

If You Build It They Will Come: Bird Response to Aspen Restoration in the Sierra Nevada

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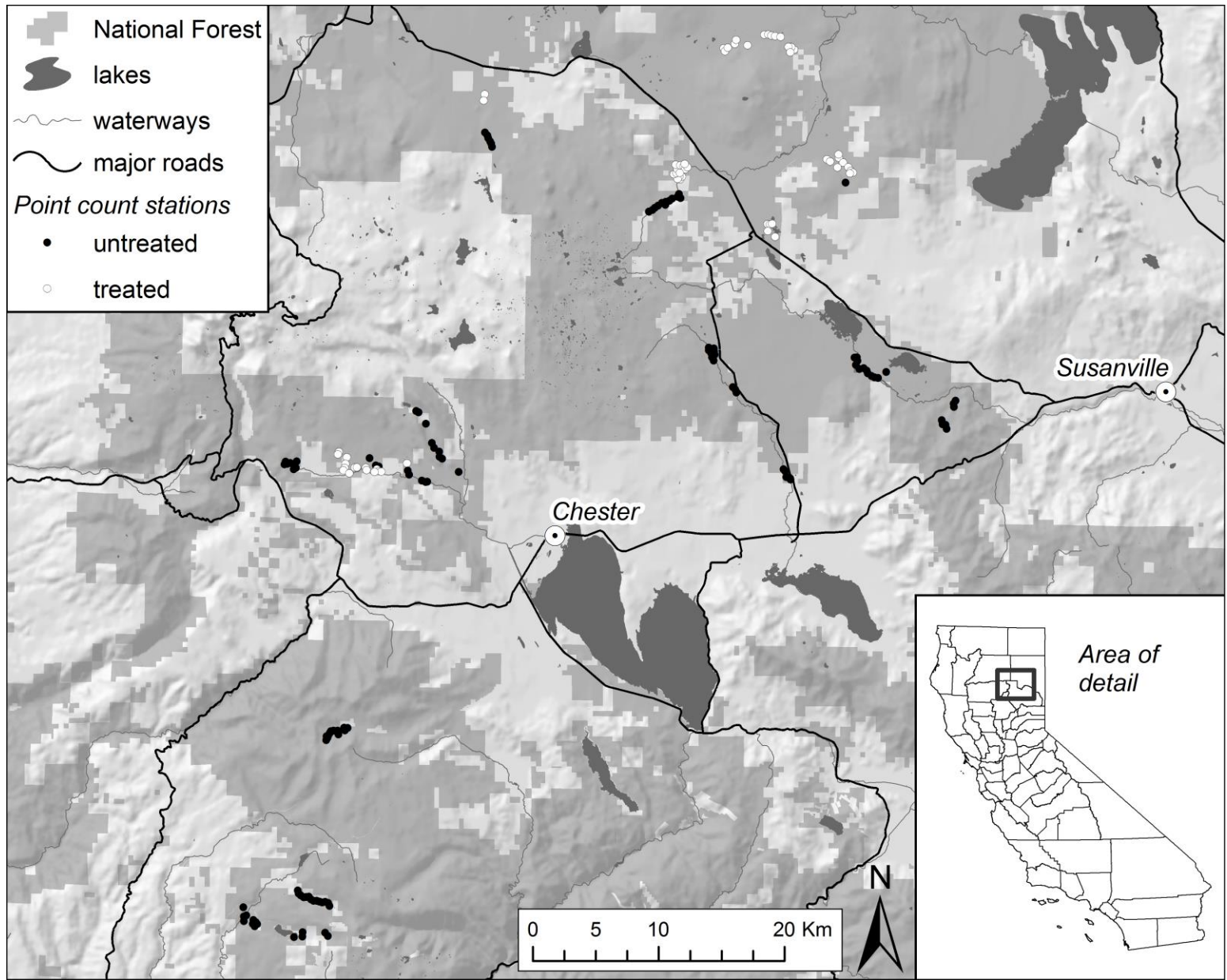


