



Black-backed Woodpeckers, Fire, and Drought – Understanding Resource Needs of a Disturbance Specialist

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Black-backed Woodpecker talk outline



Talk preview:

- Background info on BBWO
- Distribution, occurrence, and identification
- BBWO fire colonization and dispersal
- Nesting anecdotes
- Home range and habitat selection
- Management Indicator Species surveys
 - Including recent beetle-killed forest surveys
- Woodboring beetle/Woodpecker research

Black-backed Woodpecker ecology

Burned-forest specialist

Primary food = larvae of wood-boring beetles



Black-backed Woodpecker ecology

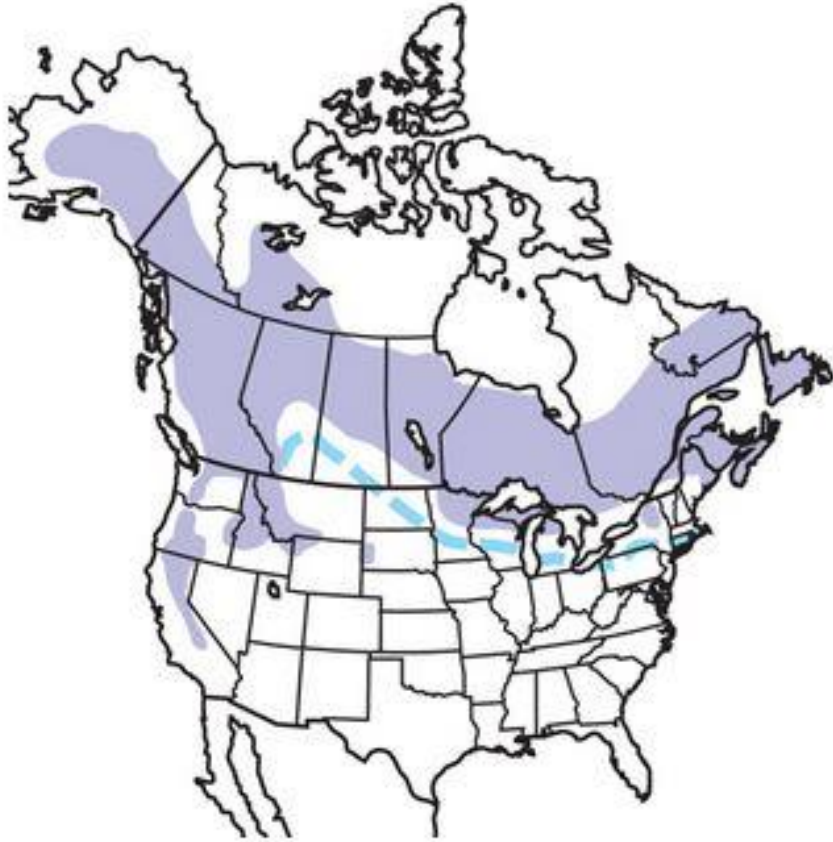
- **Burned forests are commonly treated with salvage logging or other prescriptions that remove fire-killed trees**
- **Can reduce or entirely negate habitat suitability for BBWOs, setting up a potential conflict**
- **Creating a need for more information on the ecology and habitat needs of the species**
- **IBP and the various Forest Service partners have been working to address this need**





Black-backed Woodpecker background info

Distribution



Black-backed Woodpecker background info

Identification and Occurrence



Black-backed Woodpecker background info

Identification and Occurrence



- Occurrence starts at SMC belt
- Most abundant in burned forest, but can be common in one fire and absent in another
- Can be present but very uncommon in green forest
- In green forest seem to be most abundant in LPP
- Typically detected by vocalizations or drumming
- Vocalizations include: kek call, snarl
- Identifiable by drumming but takes a trained ear
- But generally quiet and not surveyed adequately without playback

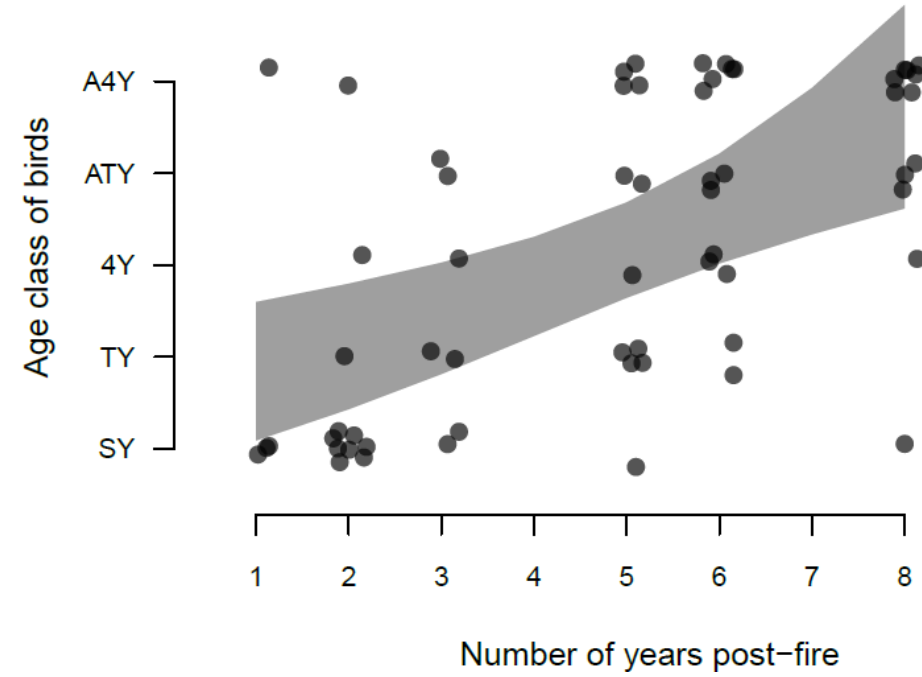
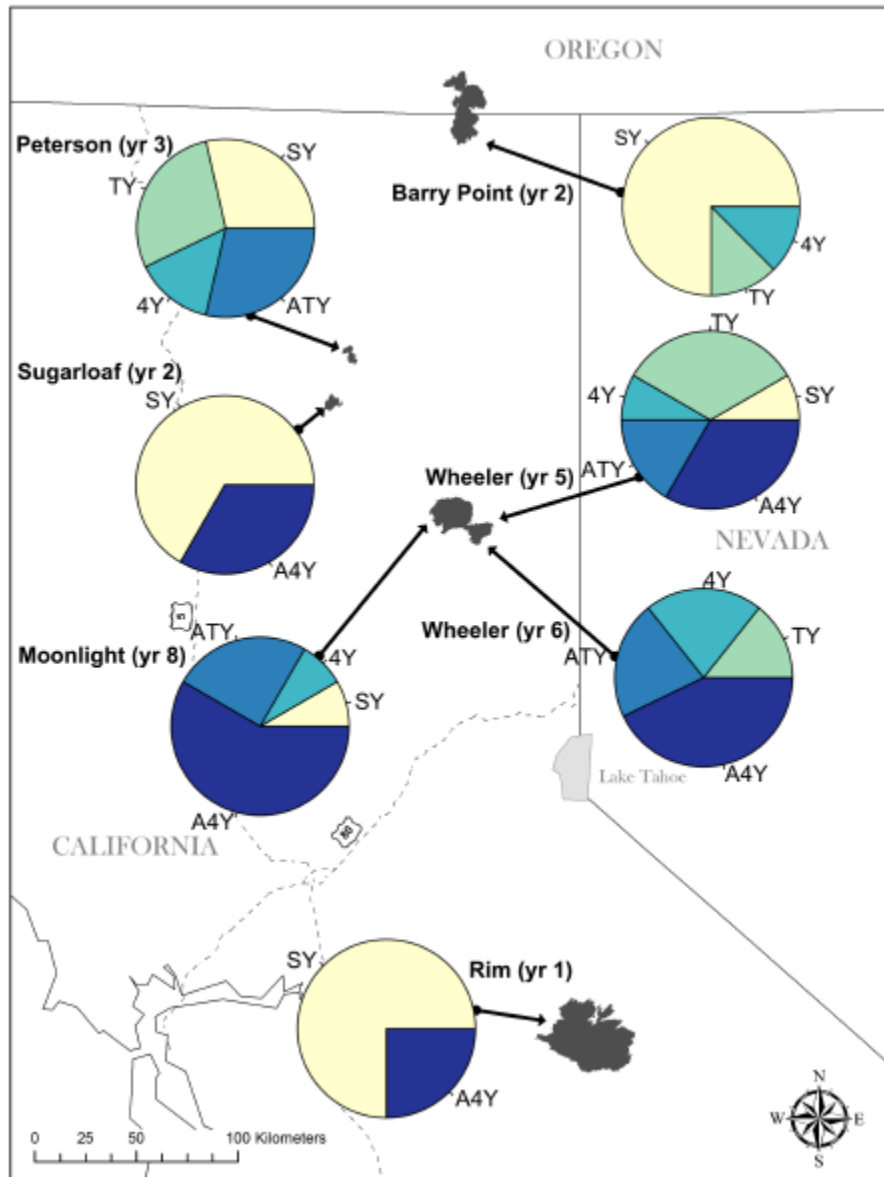
Black-backed Woodpecker background info

