



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



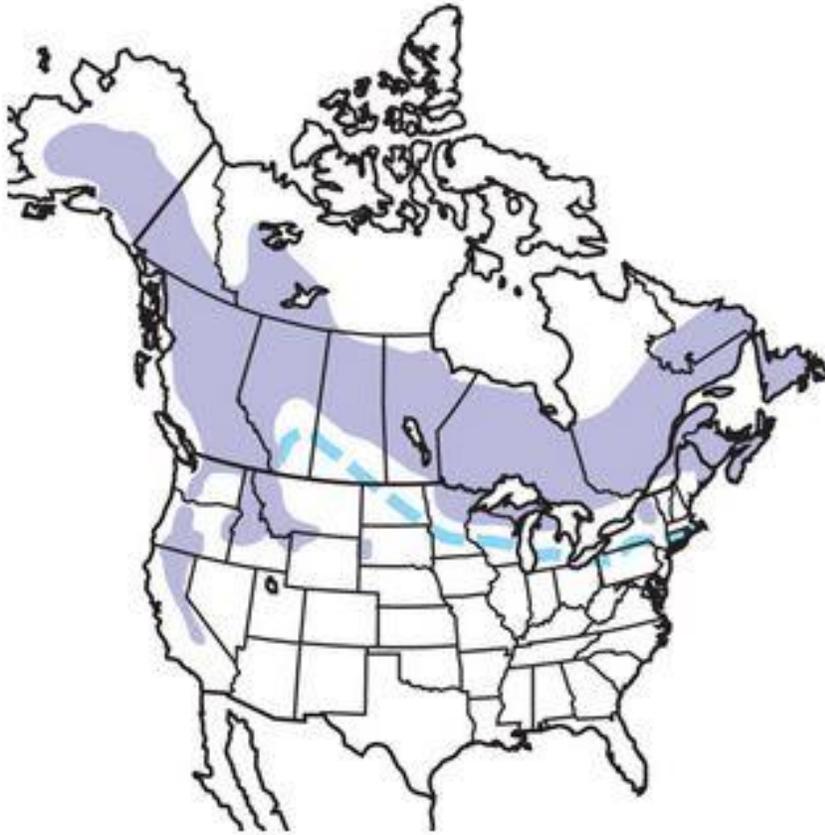
Black-backed Woodpecker ecology

- **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

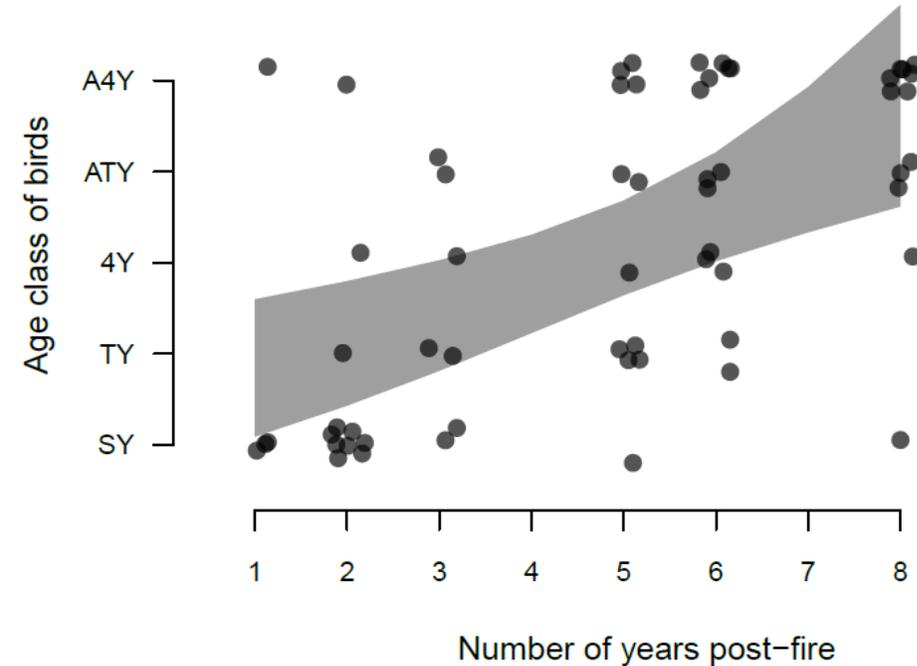
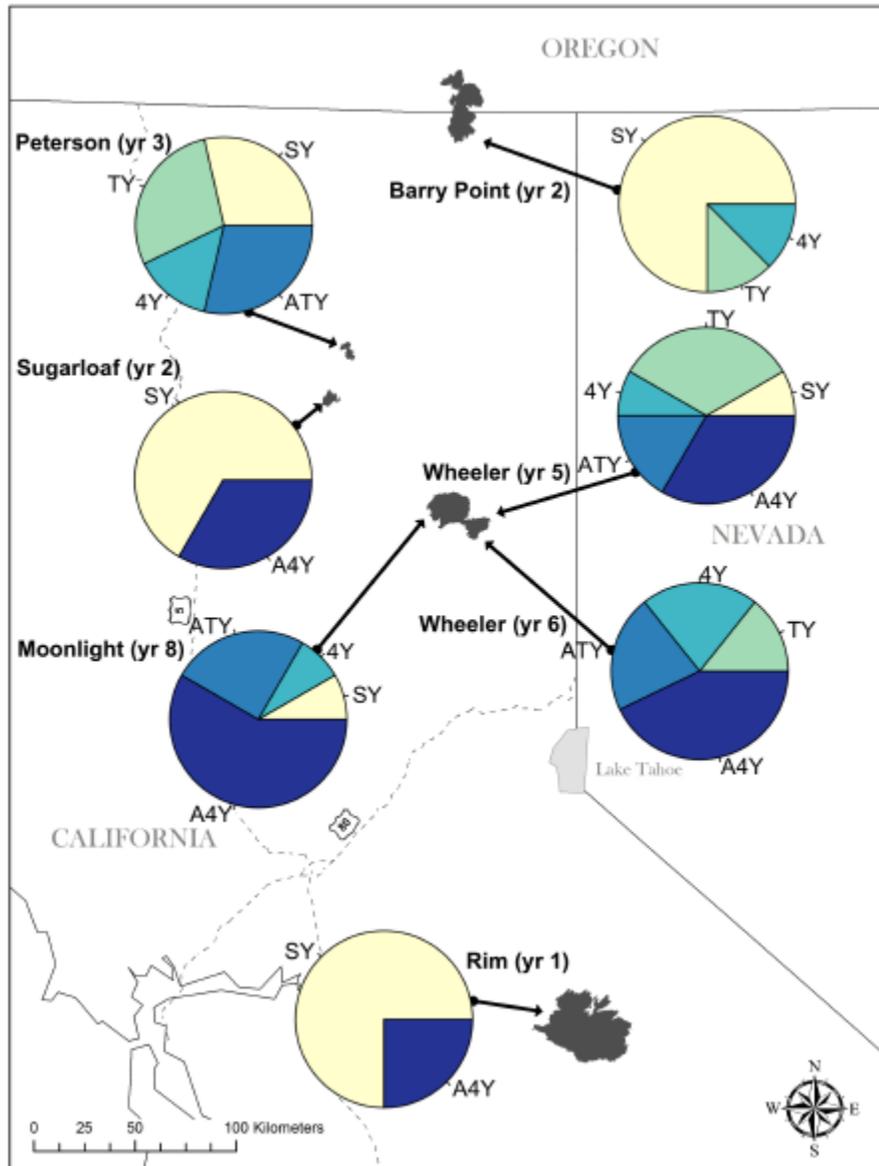
Black-backed Woodpecker background info

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.