Mechanical Conifer Removal Treatments

- Almanor & Eagle Lake Ranger Districts
- Removal of majority of conifers within 1-2 tree lengths of outermost aspen in stand
- Retained conifers with old growth characteristics (generally > 30 in dbh)
- Treatments included riparian zone hand thinning
- Treatments implemented 2003 – 2011* (fall, or winter over snow)

Methods: Site Selection

- Used USFS aspen inventory to select all sites in GIS
- Focused on areas recently treated or proposed for treatment by USFS
- Prioritized areas with enough aspen stands or acres to locate 4 point count stations at least 250 m apart
- Selected sites contained between 4 and 16 point count stations
- Elevation range ~1500 – 2000 m
- Surrounding forest primarily Mixed Conifer, Eastside Pine, Lodgepole



Methods: Data Collection

- 5-min exact-distance point counts – truncated for analysis at 100 m
- 181 stations across 18 unique “sites” that represent a range of existing aspen physiography and health
- 61 stations treated as of 2012
- 2 visits to each point per year
- Surveyed May 15 – July 7
- Data collected 2004 – 2012

Methods: Analysis

- Before-After-Control-Impact approach
- Pooled all data before treatment and all data after treatment
- Mean years post-treatment = 5.6
- Used a randomly selected “treatment year” for each control station

Methods: Analysis

- Does the status as before or after treatment depend on whether the station was impact or control?
- Probability of detection (pDet) – modeled using program Distance
- GLMM with Poisson probability distribution
point-level abundance ~ *treatment* + *time* + *treatment* × *time* ←fixed effects
+ (*year*) + (*transect*) + (*point*) ←random effects
+ *log(pDet)* ←offset term