Fire colonization and dispersal



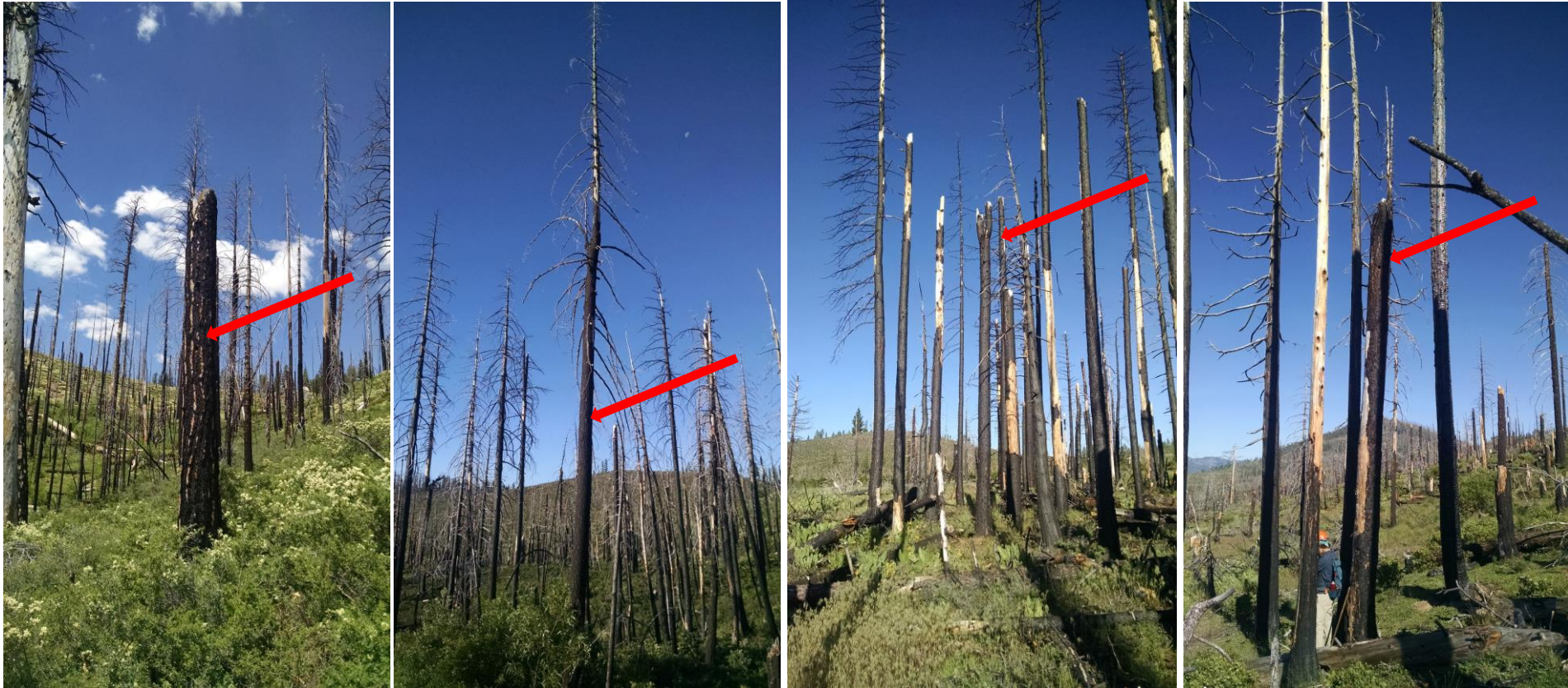


Black-backed Woodpecker background info



PEER REVIEWED PAPER:
 Siegel, R. B., M. W. Tingley, R. L. Wilkerson, C. A. Howell, M. Johnson, and P. Pyle. 2016. Age structure of Black-backed Woodpecker populations in burned forests. *The Auk: Ornithological Advances* 133:69-78.

Black-backed Woodpecker background info



Examples of nests on the Moonlight fire, 7-10 years after fire.

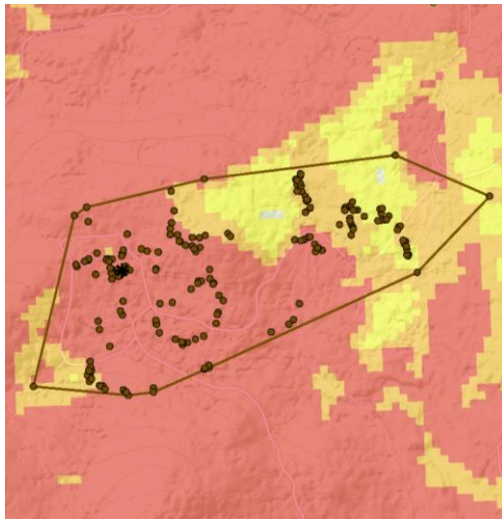
Black-backed Woodpecker background info



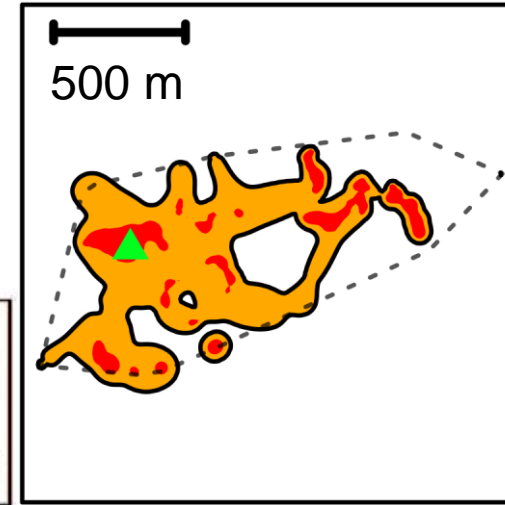
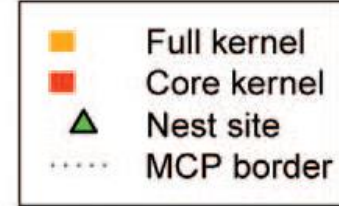
Bear predation



Home range and habitat selection studies



Movement-based kernel estimation



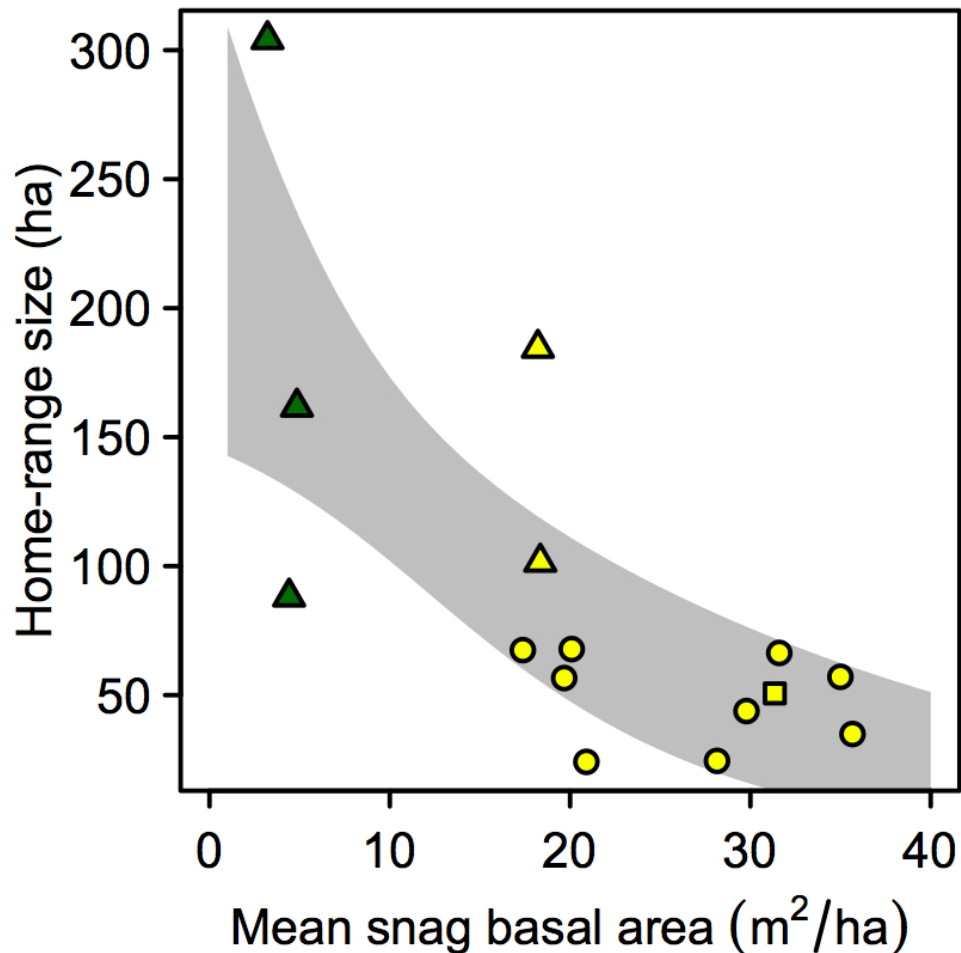
Telemetry-based tracking yields:

- Assessment of home-range size and characteristics
- Identification of intensive use areas
- Ground-based description of forest stands and individual trees used for foraging



Home range and habitat selection studies

Evaluated habitat variables, age, and sex for predicting home range size. Average **snag basal area** across home range was best predictor, by far.



