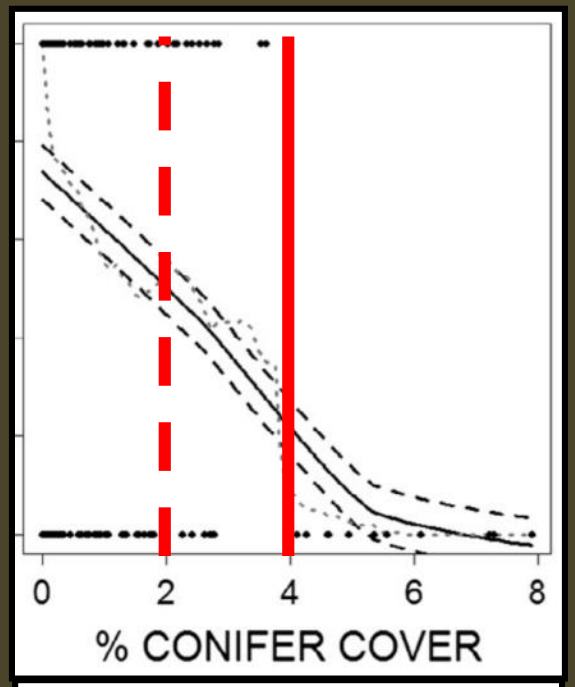
Phase II
CC2 = >10 – 20%

Phase III
CC3 = >20%

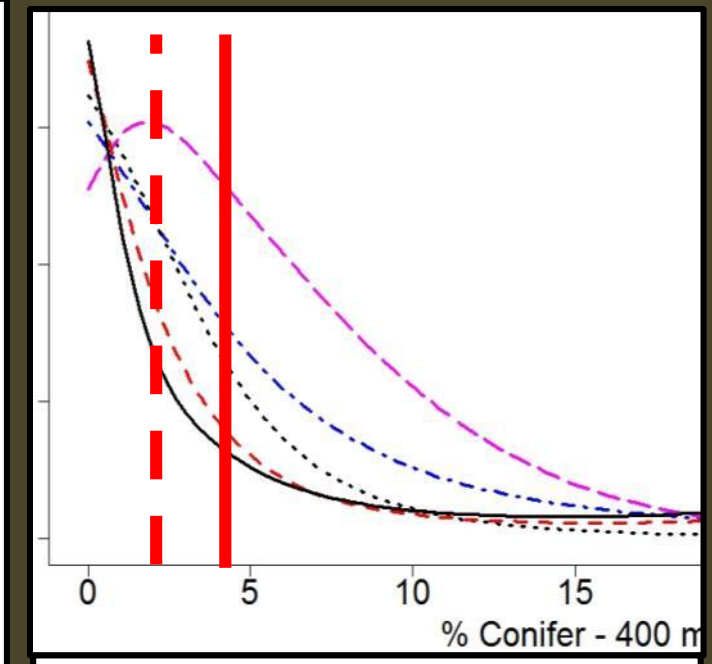
Effects of Conifer on Sage-Grouse



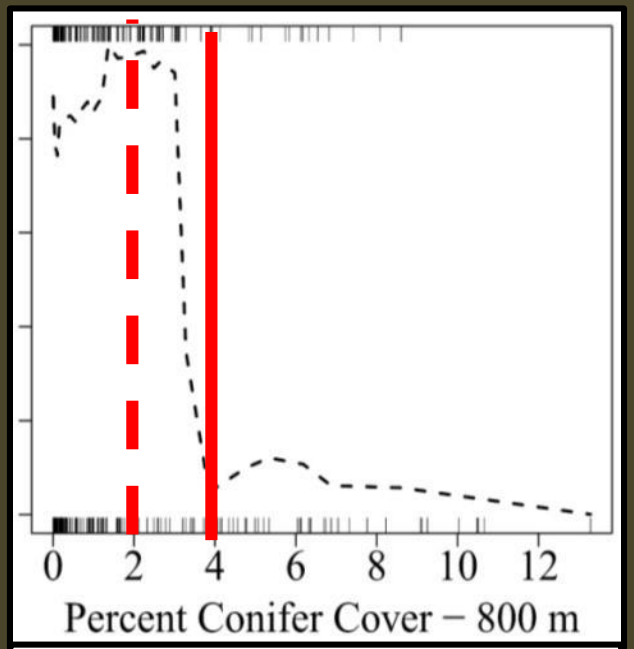
Effects of Conifer on Sage-Grouse



Leks: 1000 m
Baruch-Mordo et al 2013

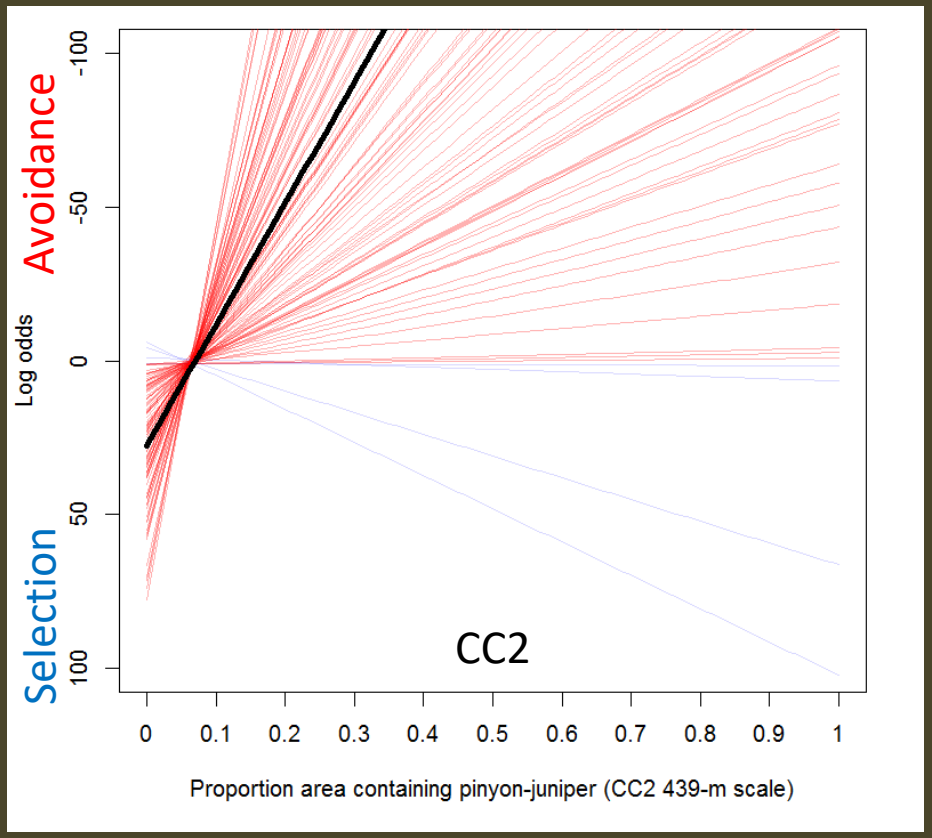


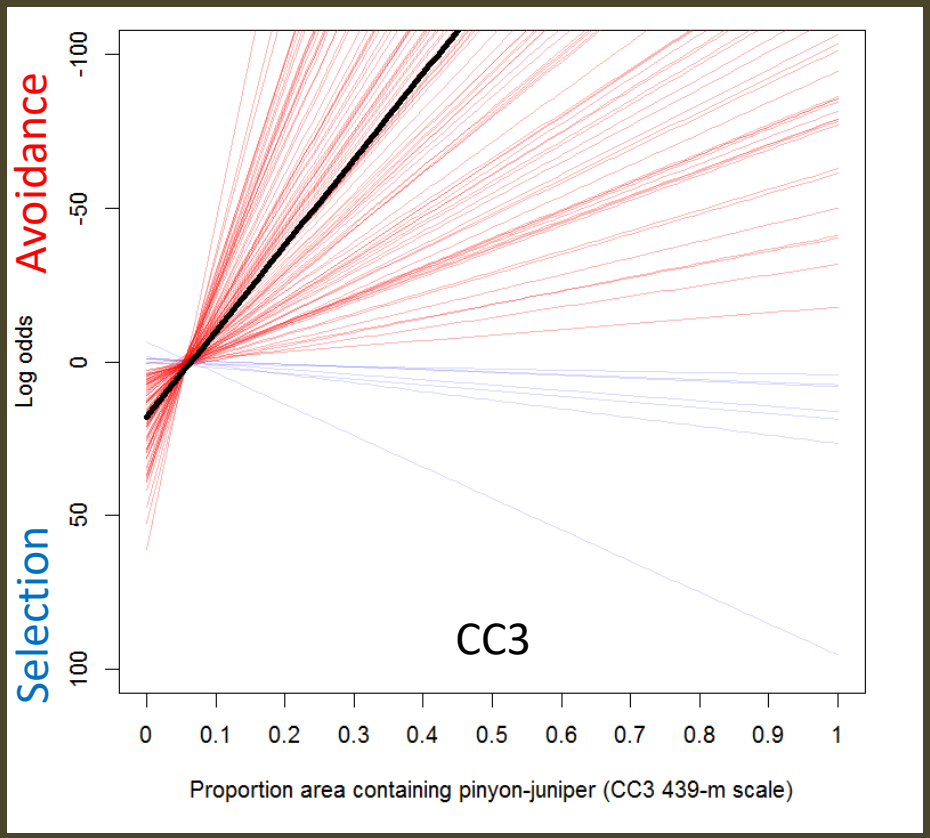
Seasonal: 400 m
Severson et al (in prep)