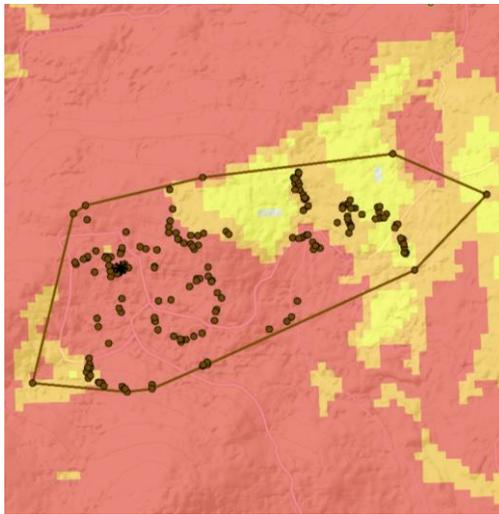
Black-backed Woodpecker background info



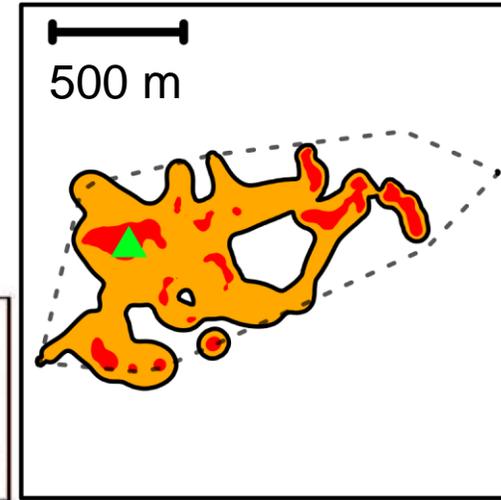
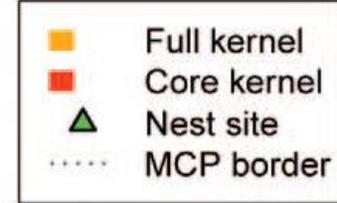
Bear predation



Home range and habitat selection studies



Movement-based kernel estimation



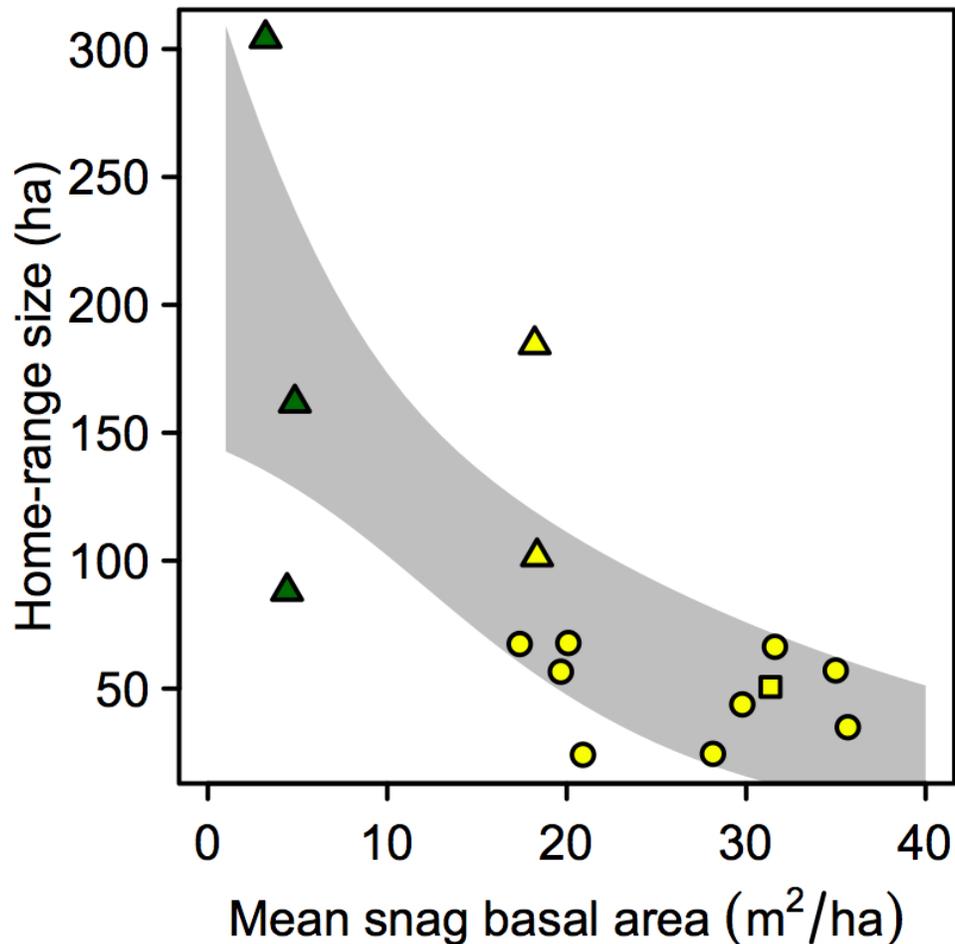
Telemetry-based tracking yields:

- 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.

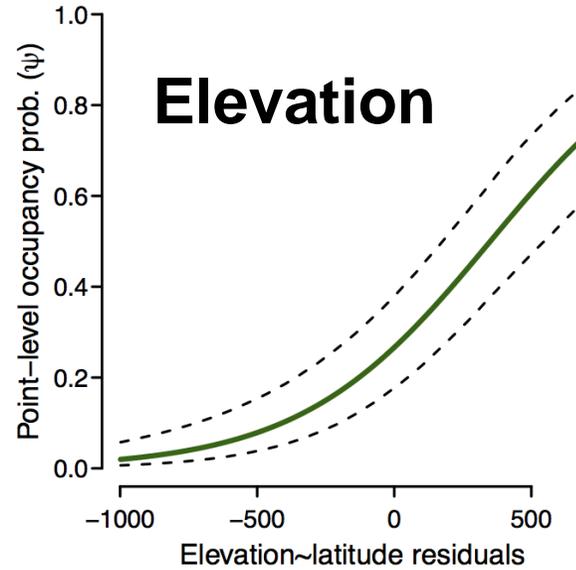
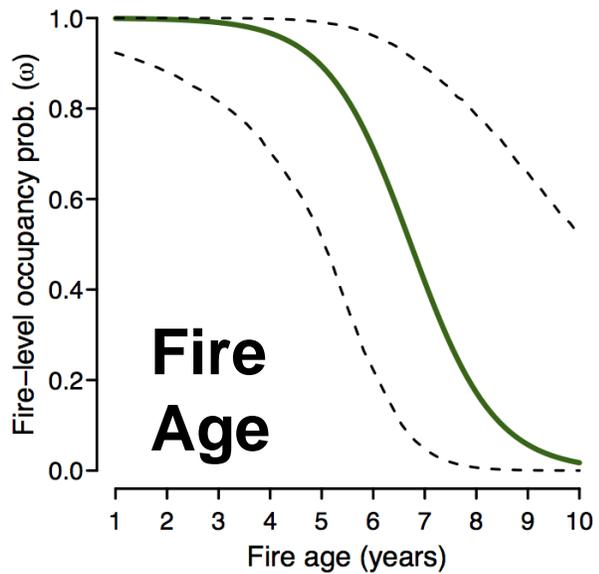
Tingley, M. W., R. L. Wilkerson, M. L. Bond, C. A. Howell, and R. B. Siegel. 2014. Variation in home range size of Black-backed Woodpeckers (*Picoides arcticus*). *The Condor: Ornithological Applications* 116:325–340.



Management Indicator Species monitoring

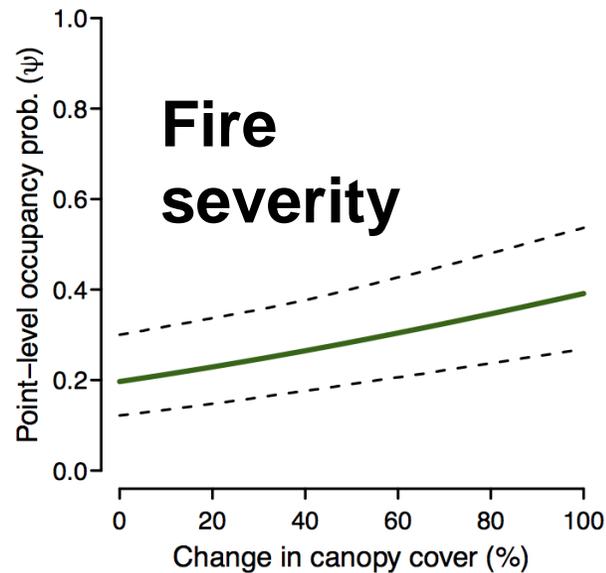
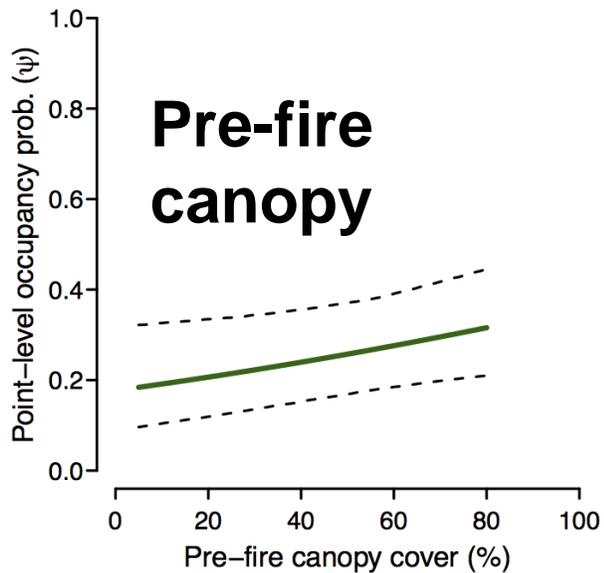
- Randomly select 50 fires in Sierra/Cascades ecoregion for surveys every summer since 2009
- Approximately 450 surveys visits at >100 fires
- >8,000 individual BBWO surveys
- We use these occupancy data in a Bayesian hierarchical model to estimate detection probability and occupancy probability, both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