Methods: Species Selection

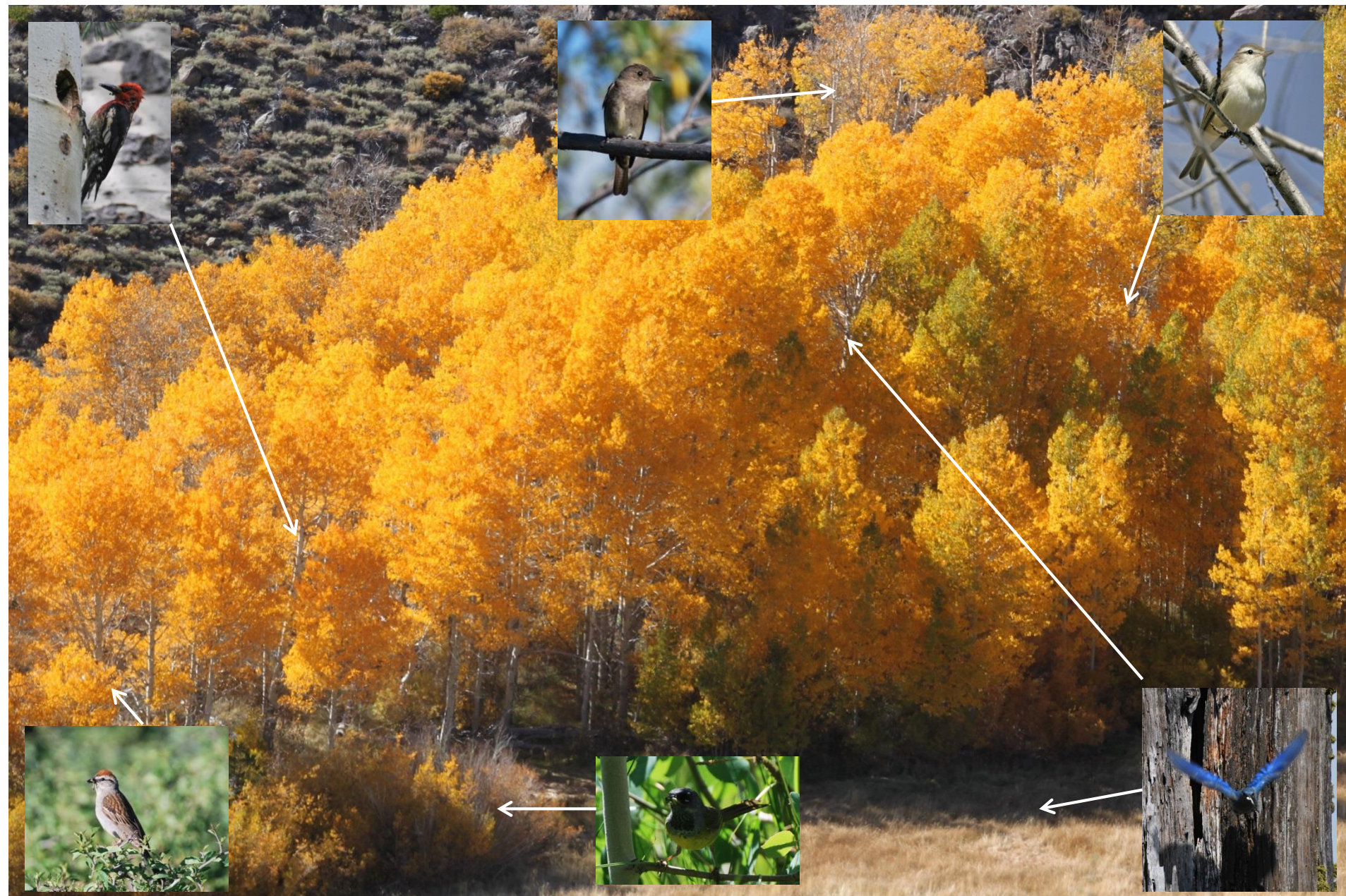
Aspen Focal Species

Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Western Wood-Pewee	<i>Contopus sordidulus</i>
Dusky Flycatcher	<i>Empidonax oberholseri</i>
Warbling Vireo	<i>Vireo gilvus</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Mountain Bluebird	<i>Sialia currucoides</i>
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>
Chipping Sparrow	<i>Spizella passerina</i>

PIF Conifer Focal Species

Olive-sided Flycatcher	<i>Contopus cooperi</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Brown Creeper	<i>Certha americana</i>
Golden-crowned Kinglet	<i>Regula satrapa</i>
Western Tanager	<i>Piranga ludoviciana</i>
Dark-eyed Junco	<i>Junco hyemalis</i>



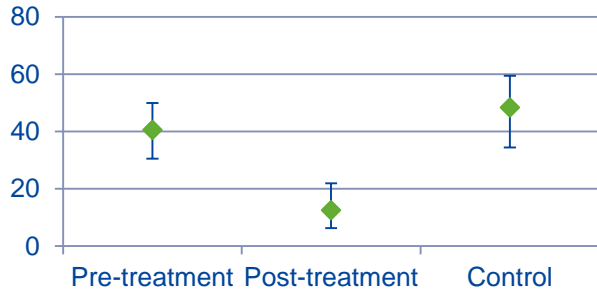


Species Response Hypotheses

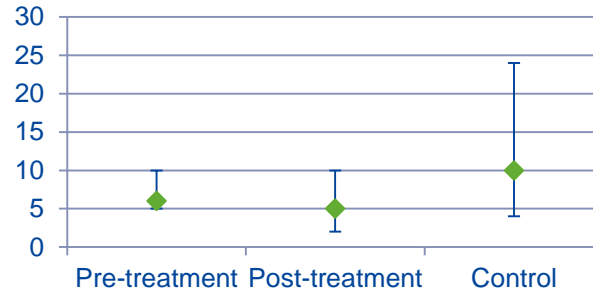
- Species most associated with early seral (open) habitat will increase soon after treatment
- Understory and shrub-associated species will increase 5-10 years post-treatment
- Aspen tree and cavity nesters will decline in short term
- All closed-canopy conifer associates will markedly decline immediately following treatment
- Olive-sided Flycatchers, with affinity for hard edges, will increase