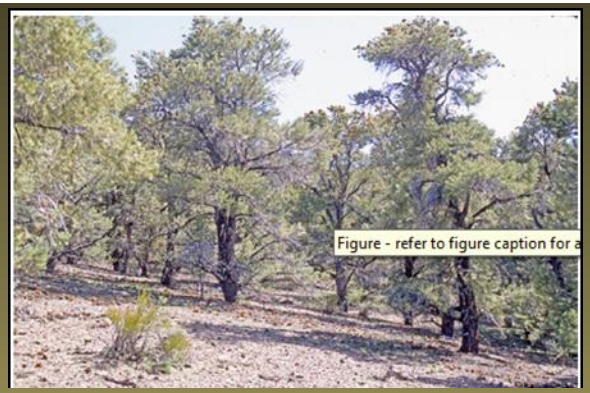
Nests: 800 m
Severson et al 2017

Avoid Cover Class 2 & 3

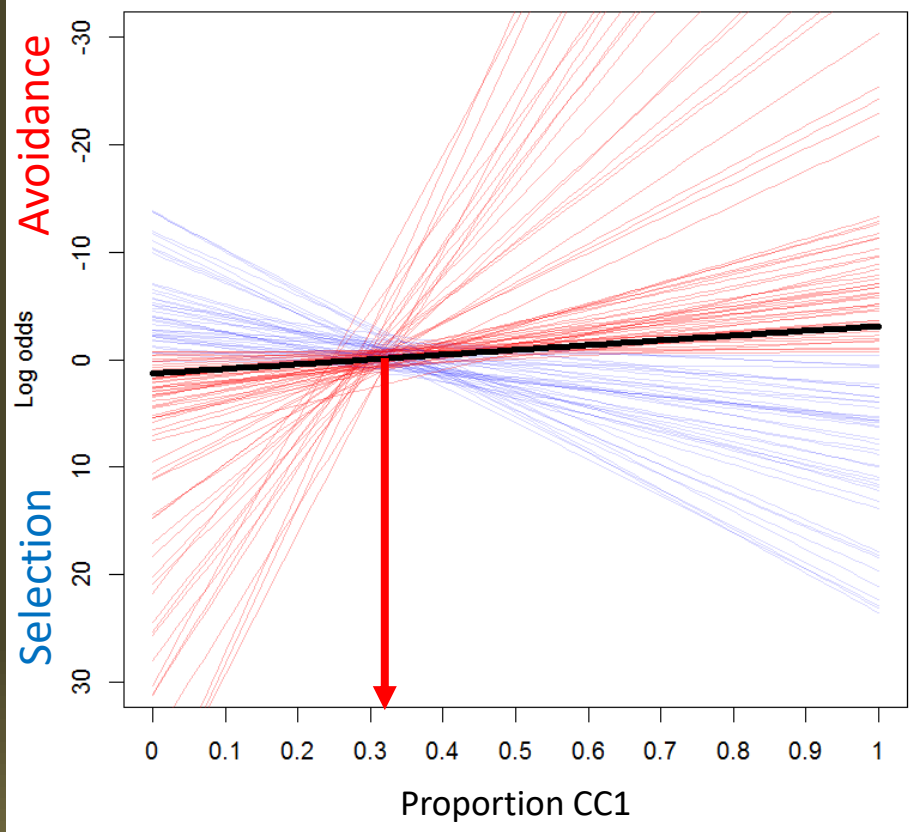


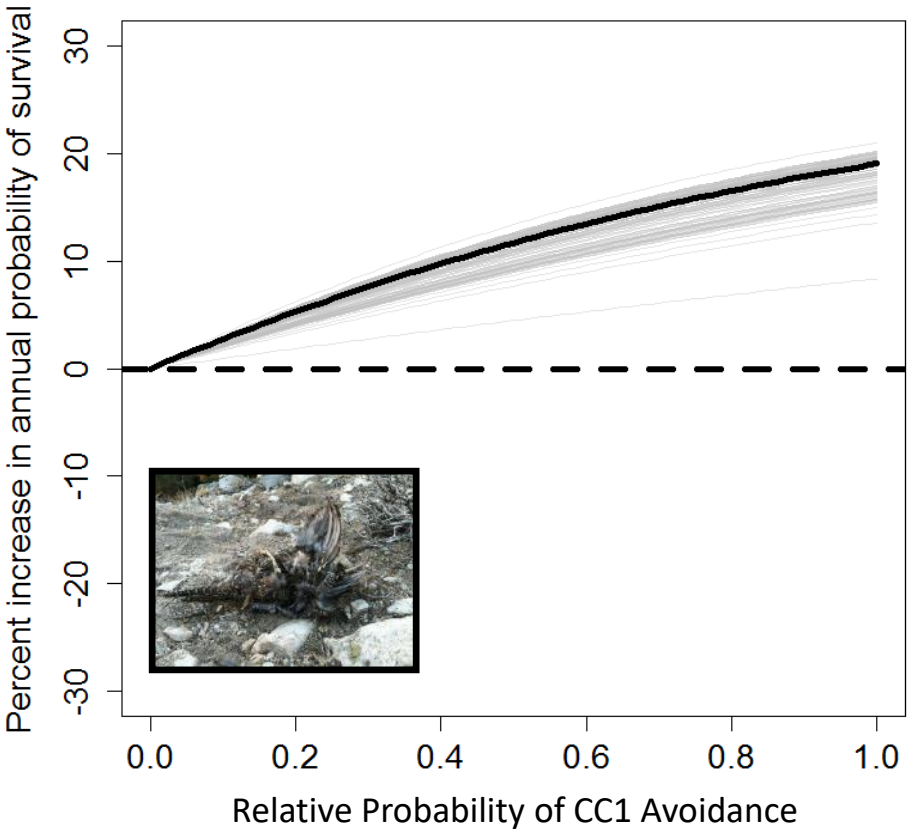


Coates et al. 2017



Processes: Avoidance of PJ Associated with Higher Survival