Home-range results published in peer-reviewed literature.

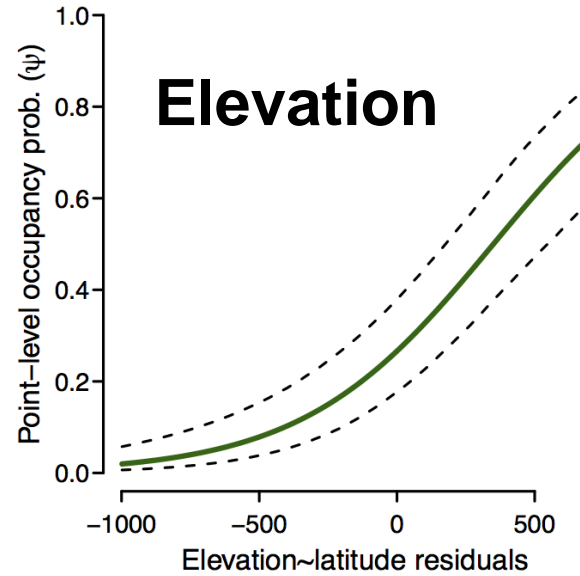
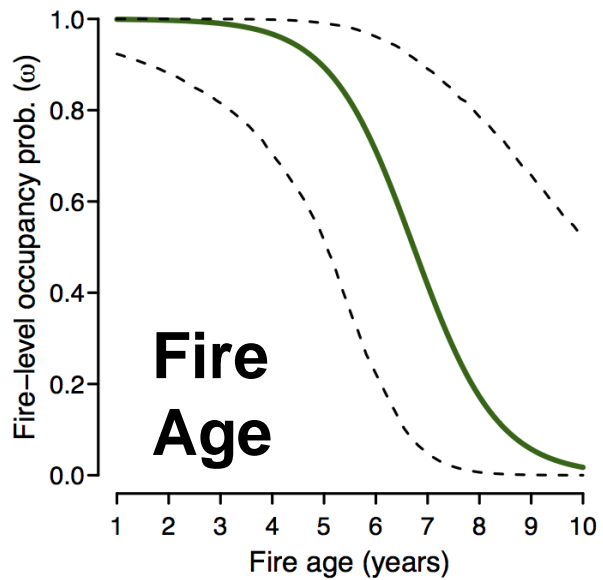
Tingley, M. W., R. L. Wilkerson, M. L. Bond, C. A. Howell, and R. B. Siegel. 2014. Variation in home range size of Black-backed Woodpeckers (*Picoides arcticus*). *The Condor: Ornithological Applications* 116:325–340.



Management Indicator Species monitoring

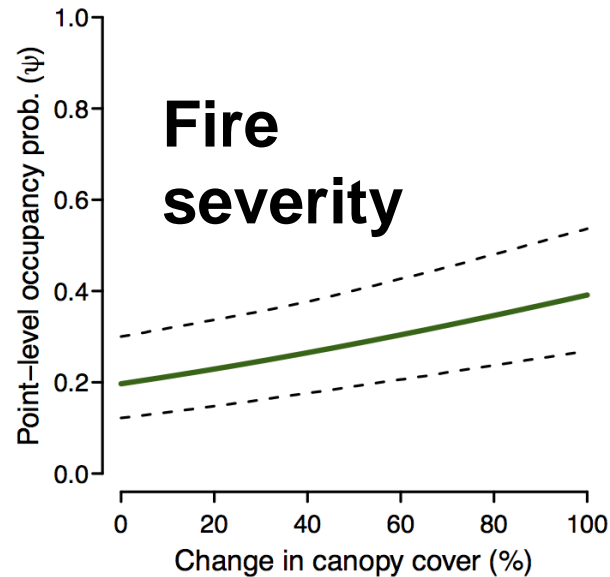
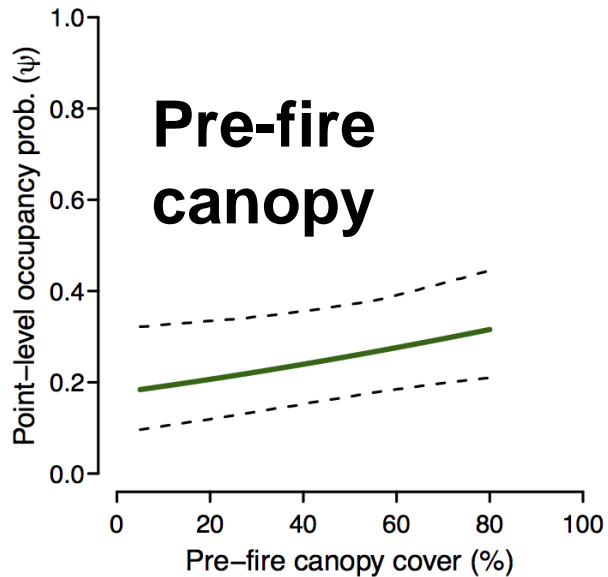
- Randomly select 50 fires in Sierra/Cascades ecoregion for surveys every summer since 2009
- Approximately 450 surveys visits at >100 fires
- >8,000 individual BBWO surveys
- We use these occupancy data in a Bayesian hierarchical model to estimate detection probability and occupancy probability, both as functions of a variety of environmental covariates and survey variables.

Management Indicator Species monitoring



Other variables in the model include:

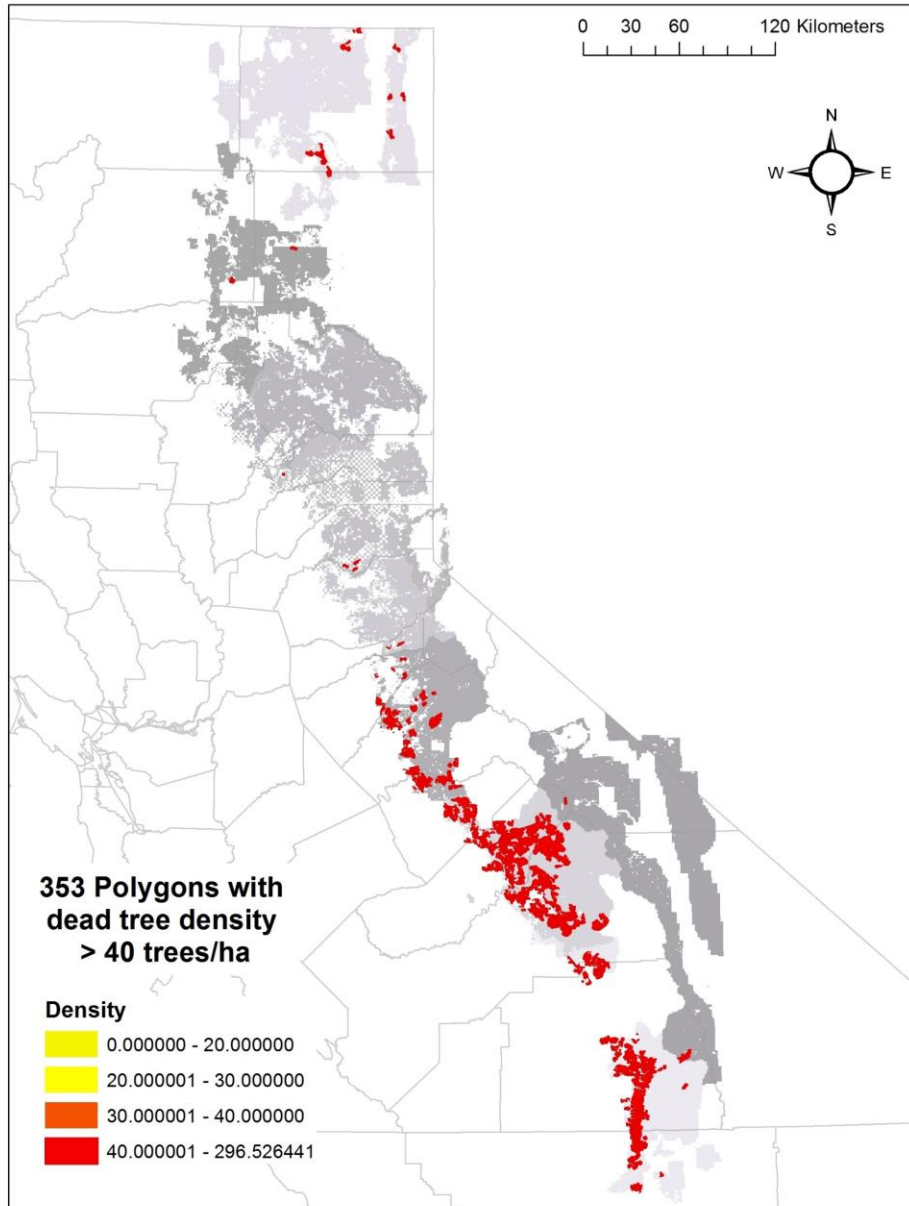
- **dominant tree size class**
- **forest type**
- **latitude**



Occupancy modeling approach and results published in peer-reviewed literature.