Results: Vegetation Changes

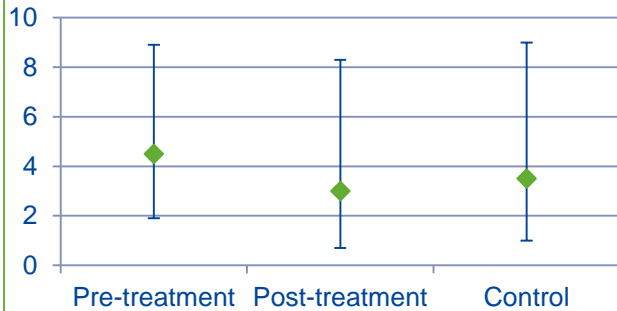
Canopy Cover



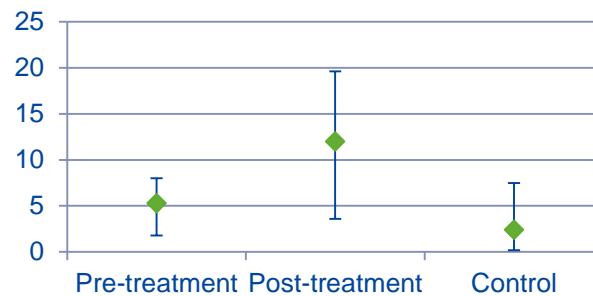
Shrub Cover



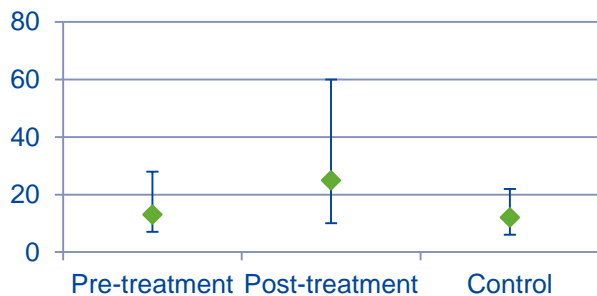
Overstory Aspen Cover



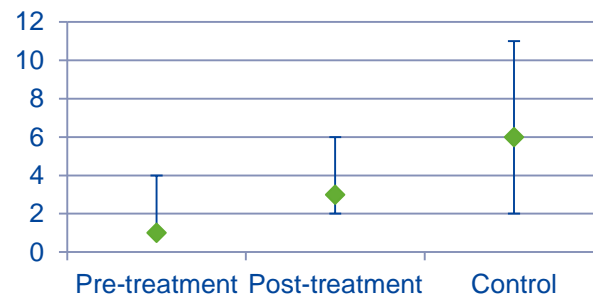
Understory Aspen Cover



Herbaceous Plant Cover



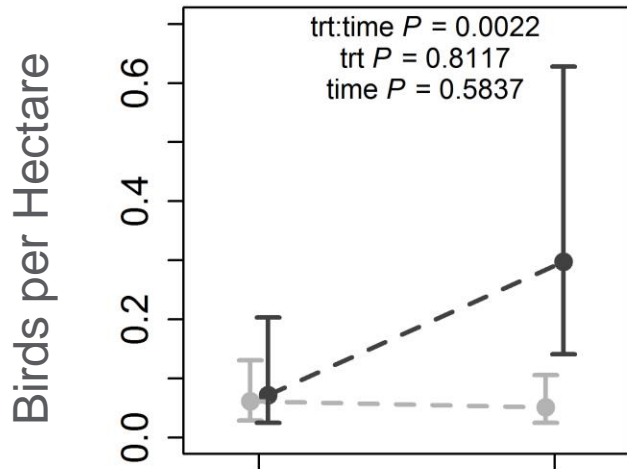
Snags >30 cm



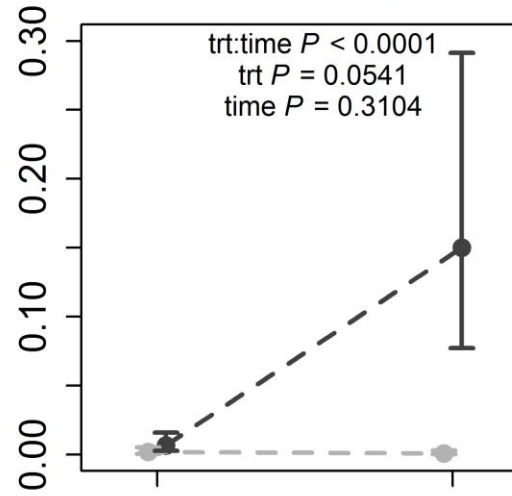
Results: Aspen Focal Species

Early-seral associates

Tree Swallow



Mountain Bluebird

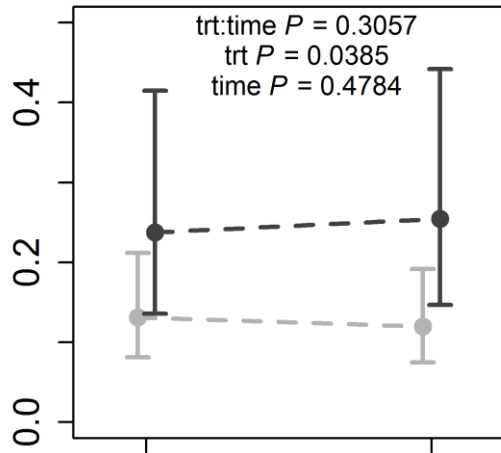


Results: Aspen Focal Species

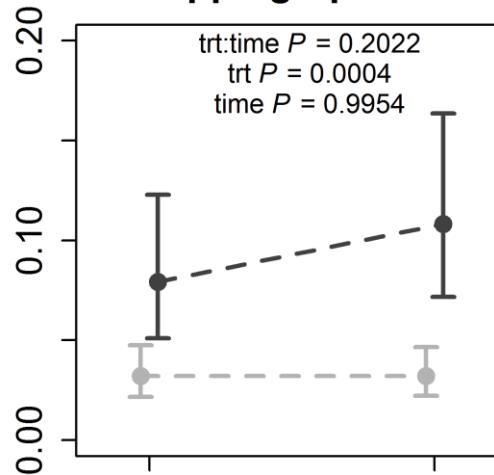
Early-to-mid-seral associates

Birds per Hectare