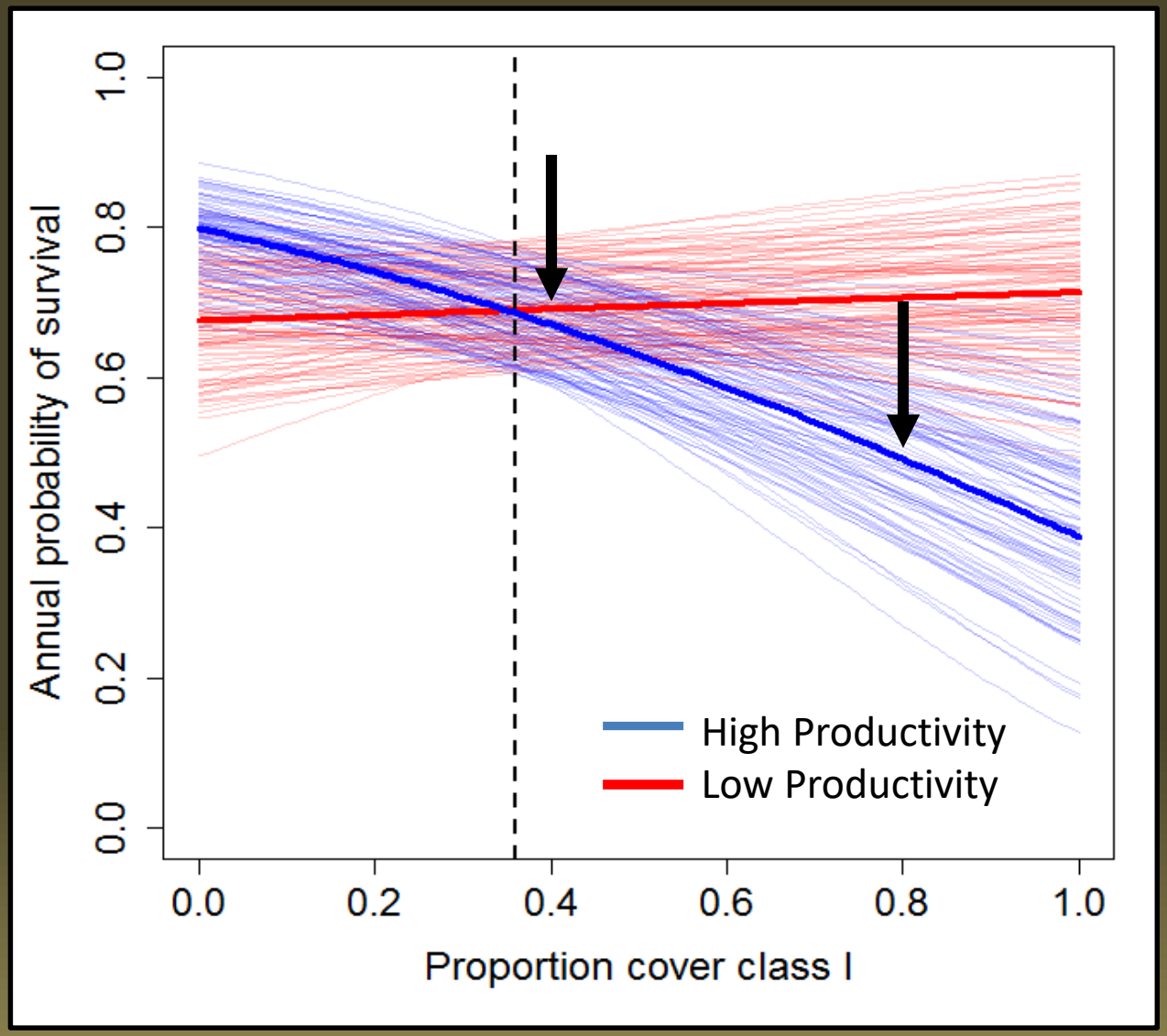




50% probability of selection was ~1.5% canopy cover

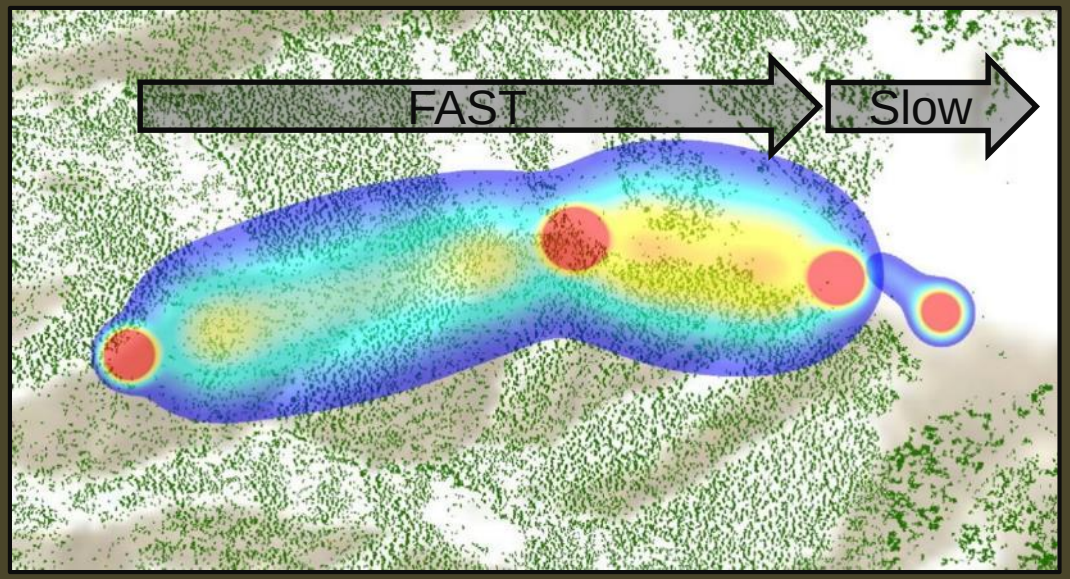
Coates et al. 2017

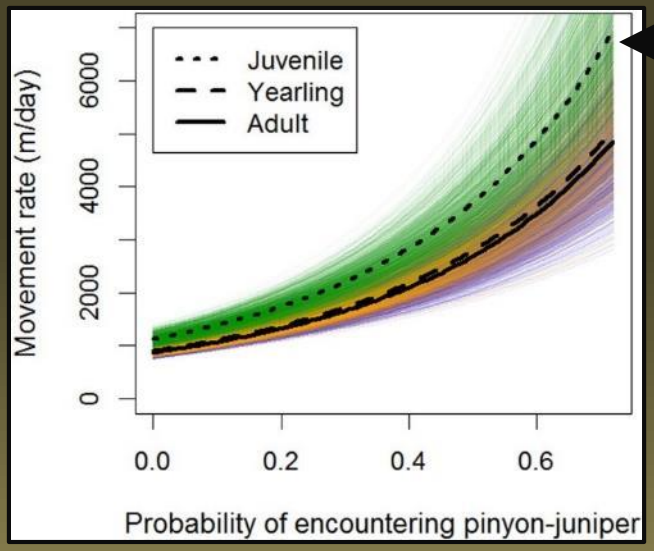
Survival in Productive Habitat is more Affected by Conifers than less Productive Habitat