Saracco, J. F., R. B. Siegel, and R. L. Wilkerson. 2011. Occupancy modeling of Black-backed Woodpeckers on burned Sierra Nevada forests. *Ecosphere* 2:art31.

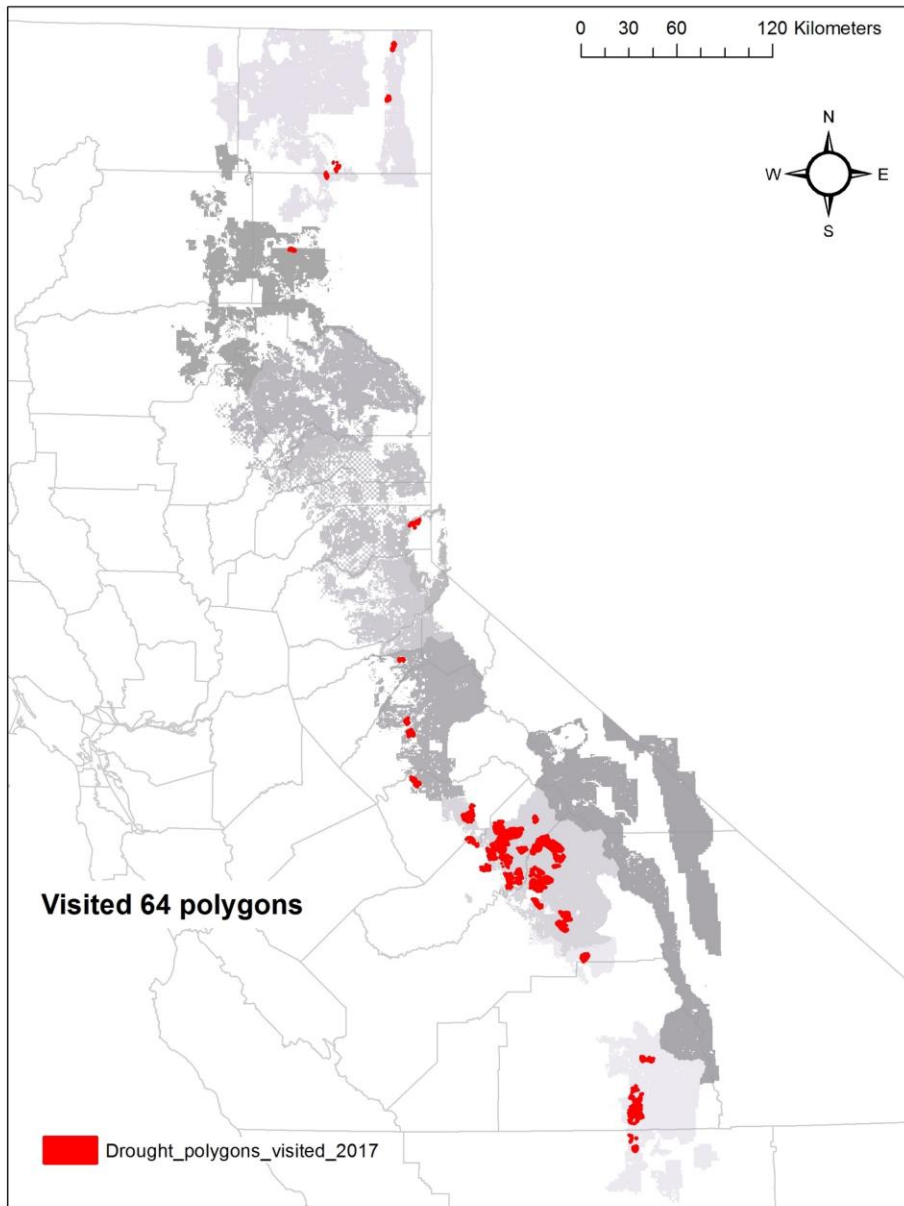
Management Indicator Species monitoring



Beetle-killed forest BBWO surveys

- **Used 2016 ADS data to identify 353 potential survey polygons**
 - **On Forest Service property**
 - **>250 ha in size**
 - **Minimum of 40 dead trees/ha**
 - **Randomly selected polygons to visit for BBWO surveys**