Management Indicator Species monitoring



Other variables in the model include:

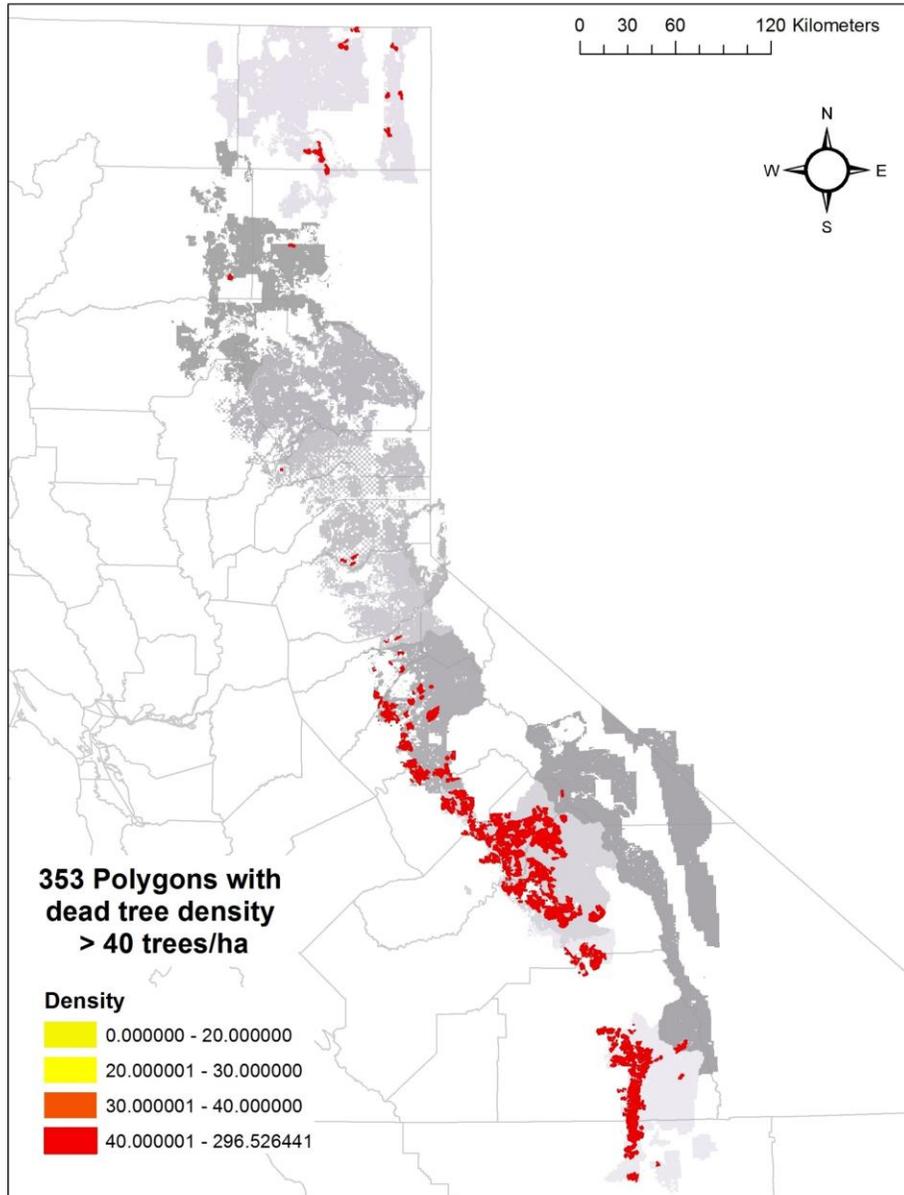
- **dominant tree size class**
- **forest type**
- **latitude**



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.