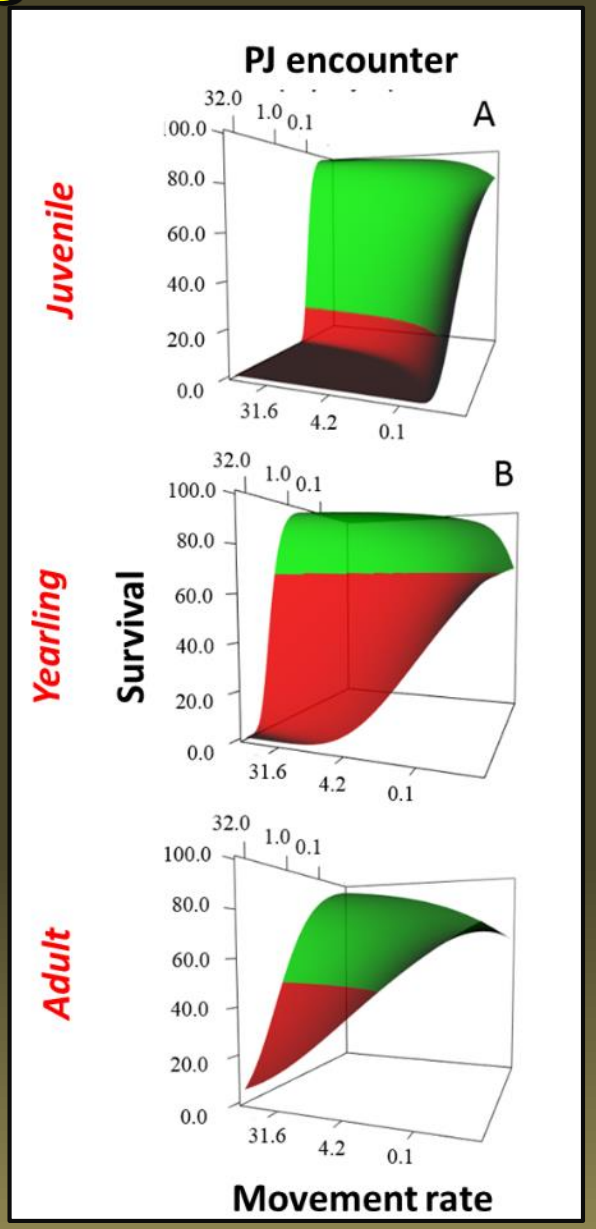


Coates et al. 2017

Mechanism: Movement Rates

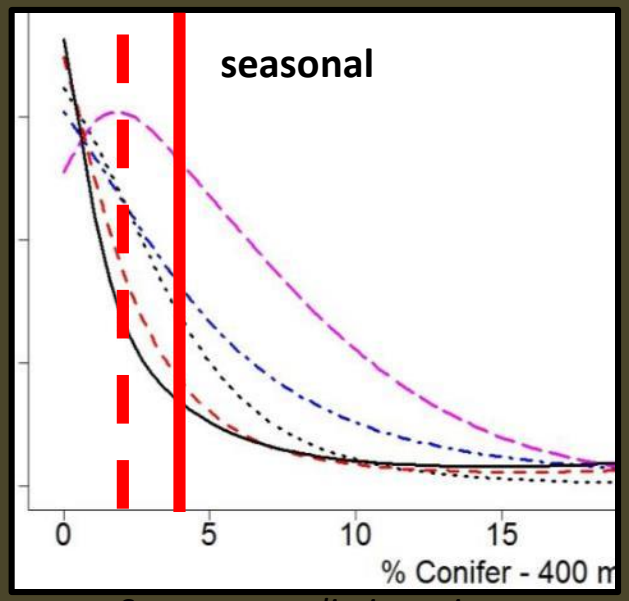




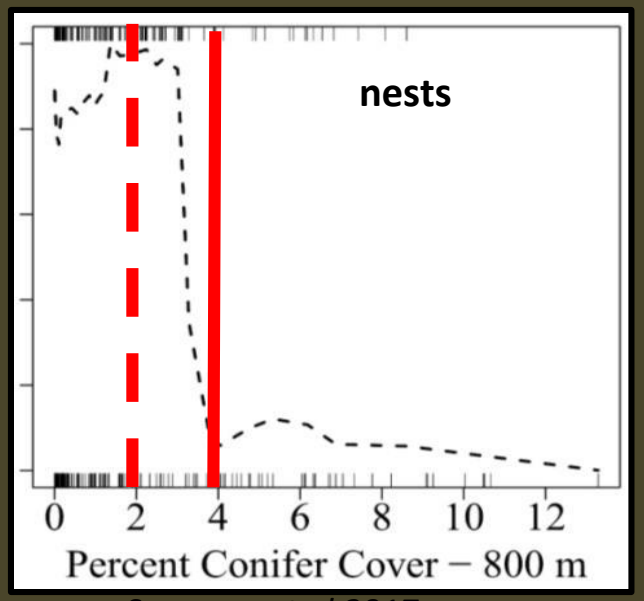


Prochazka et al 2017

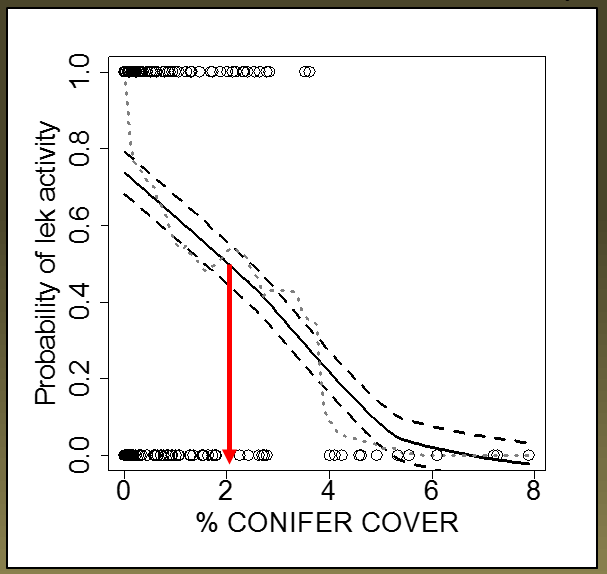
Common Threshold: 2-4% (or less)



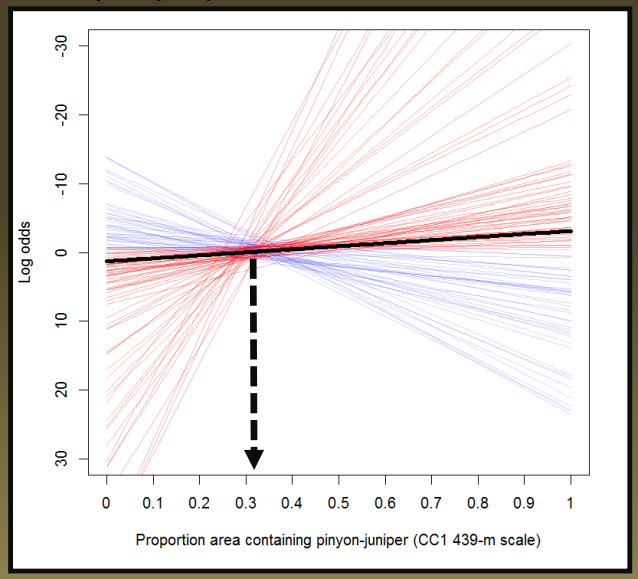
Severson, preliminary in prep

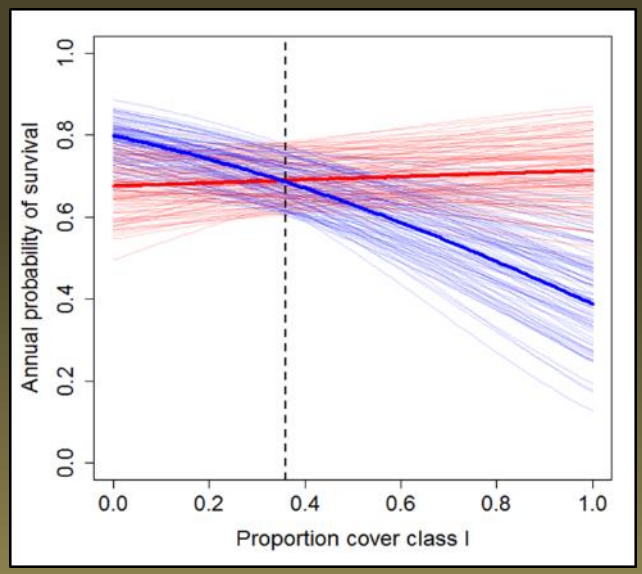


Severson et al 2017



Baruch-Mordo et al. 2013.