Management Indicator Species monitoring



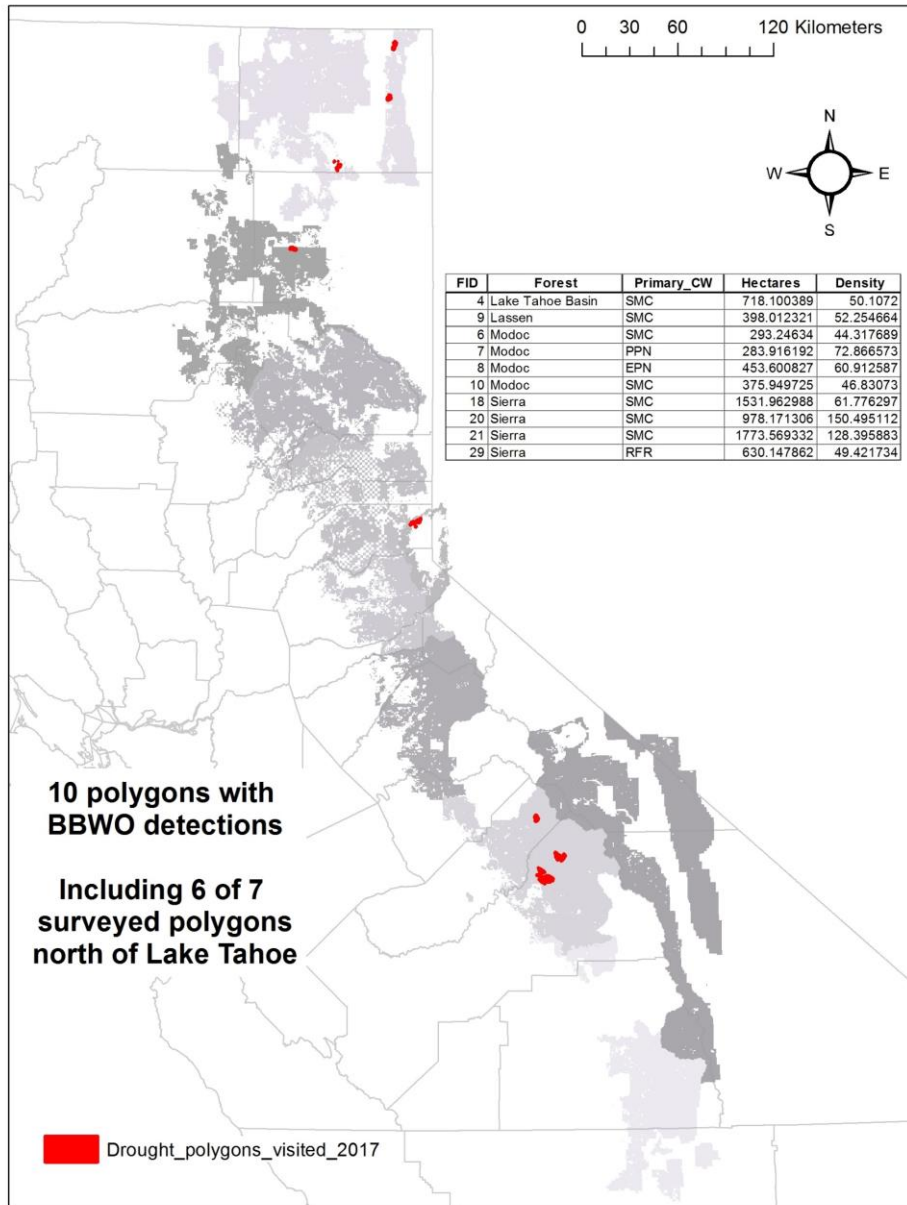
Beetle-killed forest BBWO surveys

- Surveyed 64 polygons in 2017



THE INSTITUTE FOR BIRD POPULATIONS

Management Indicator Species monitoring

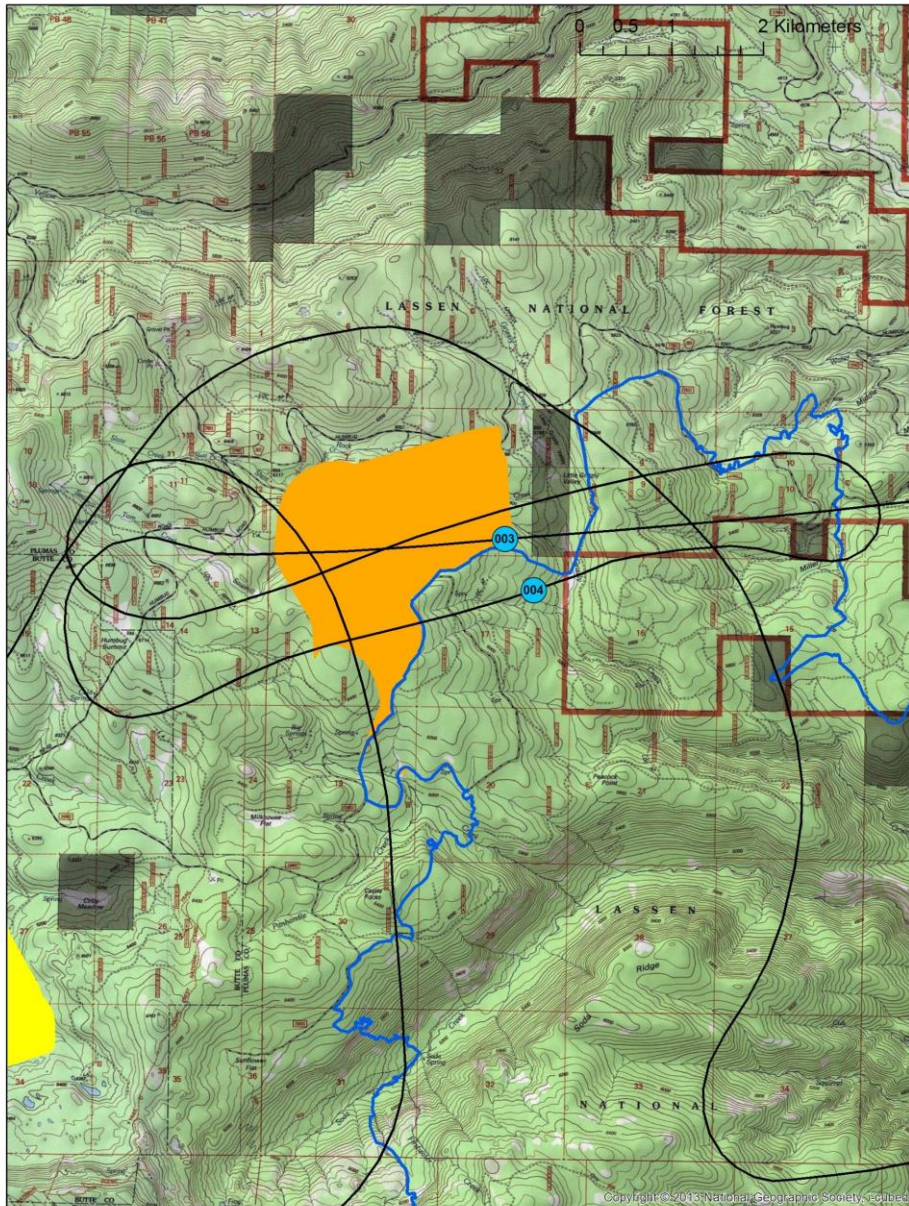


Beetle-killed forest BBWO surveys

- Surveyed 64 polygons in 2017
- 10 polygons with BBWO detections
- 6 of 7 polygons north of Lake Tahoe had BBWO detections
- No effect of polygon size or dead tree density

FID	Forest	Primary_CW	Hectares	Density
4	Lake Tahoe Basin	SMC	718.100389	50.1072
9	Lassen	SMC	398.012321	52.254664
6	Modoc	SMC	293.24634	44.317689
7	Modoc	PPN	283.916192	72.866573
8	Modoc	EPN	453.600827	60.912587
10	Modoc	SMC	375.949725	46.83073
18	Sierra	SMC	1531.962988	61.776297
20	Sierra	SMC	978.171306	150.495112
21	Sierra	SMC	1773.569332	128.395883
29	Sierra	RFR	630.147862	49.421734

Management Indicator Species monitoring



Woodboring beetle research

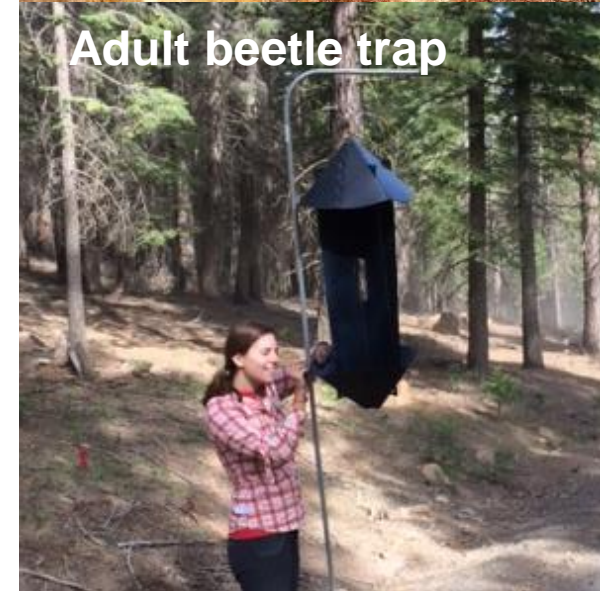
How do tree and forest stand characteristics, and time since disturbance, drive adult and larval wood-borer abundance? Does woodborer abundance explain patterns in woodpecker occurrence?



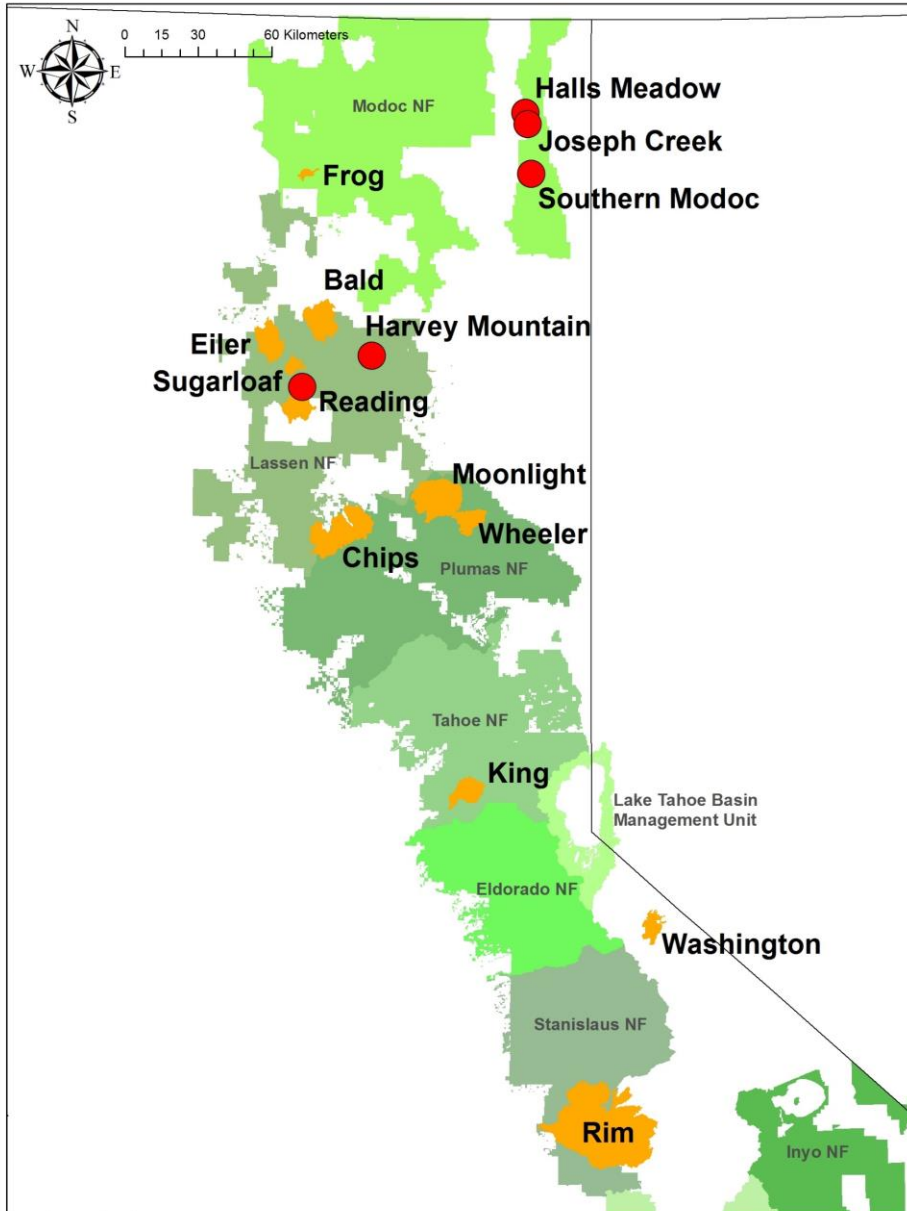
Partnership with USFS entomologist and funding from a FHP EM grant to study wood-boring beetle ecology across multiple burned areas and drought-stressed forests in Sierra Nevada and Southern Cascades.