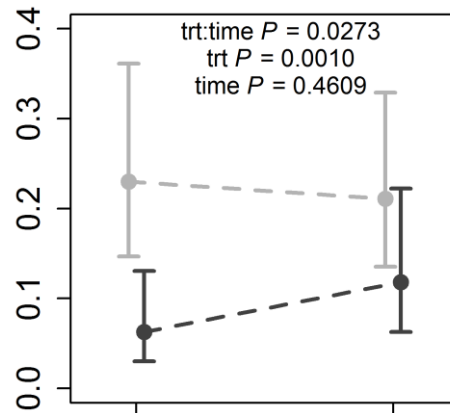
Dusky Flycatcher



Chipping Sparrow



MacGillivray's Warbler

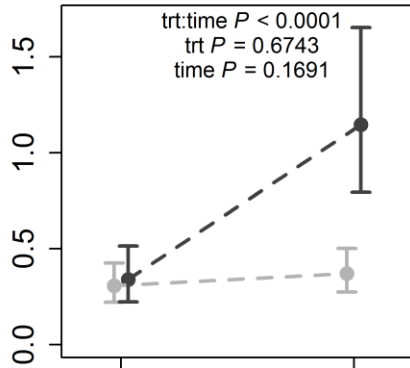


Results: Aspen Focal Species

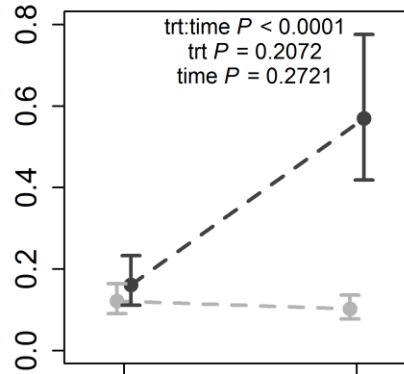
Mid-to-late-seral associates

Birds per Hectare

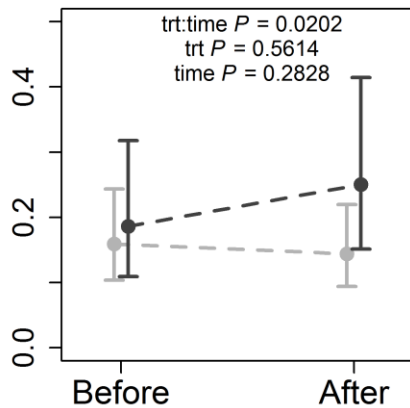
Red-breasted Sapsucker



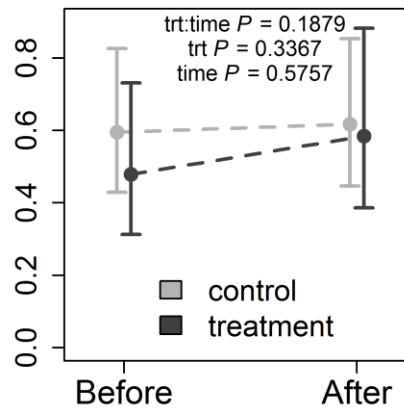
Hairy Woodpecker



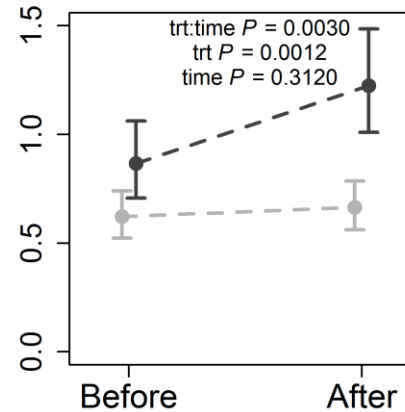
Western Wood-Pewee



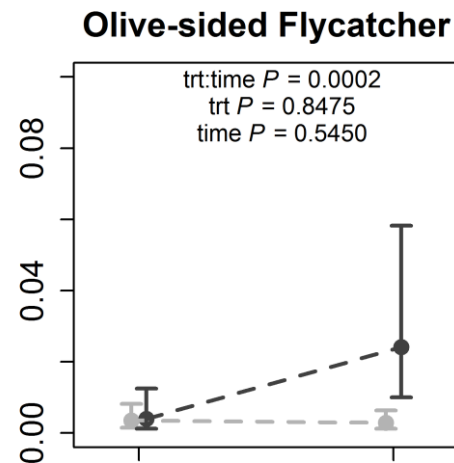
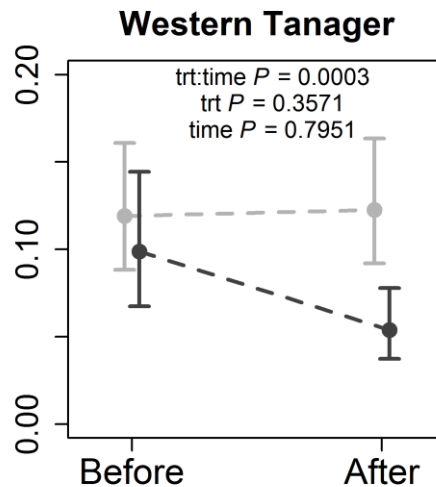
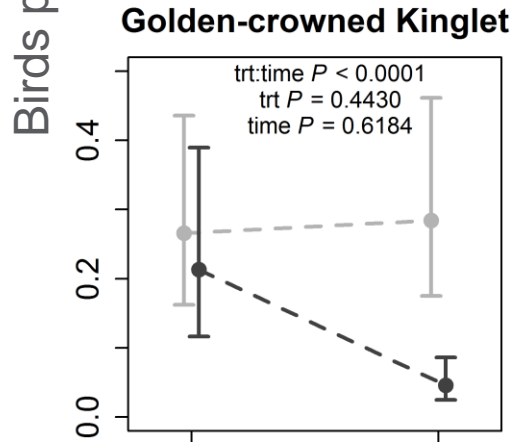
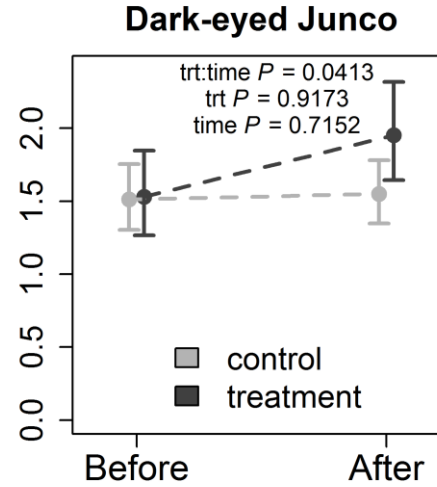
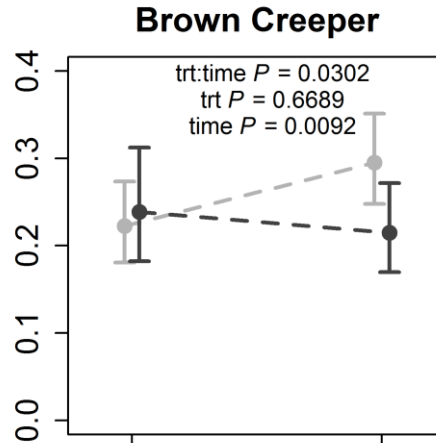
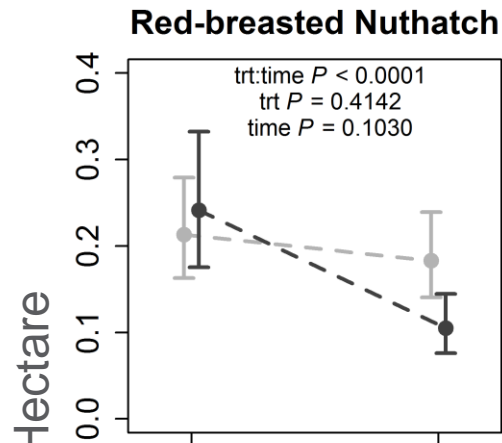
Warbling Vireo



Mountain Chickadee



Results: Conifer Forest Focal Species



Evaluating Our Hypotheses

- Species most associated with open habitat will increase soon after treatment – **Yes 2 of 2**
- Understory and shrub-associated species will increase 5-10 years post-treatment – **Only 1 of 3 did**
- Aspen tree and cavity nesters will decline in short term – **No, none declined & most increased**
- All closed-canopy conifer associates will markedly decline immediately following treatment – **Yes, 3 of 4 did**
- Olive-sided Flycatchers, with affinity for hard edges, will increase – **Yes**

Management Implications

- Consider the role of aggressive mechanical thinning in the restoration of disturbance-dependent habitat
- Retain legacy structures (large trees, snags) to increase the diversity of wildlife (e.g. Olive-sided Flycatcher)
- Manage for a range of aspen seral stages
- Understory is important
- Don't ignore riparian aspen
- Manage aspen for aspen communities



Aknowledgements

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 - Collin Dillingham, HFQLG monitoring coordinator
 - Multitudes of Point Blue technicians that collected the data
 - Images: Tom Grey & Dan Lipp

For more Info: rburnett@pointblue.org or Google – SNAMIN

If you believe the impossible,
the incredible can come true