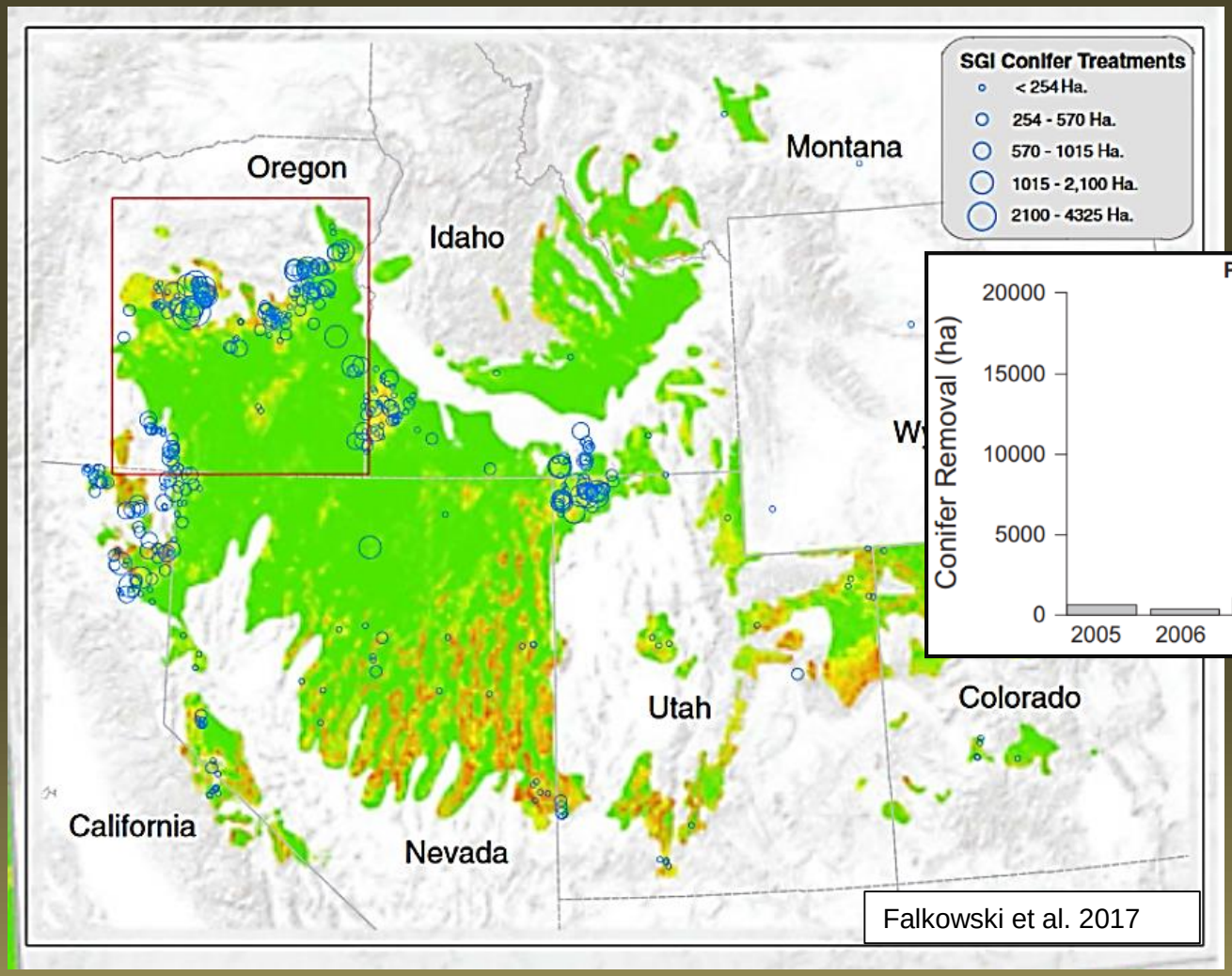
Coates et al. 2017

Conifer Removal for Sage-Grouse

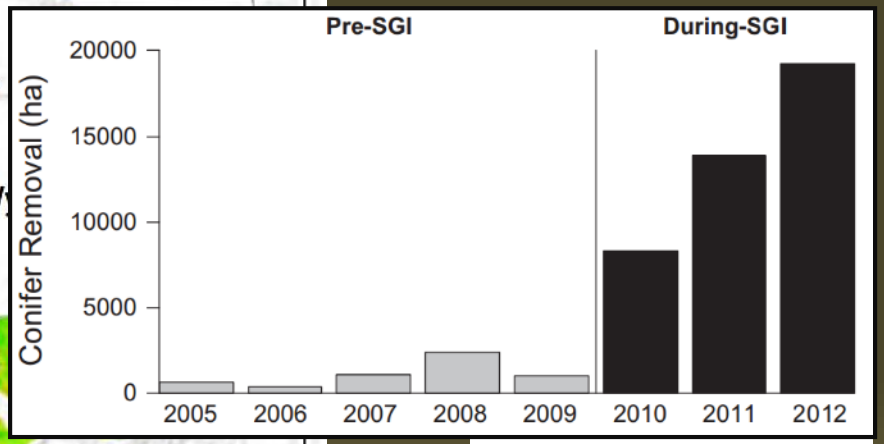
- Recommended in guidelines

  Connelly et al. 2000, Crawford et al. 2004

- Very little direct research (USFWS 2015)