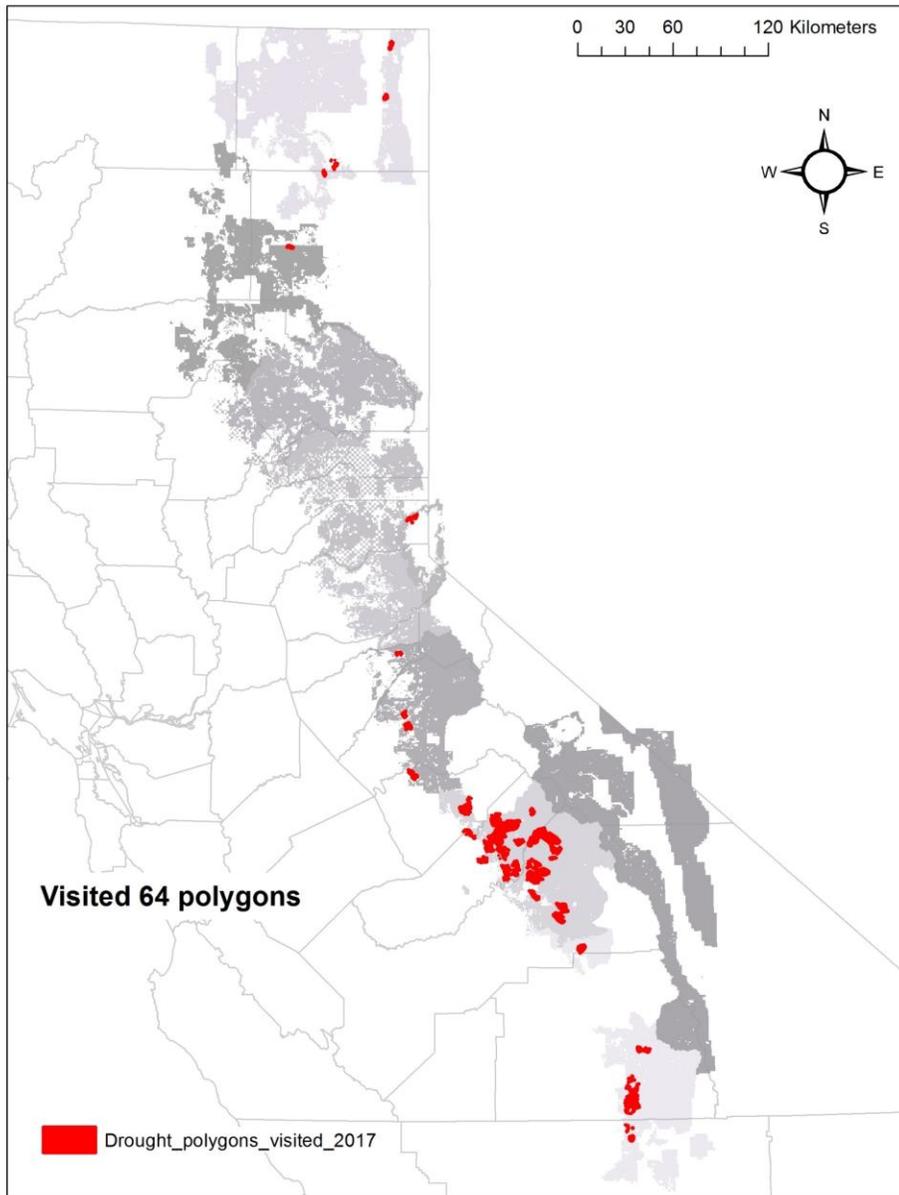
Management Indicator Species monitoring



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**

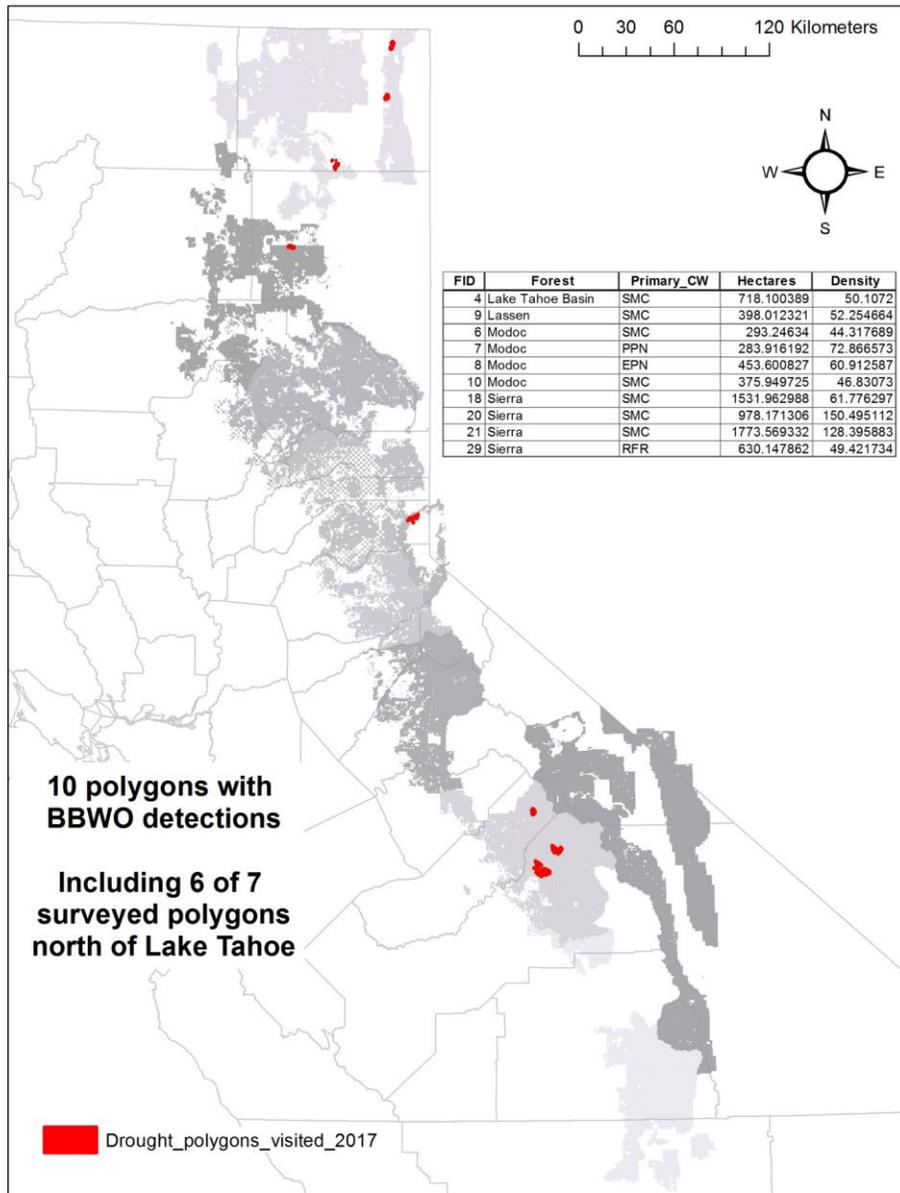
Management Indicator Species monitoring



Beetle-killed forest BBWO surveys

- Surveyed 64 polygons in 2017

Management Indicator Species monitoring



Beetle-killed forest BBWO surveys

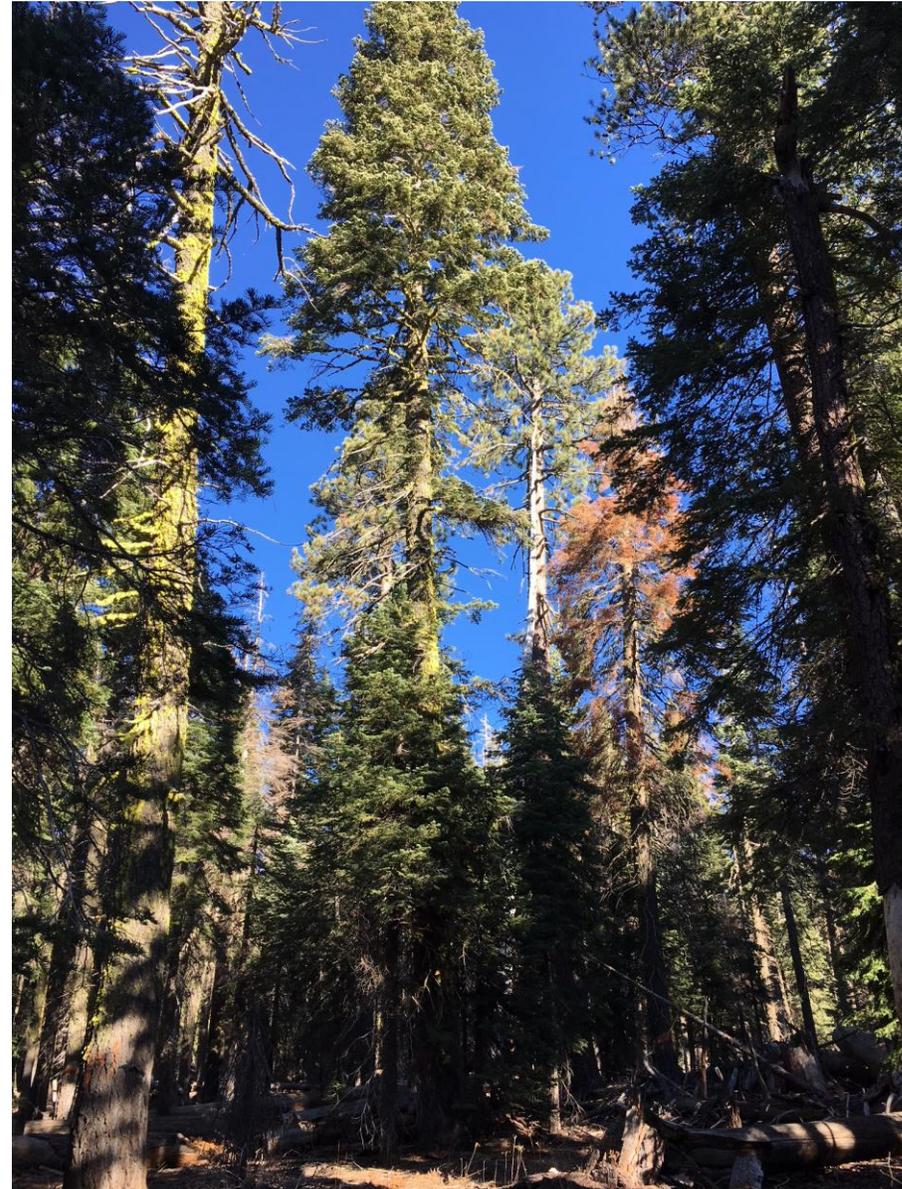
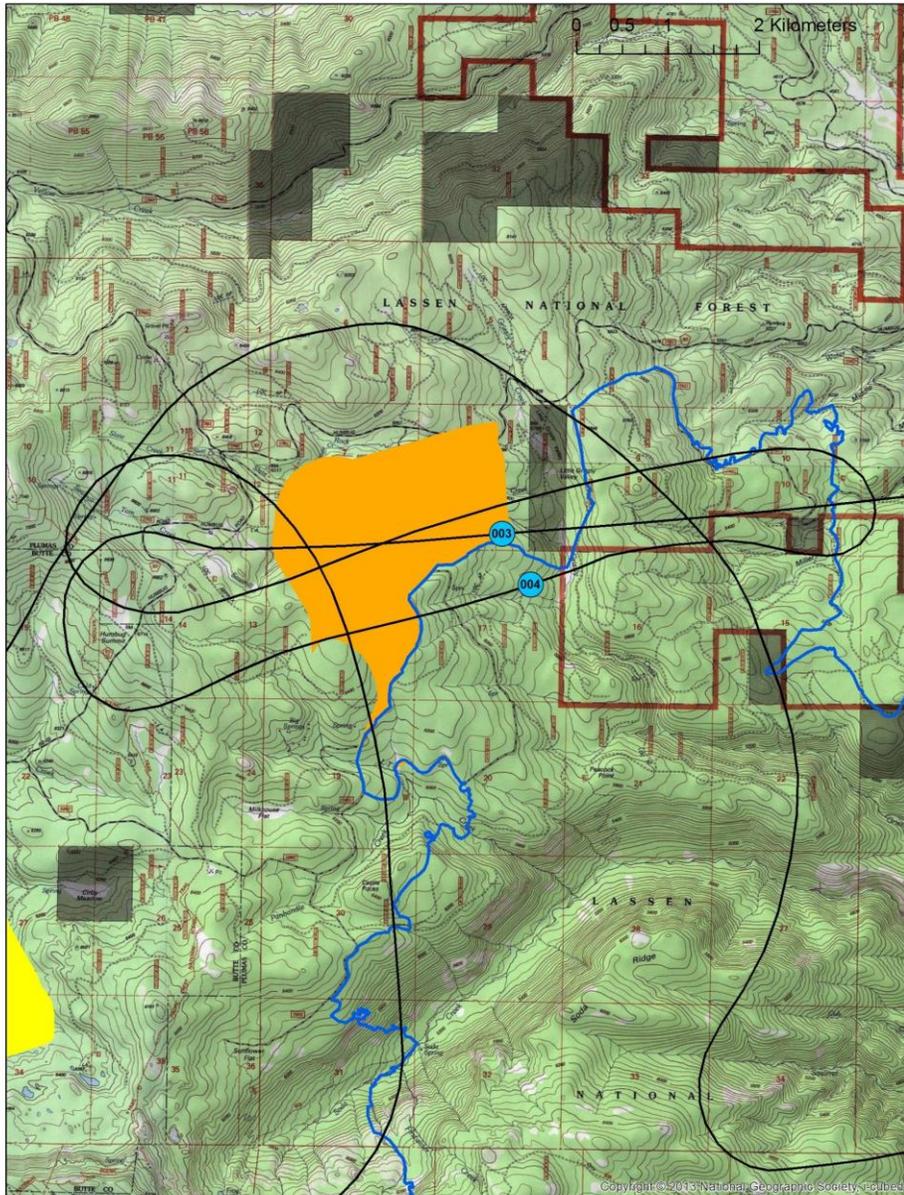
- Surveyed 64 polygons in 2017
- 10 polygons with BBWO detections
- 6 of 7 polygons north of Lake Tahoe had BBWO detections
- No effect of polygon size or dead tree density