Adult beetle trap



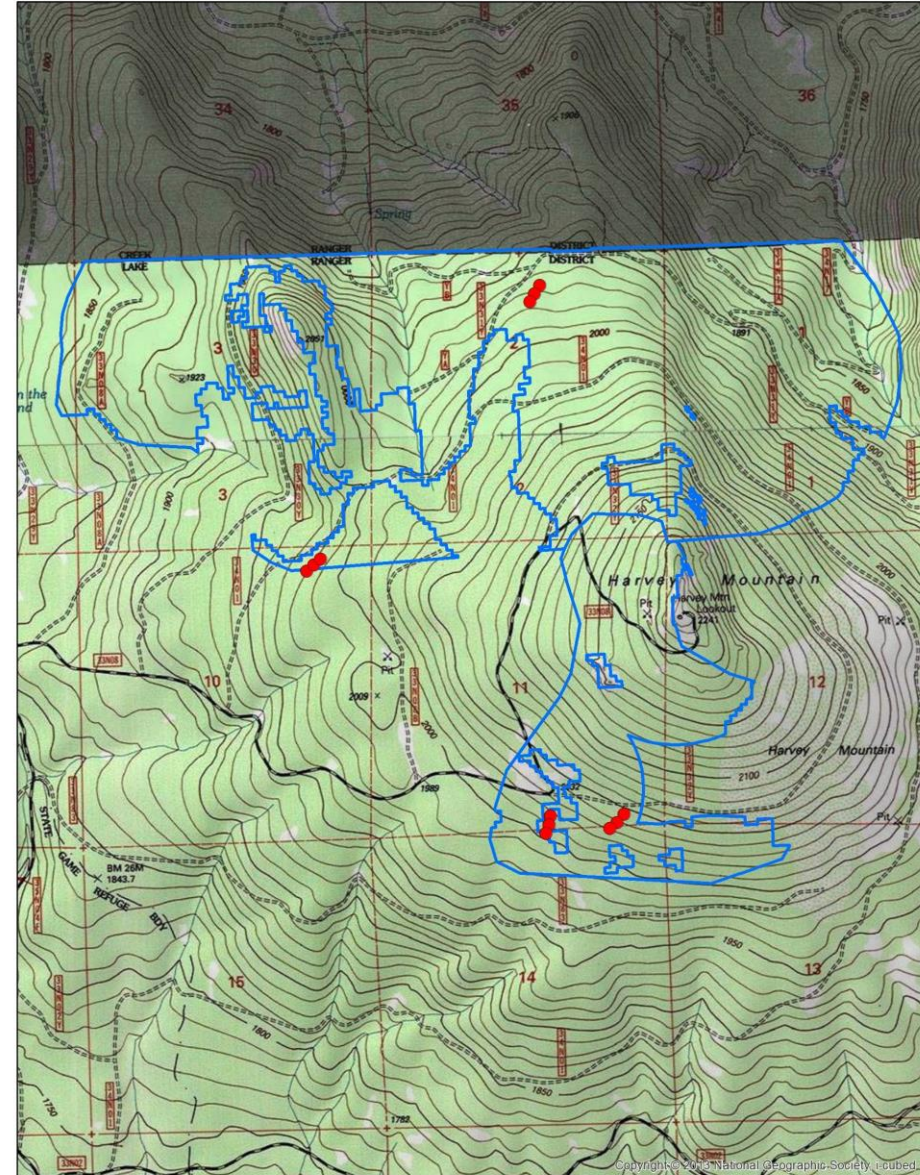
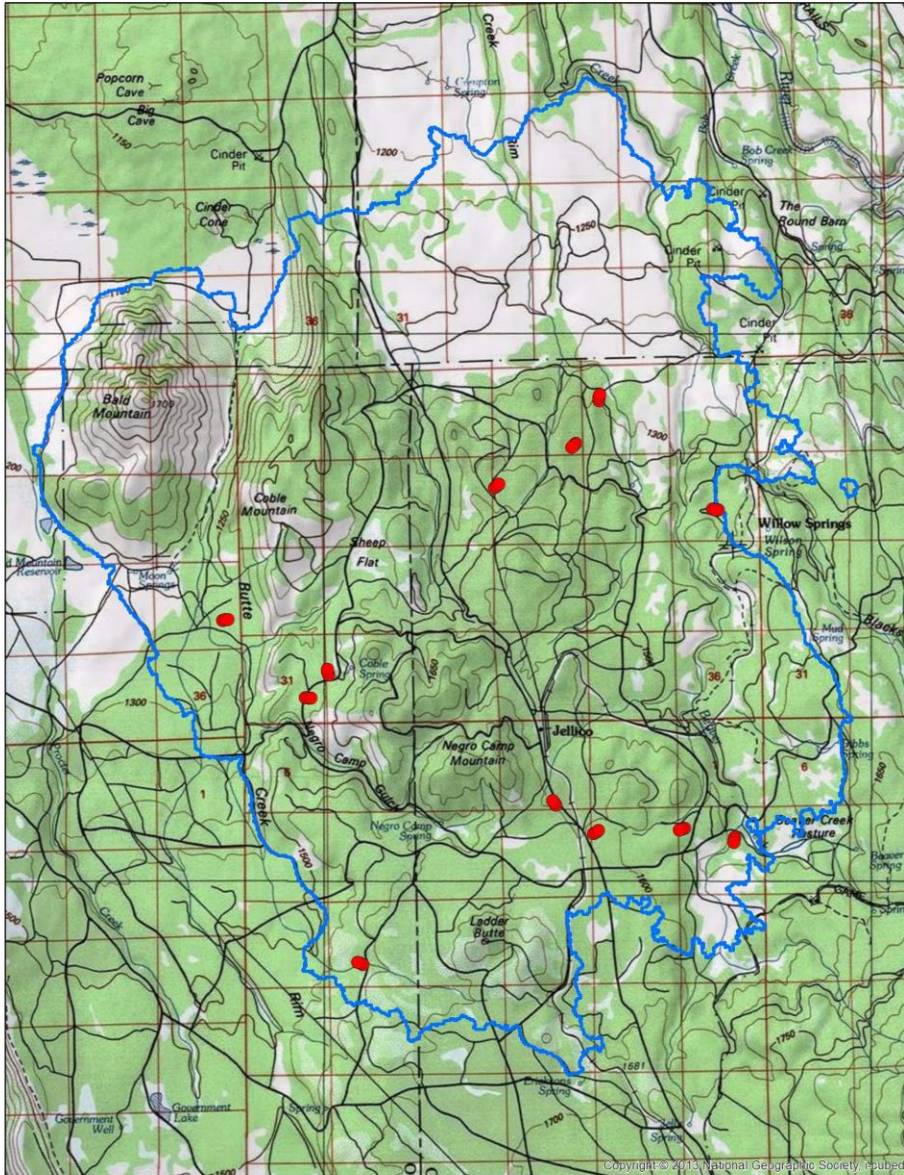
Woodboring beetle research



2015-2016 Field Seasons

- Placed traps at 11 fires and 5 beetle-killed forest stands (SMC and EPN)
- Burned forest stratified by age, CWHR size class, and burn severity
 - 129 trap lines = 387 traps
- Beetle-killed stands identified using 2015 ADS polygons, stratified by CWHR size class
 - 29 trap lines = 87 traps
- Assessed beetle activity and collected larvae from up to 18 snags per line (6 snags at each trap)
- Collected data on characteristics of each snag
 - Species, DBH, height, char height, % needles retain, needle color, bark condition, exit holes, frass presence, woodpecker foraging
- Collected data on stand characteristics