Falkowski et al. 2017



Baruch-Mordo et al. 2013

Photos by: Todd Forbes

Landscape-scale BACI Conifer Removal

3 yr post-treatment

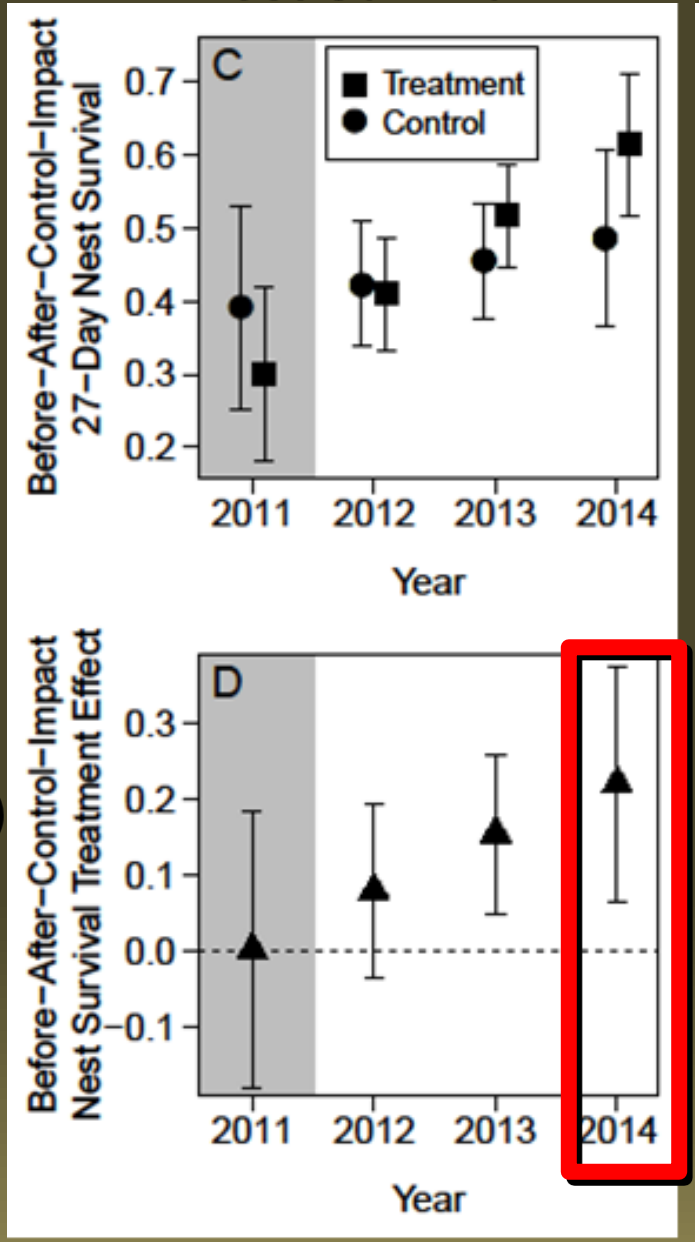
Nest Survival
- 17.8% increase

Female Survival
- 6.6% Increase

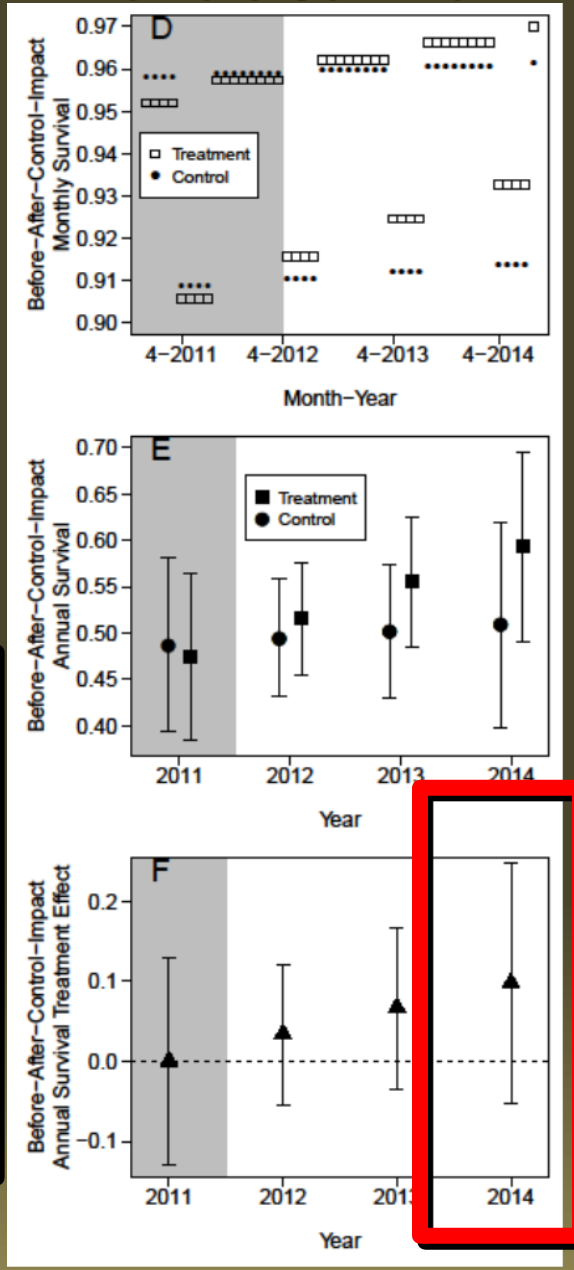
Population Growth (λ)
- Control: 0.97 (0.79-1.19)
- Treat: 1.21 (0.96-1.51)

24% increase in λ

Nest Survival



Female Survival



Severson et al 2017

Discussion

- Avoidance of conifers
- Negative impacts to demographic rates
- Important vital rate increase after treatment
  - Increased availability of high quality habitat
  - Decreased avian predator efficiency
- Targeted landscape-scale removal
- Short-term study
  - Long-term demographic assessments necessary
- More research needed on potential ecological traps
- Conifer encroachment is a tractable problem and removal can provide long-term benefits in sagebrush ecosystems

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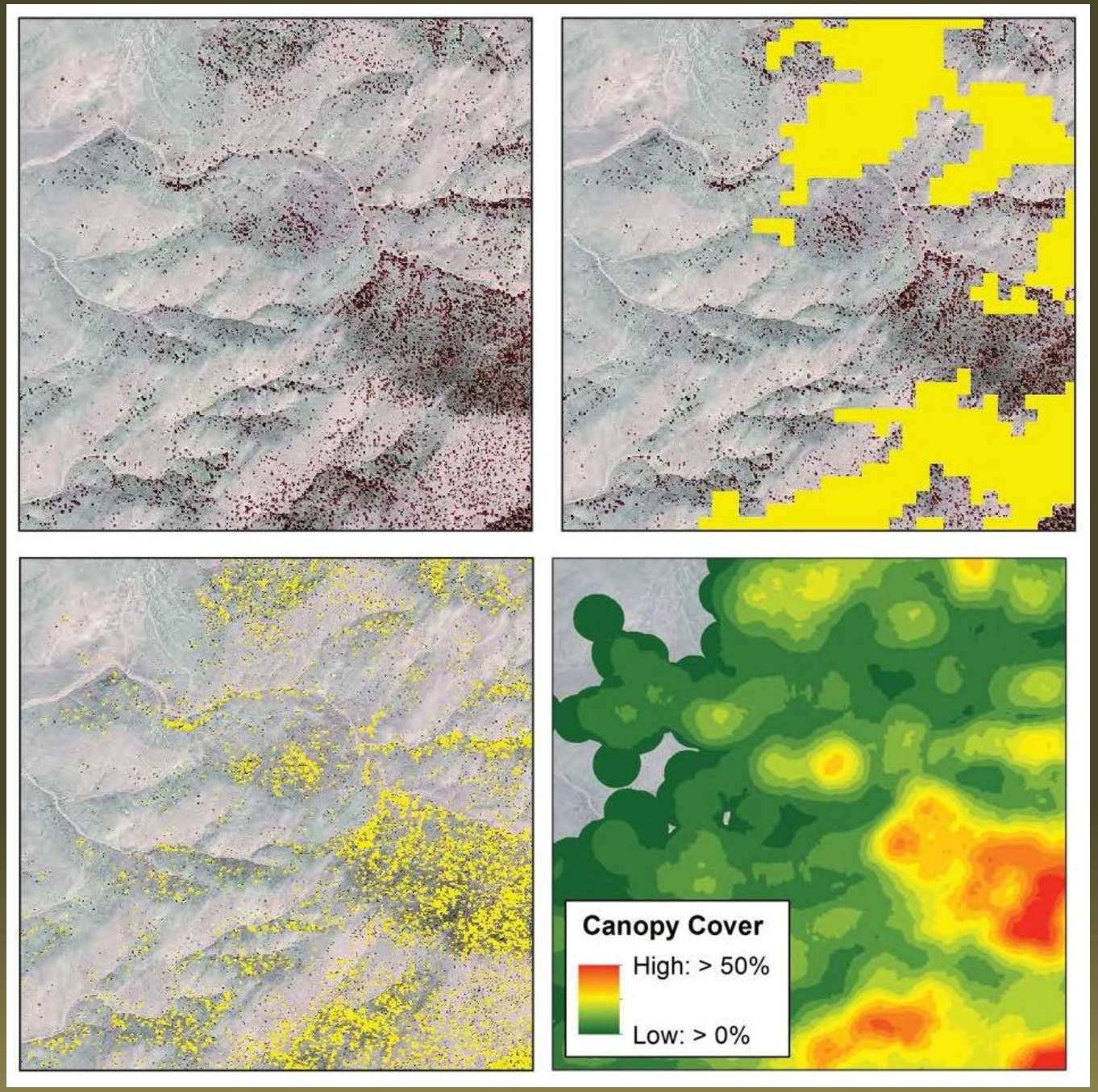
Prepared in cooperation with the Bureau of Land Management and Nevada Department of Wildlife

Using Object-Based Image Analysis to Conduct High-Resolution Conifer Extraction at Regional Spatial Scales