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



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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?

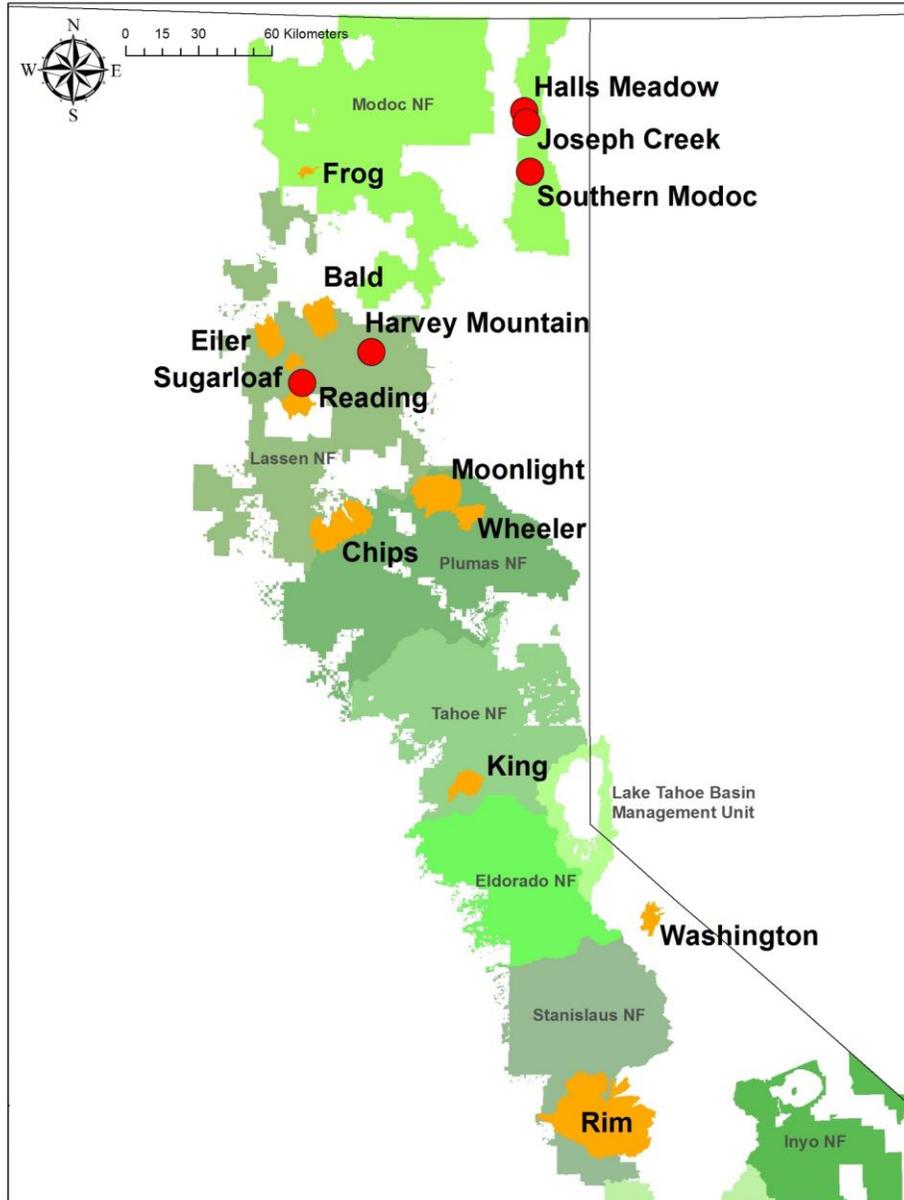


Adult beetle trap



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.