Woodboring beetle research



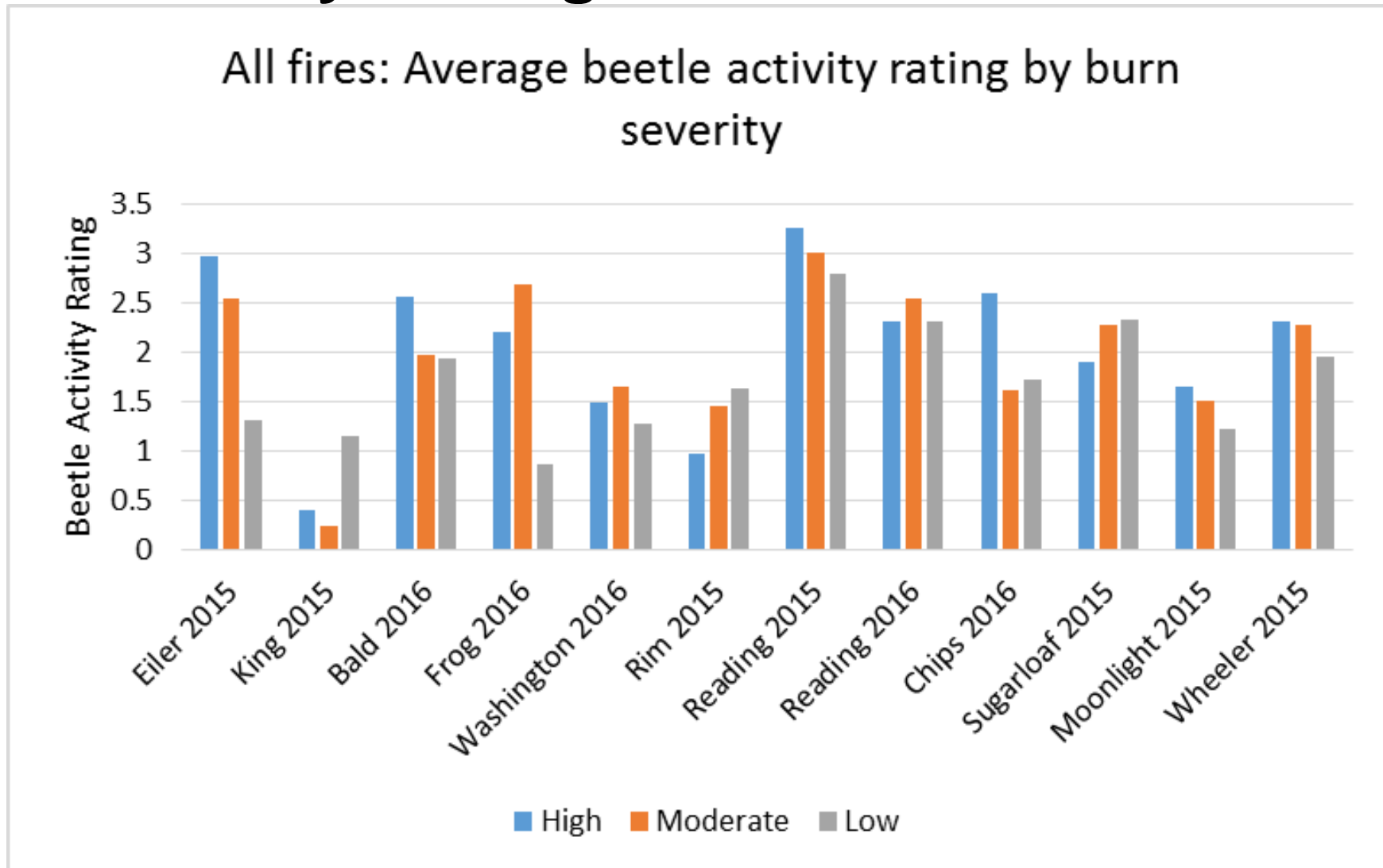


Woodboring beetle research

- Quality data set, including data from:
- 474 beetle traps along 158 trap lines
- > 2,200 snags
- Mixture of fire-killed and beetle-killed forest
- Associated BBWO surveys
- But no analysis yet...
- Currently working with Chris Ray to frame analytical approach
- With the caveat that quantitative analysis is needed to test these relationships, preliminary summary findings include:

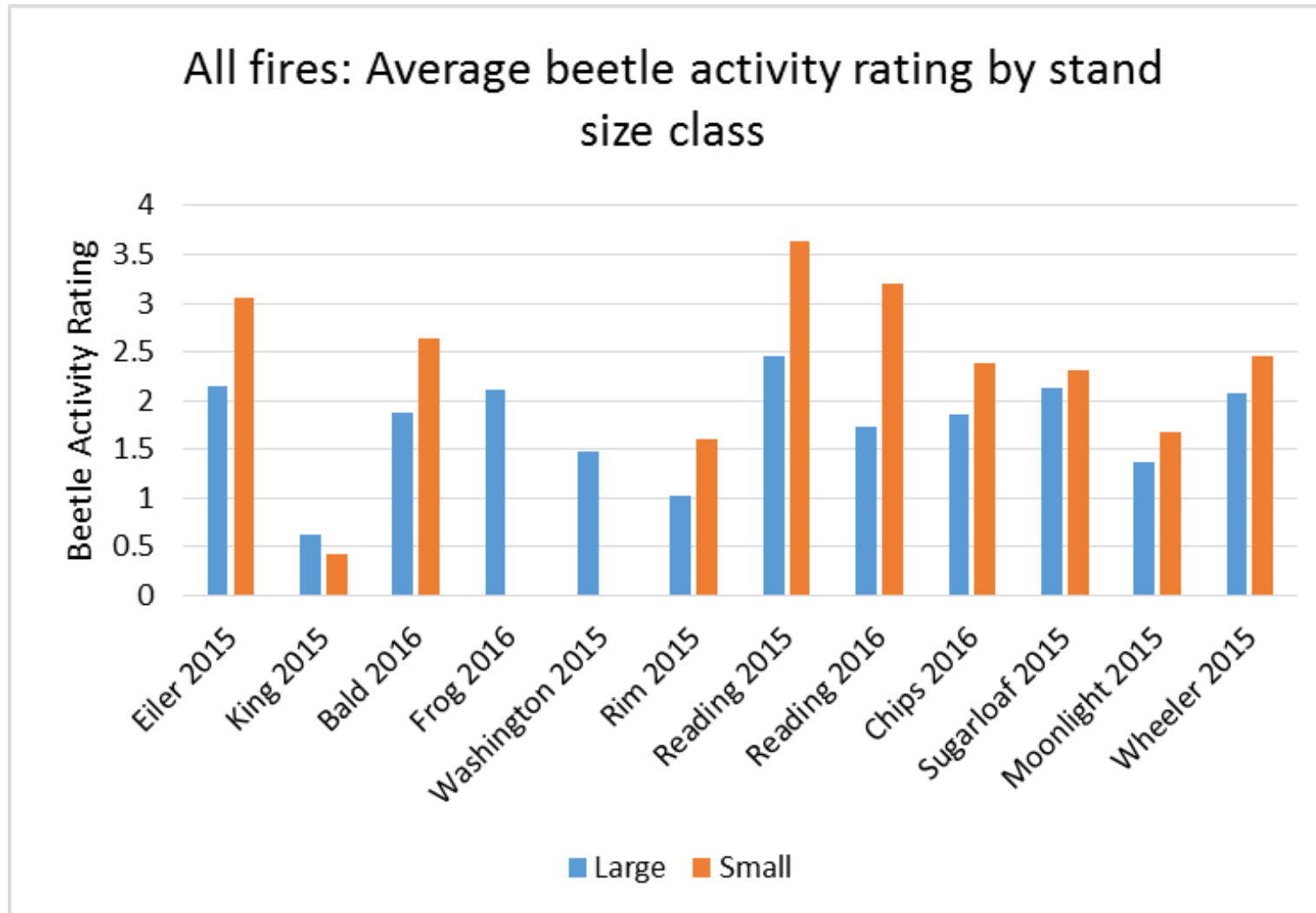
Woodboring beetle research

Preliminary findings:

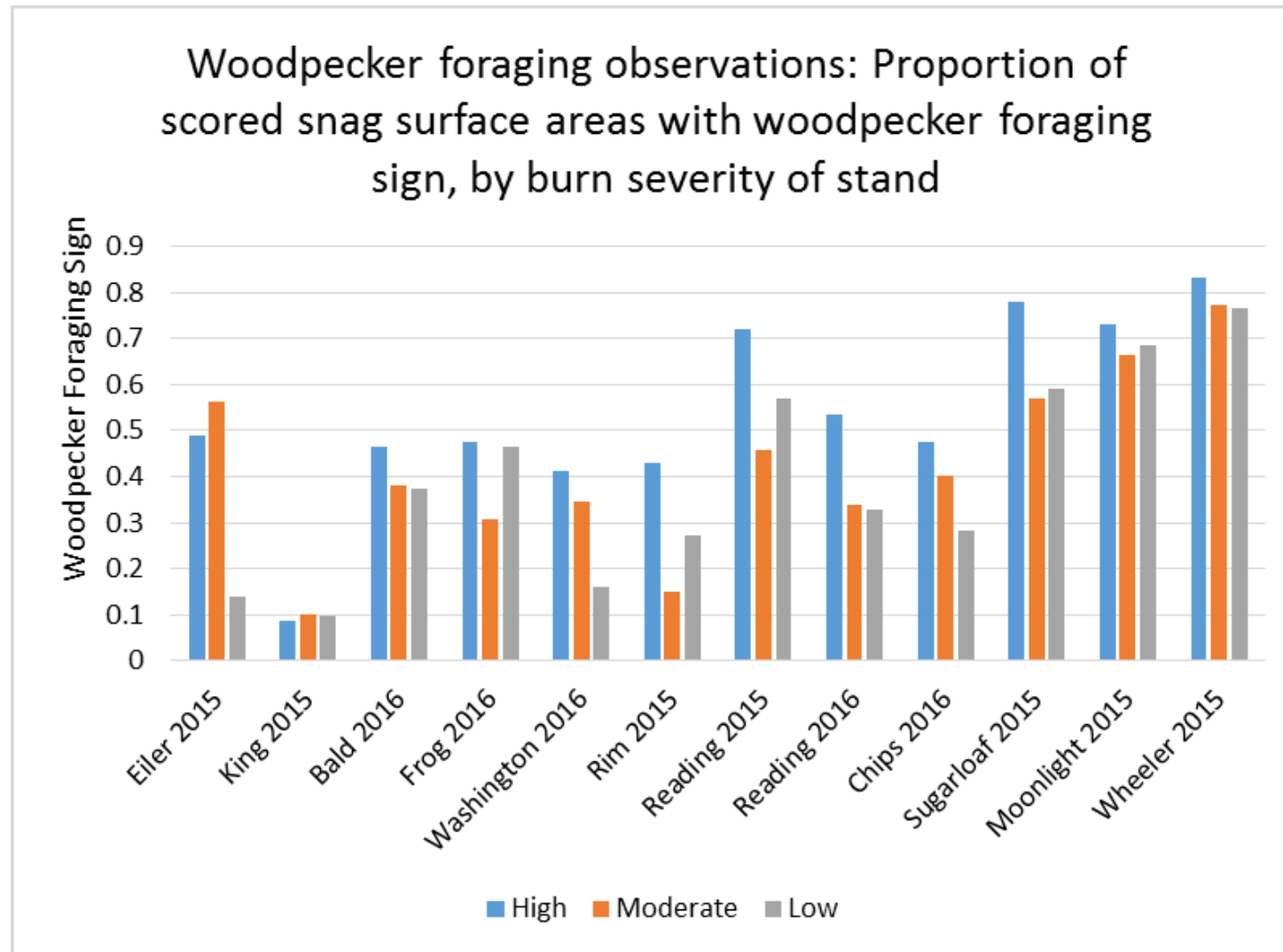


Woodboring beetle research

Preliminary findings:

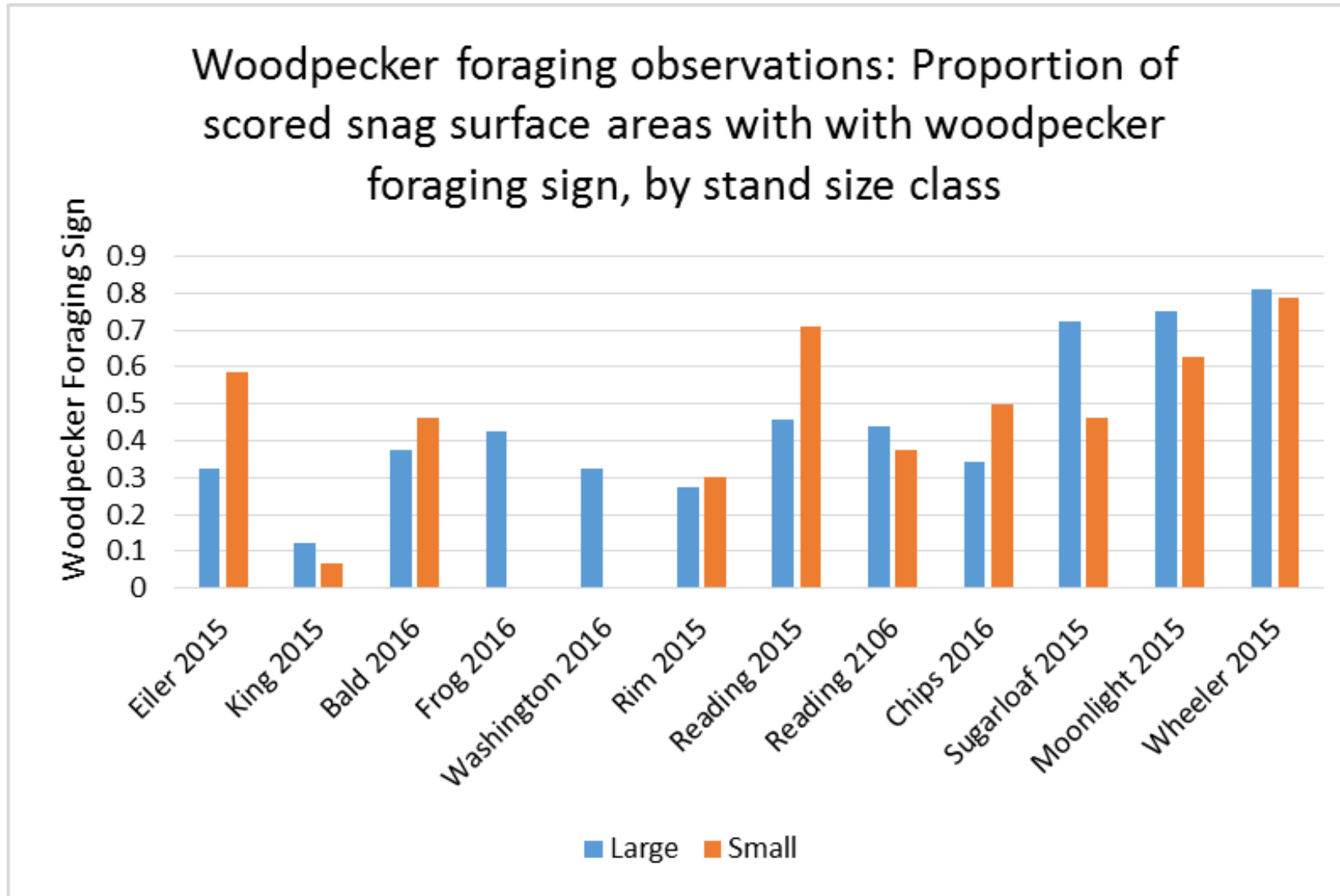


Preliminary findings:



Woodboring beetle research

Preliminary findings:





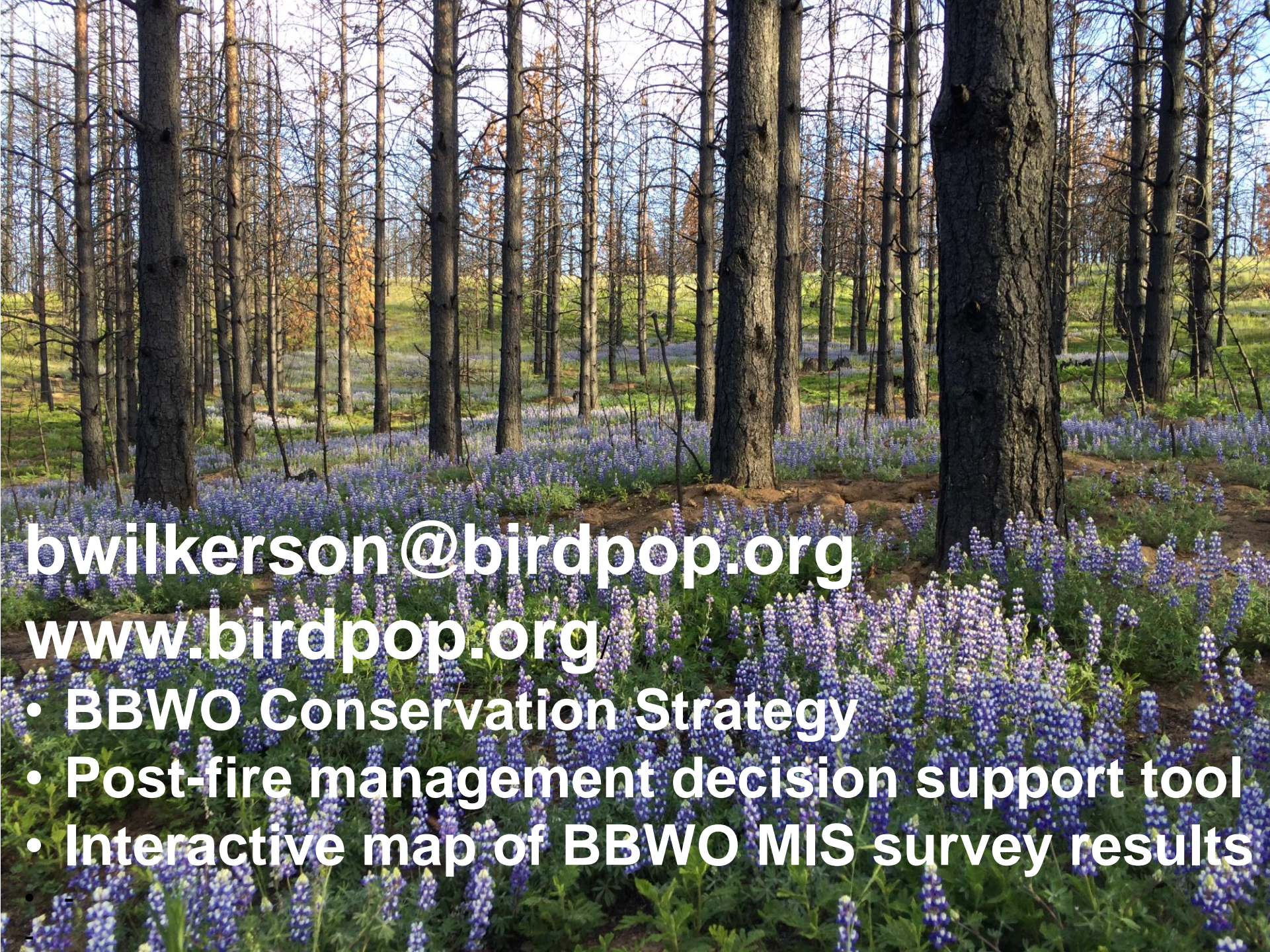
Rim fire 1 year post-burn



Woodboring beetle research

Potential analytical directions:

- Ignition date?
 - Late season fires, few BBWO presence:
 - King = September 13, 2014
 - Rim = August 17, 2013
 - BBWO occupancy very low
 - Chips = July 28, 2012
 - Reading = July 23, 2012
 - BBWO occupancy at expected rates
- All other variables being equal, does mass colonization by heat or smoke attracted beetles having an immediate effect on BBWO colonization and/or a lasting effect on site persistence



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- **BBWO Conservation Strategy**
- **Post-fire management decision support tool**
- **Interactive map of BBWO MIS survey results**