Open-File Report 2017–1093

U.S. Department of the Interior
U.S. Geological Survey


Canopy Cover
High: > 50%
Low: > 0%

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Prepared in cooperation with the Bureau of Land Management and Nevada Department of Wildlife

Greater Sage-Grouse (*Centrocercus urophasianus*) Nesting and Brood-Rearing Microhabitat in Nevada and California—Spatial Variation in Selection and Survival Patterns

Open-File Report 2017–1087

U.S. Department of the Interior
U.S. Geological Survey

USGS
science for a changing world

Prepared in cooperation with the Bureau of Land Management

Hierarchical Population Monitoring of Greater Sage-Grouse (*Centrocercus urophasianus*) in Nevada and California—Identifying Populations for Management at the Appropriate Spatial Scale

Open-File Report 2017–1089

U.S. Department of the Interior
U.S. Geological Survey

Parker Meadows Translocation

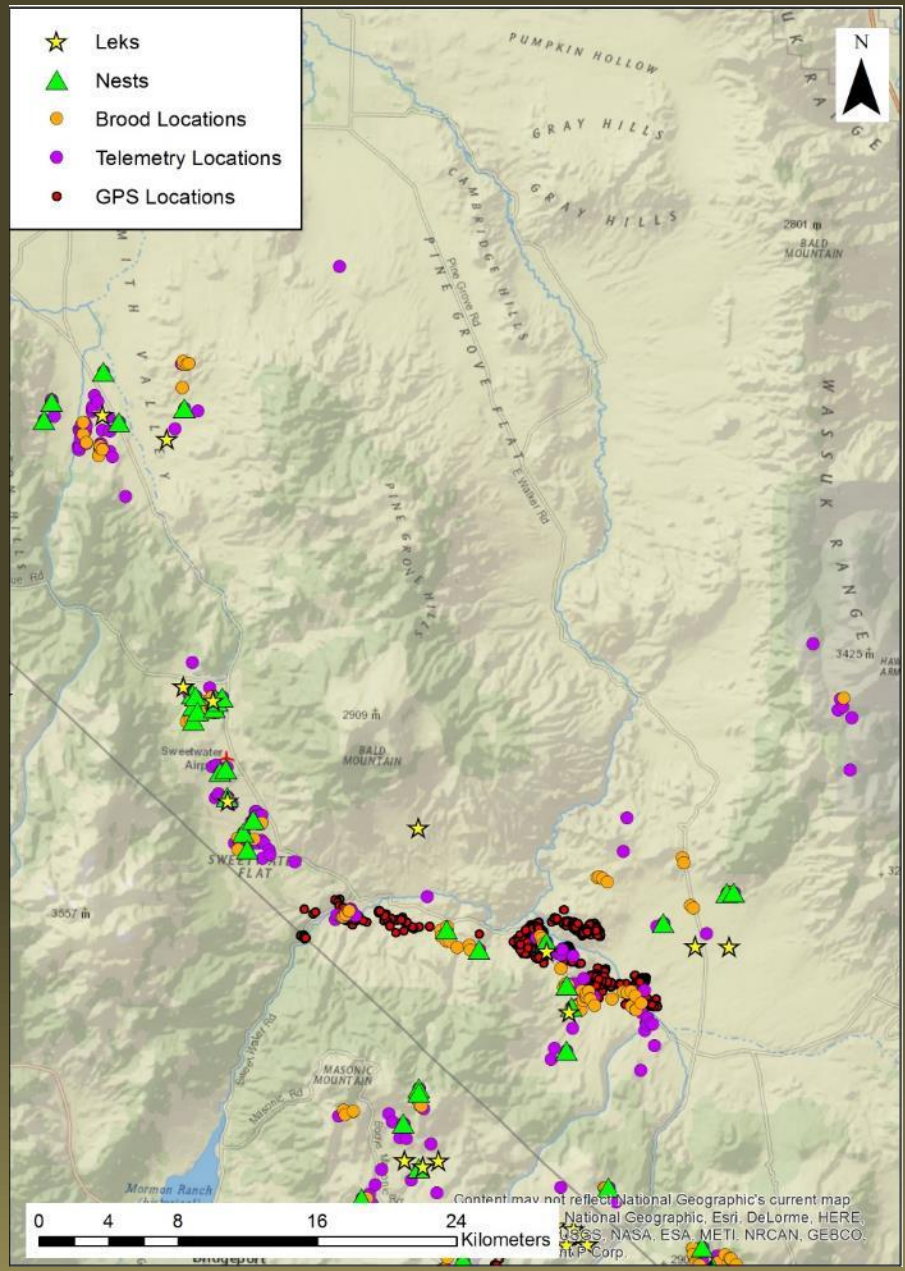
- Translocated 25 grouse (17 female, 8 males) from Bodie Hills
  - 3 females artificially inseminated
  - 3 nests: 3 hatch, 2 successful broods
  - 2 females stayed in Parker but did not nest
  - 3 males stayed in Parker
  - 4 birds are missing
  - 6 returned to Bodie (3 nested)
  - 2 went to Sage Hen
  - 5 mortalities at Parker
- Brood Translocations
  - 3 broods moved: 1 successful
  - Released in 8x8-ft enclosure

Mount Grant and Desert Creek

- 18 VHF transmitters deployed
- 3 GPS units deployed
- 78 birds tracked
- 344 VHF locations
- 2,432 GPS locations

- 35 nests: 18 hatched (51%)
- 18 broods: 7 successful (39%)