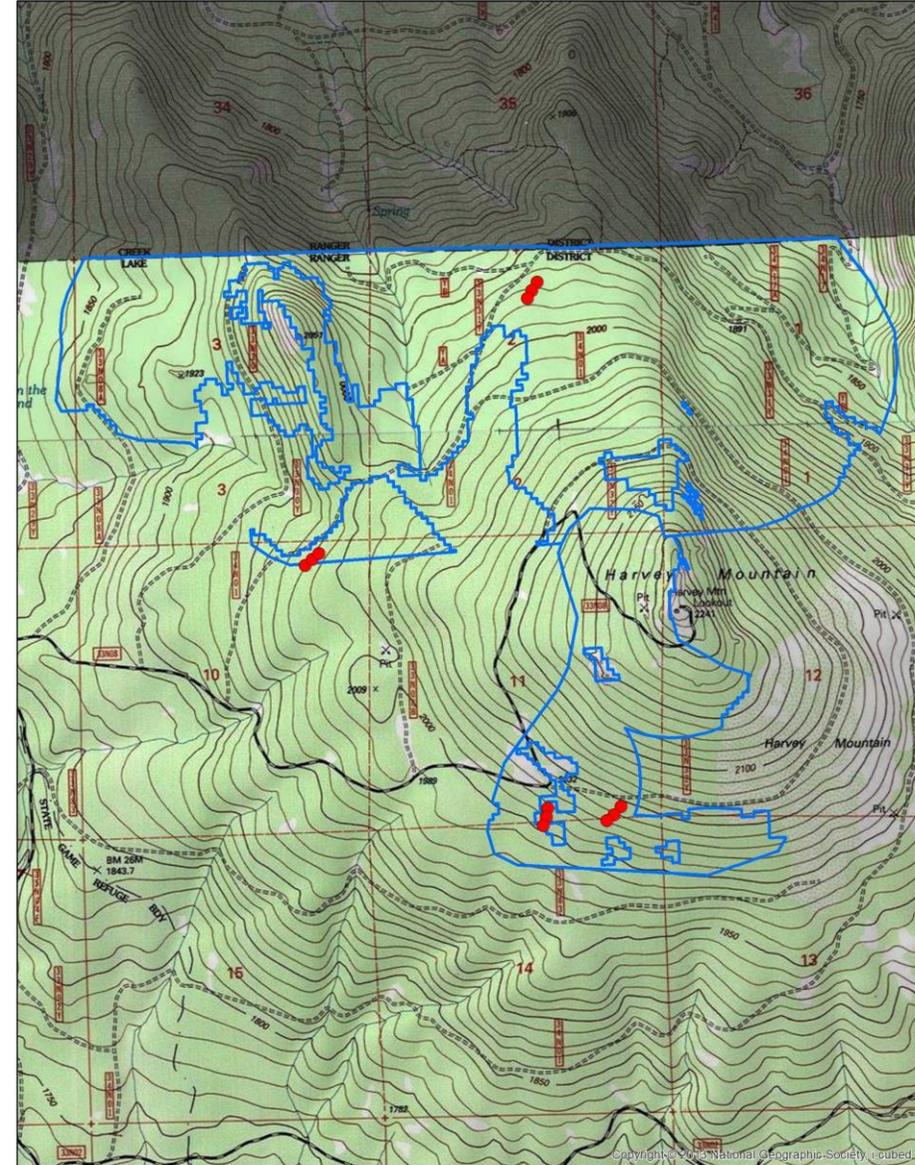
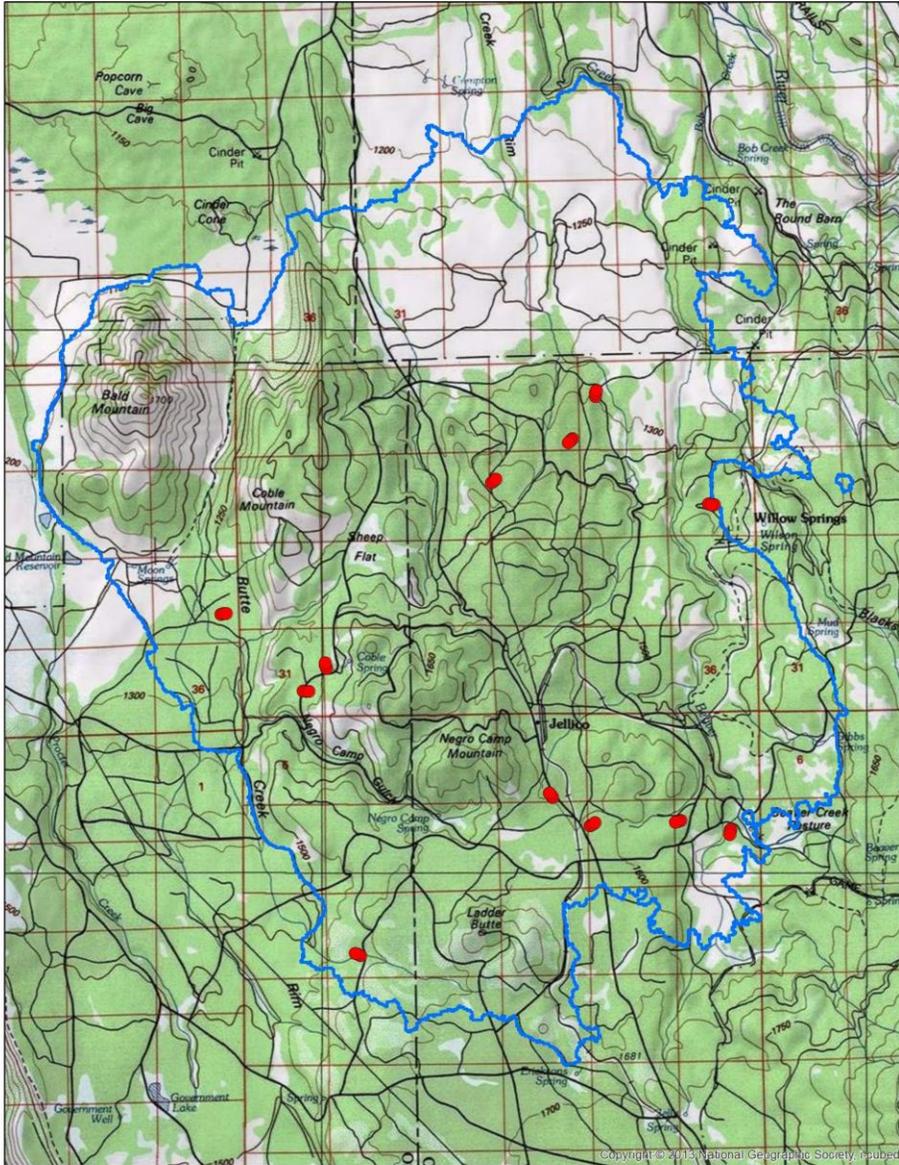
Woodboring beetle research



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



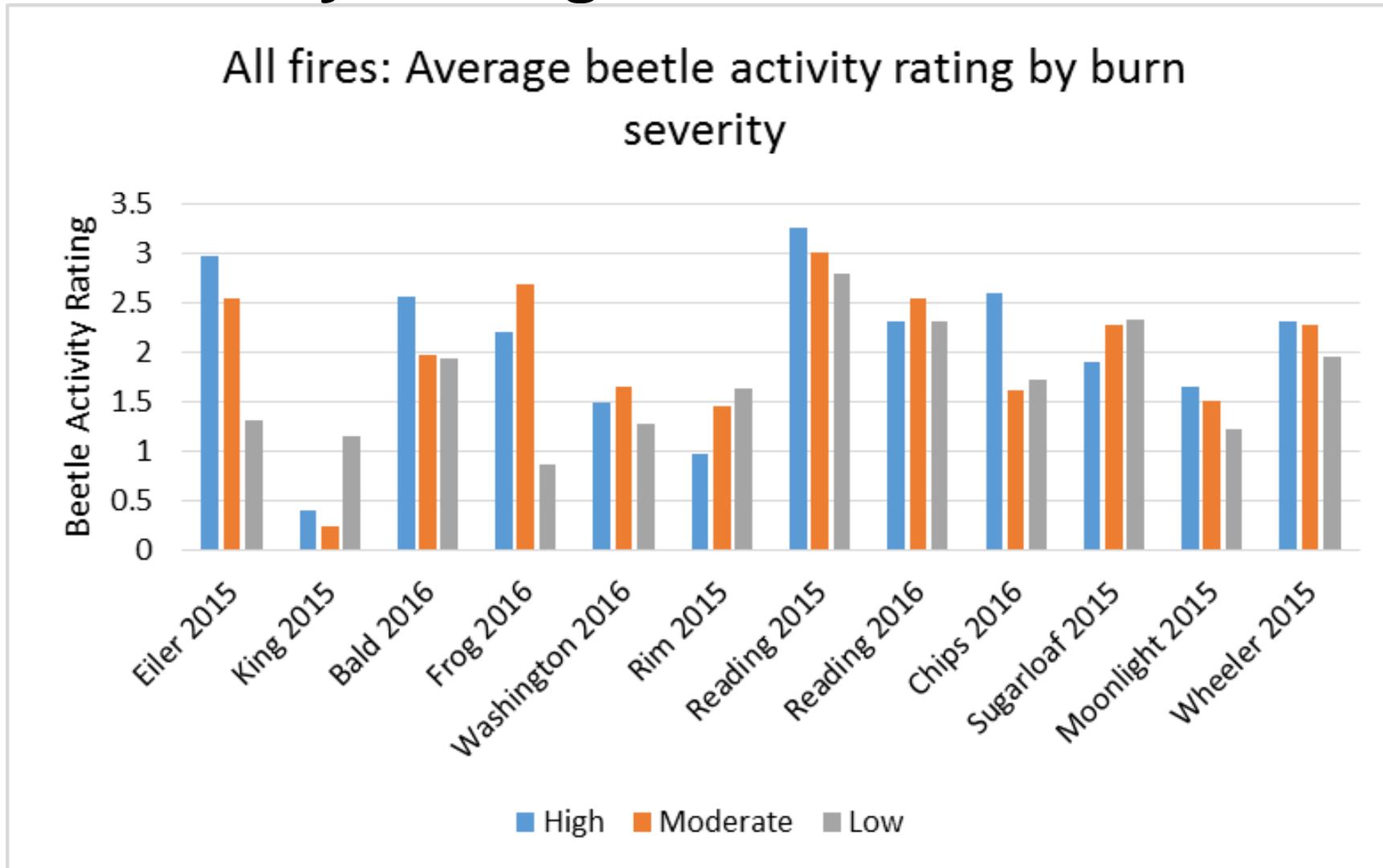


Woodboring beetle research

- 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:

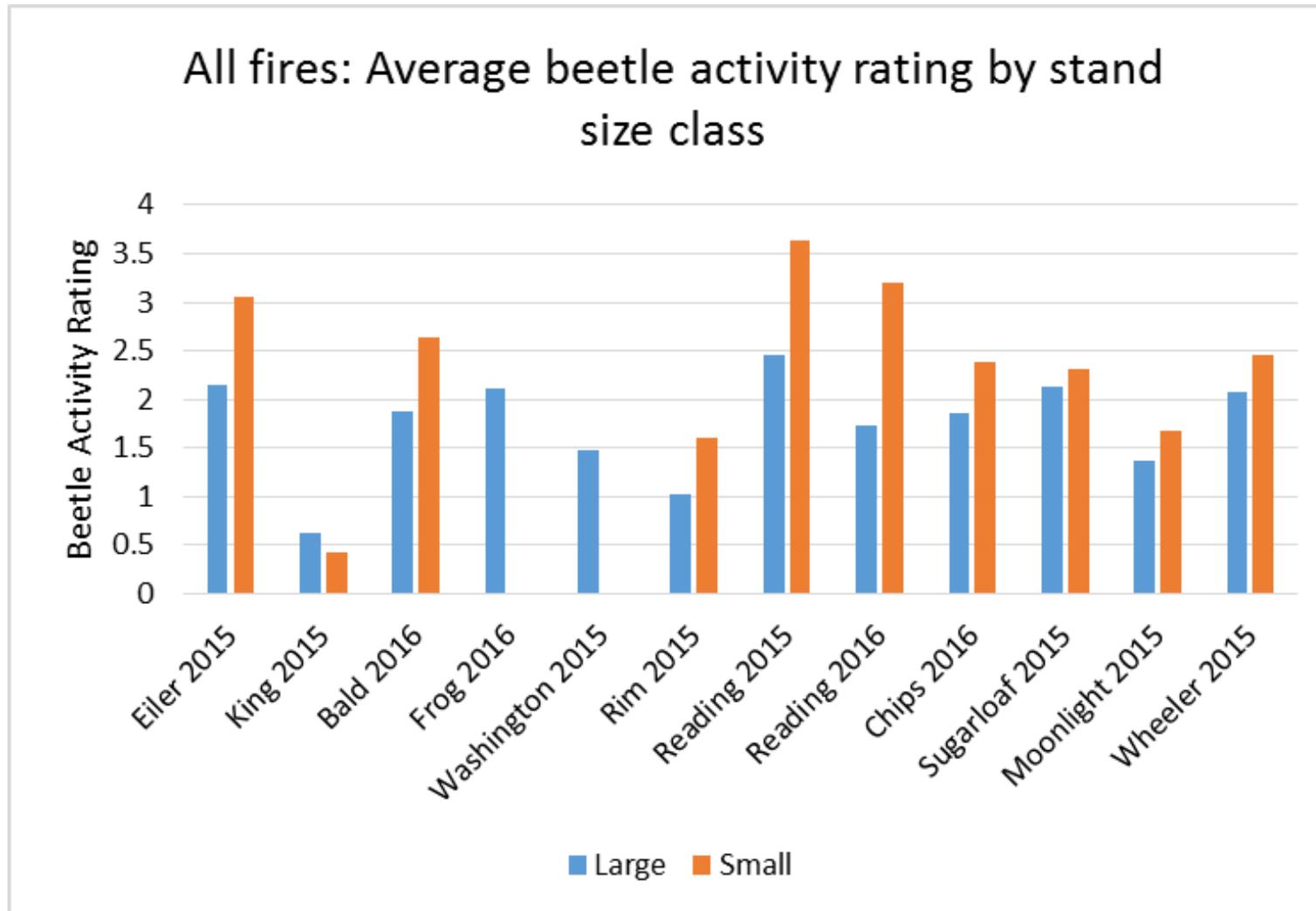
Woodboring beetle research

Preliminary findings:



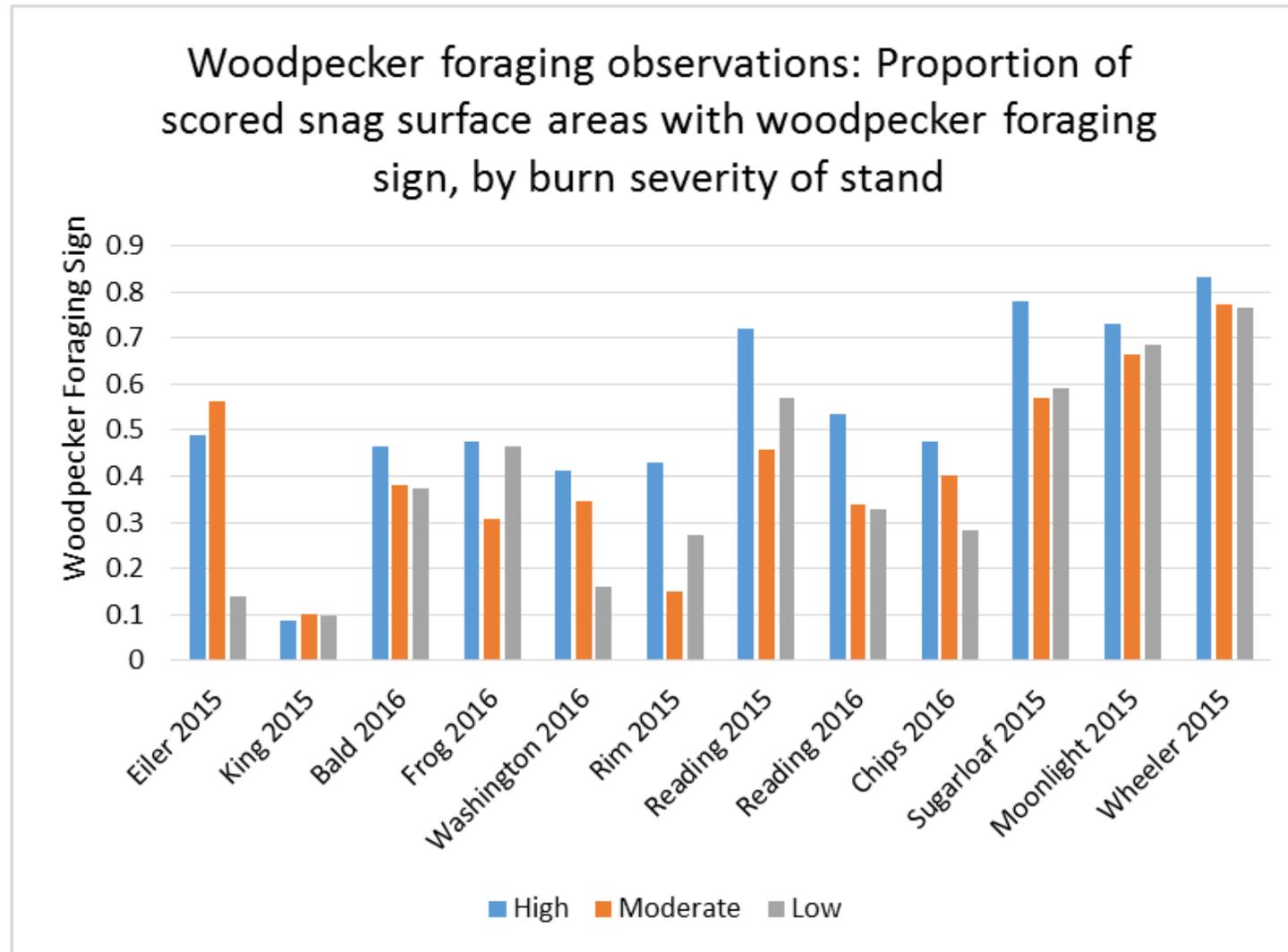
Woodboring beetle research

Preliminary findings:



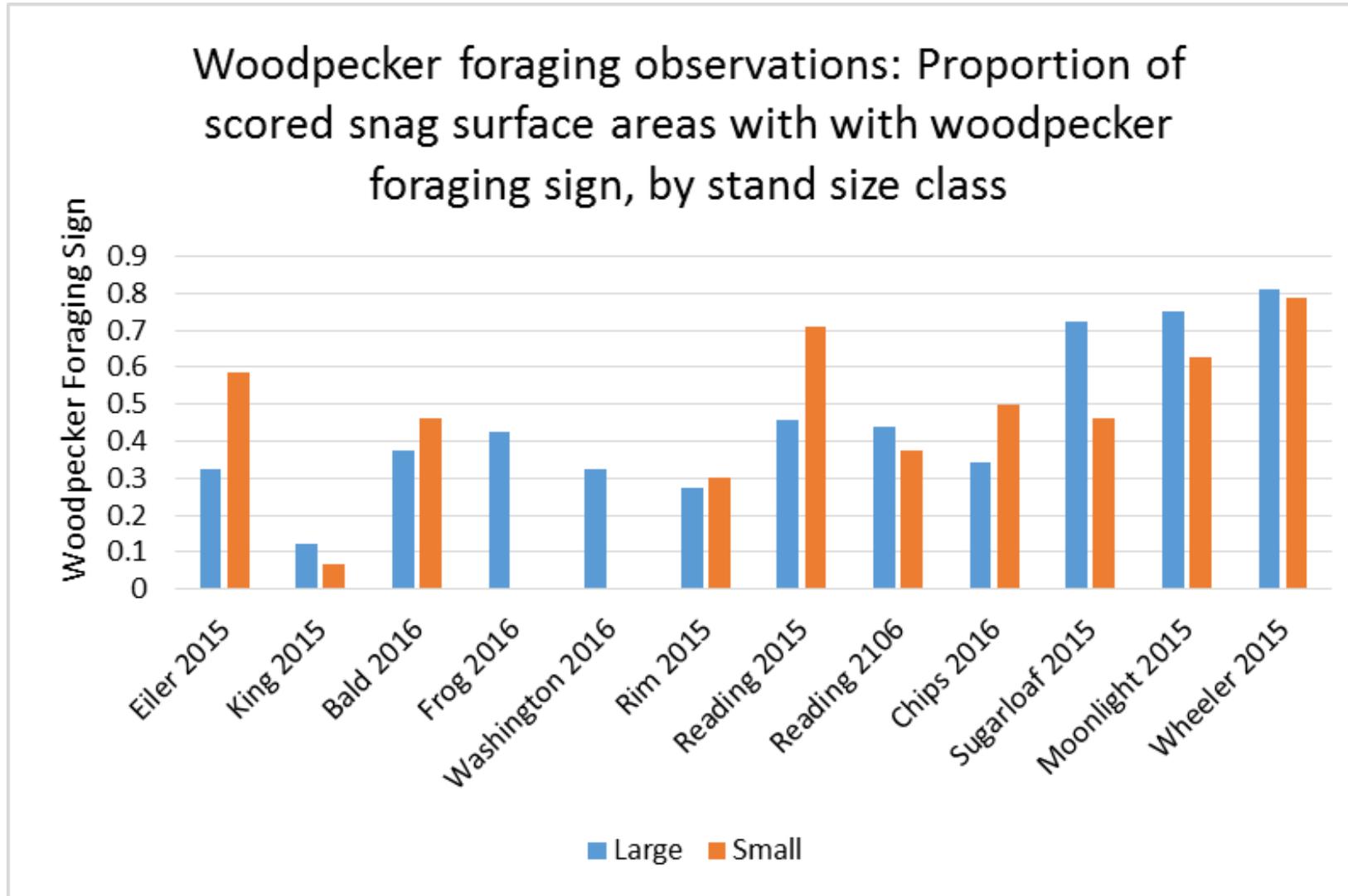
Woodboring beetle research

Preliminary findings:



Woodboring beetle research

Preliminary findings:





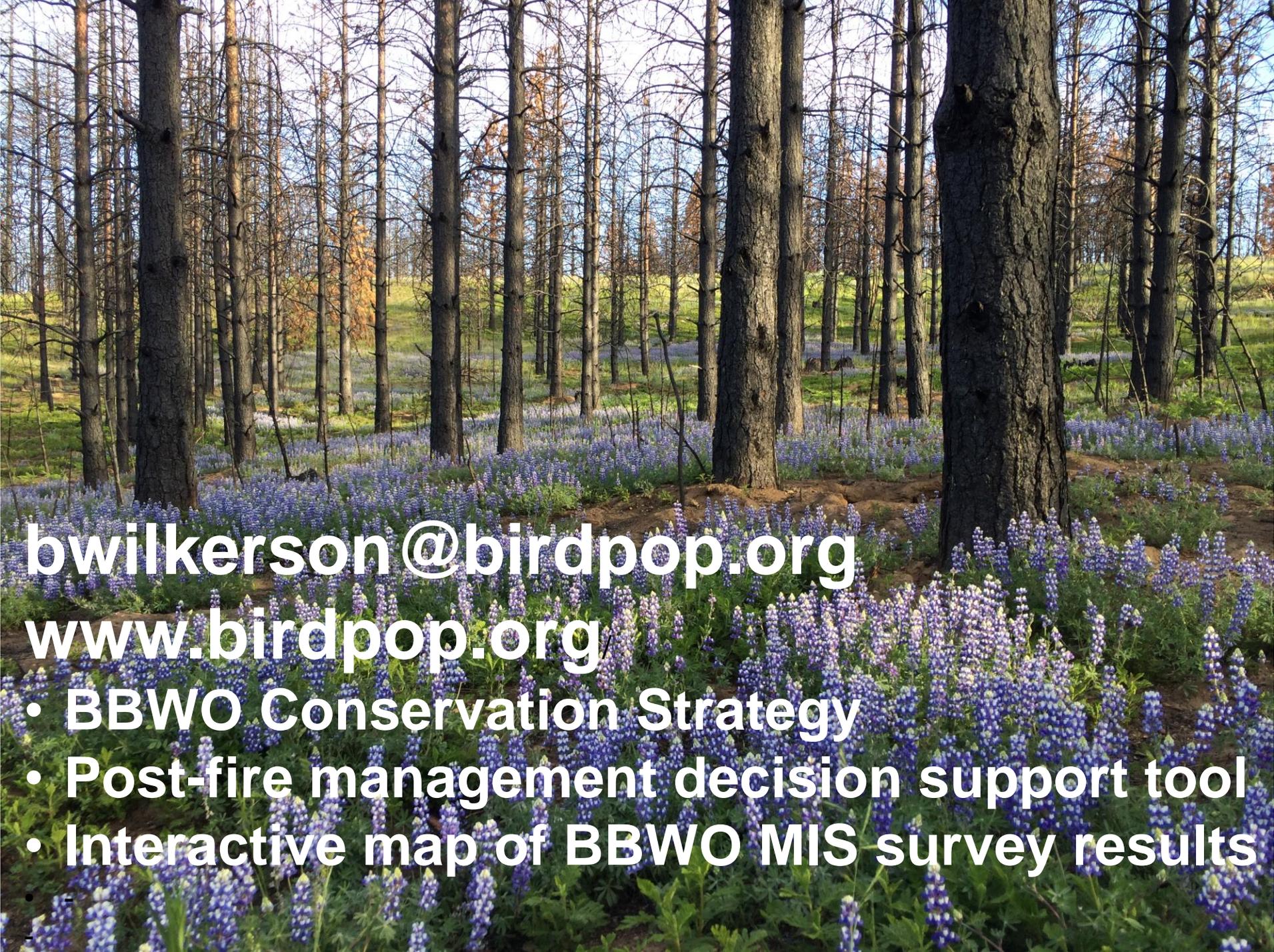
Rim fire 1 year post-burn



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