- 227 habitat surveys
- 331 raptor-raven surveys

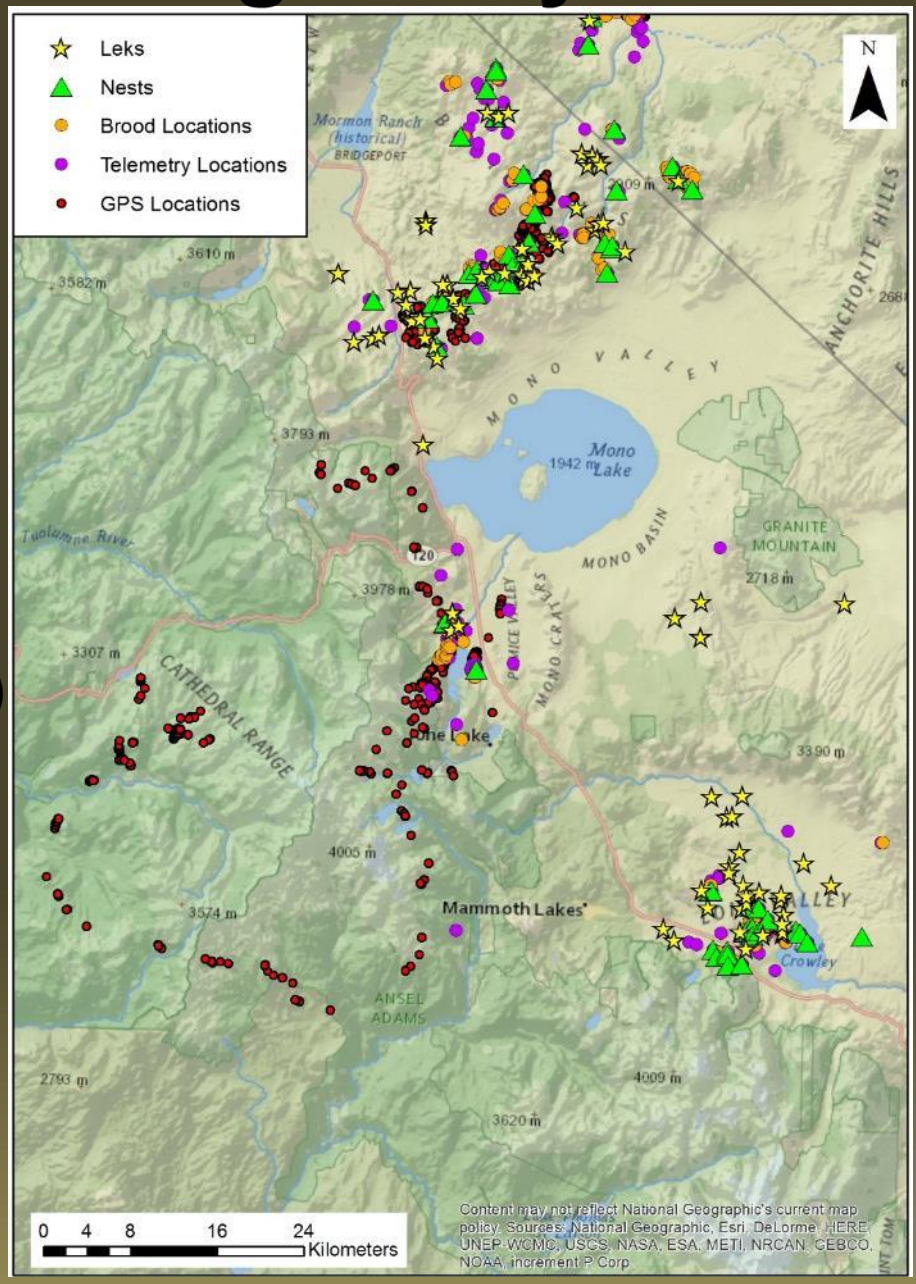


Bodie Hills and Long Valley

- 27 VHF transmitters deployed
- 7 GPS units deployed
- 79 birds tracked
- 433 VHF locations
- 4,255 GPS locations

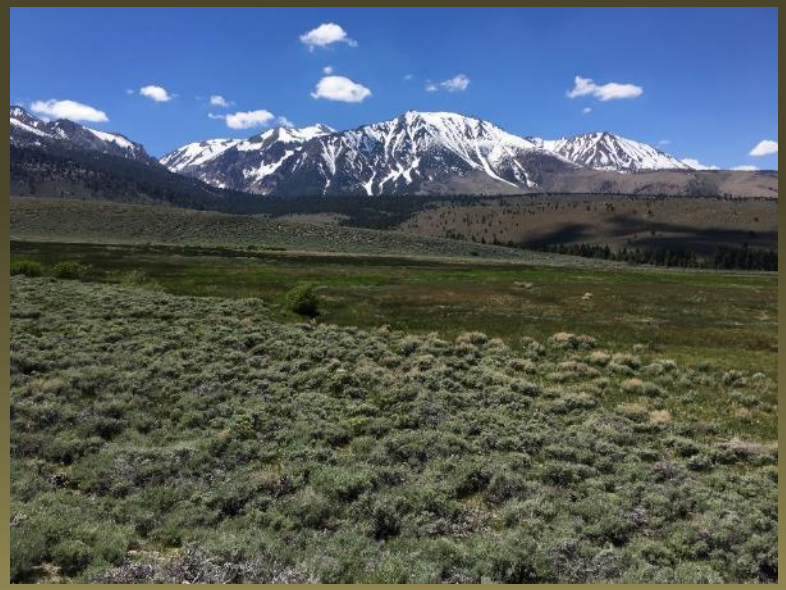
- 54 nests: 26 hatch (48%)
- 23 broods: 3 successful (~15%)

- 172 habitat surveys
- 512 raptor-raven surveys



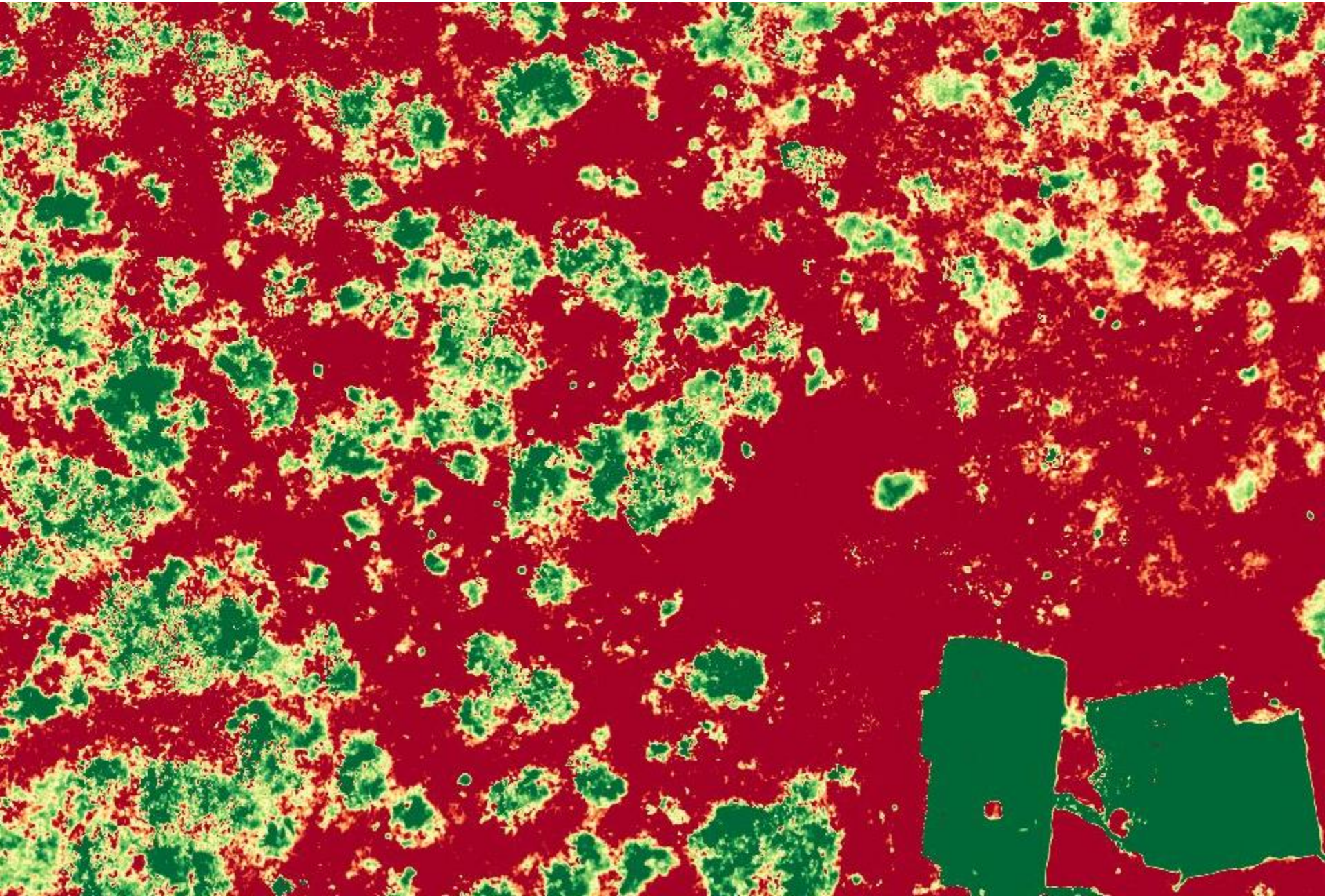
Future Field Efforts

- Deploy VHF and GPS units in fall 2017 and spring 2018
- Track 40 females/site in during nesting season
- Continue Parker Meadow translocations
- Initiate field season at White Mountains in 2018
  - 4 females and 3 males with GPS units thus far
  - 40 females by spring
- Drone habitat survey project



Drone Habitat Survey Project

Plant Health (Red = High)



Vegetation Structure

Acknowledgments

- Natural Resources Conservation Service – Sage Grouse Initiative
- Bureau of Land Management
- Oregon Dept of Fish and Wildlife
- Nevada Department of Wildlife
- University of Idaho
- Landowners
- Field Technicians
- AboveGeo