Using Birds to Guide and Evaluate Meadow Restoration

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Conservation science
for a healthy planet.

Problem

- Functional meadows provide many services
- Sierra meadows in a degraded state
- Restoration activities increasing
- Few biological targets for restoration success

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>50% of Meadows Are Degraded

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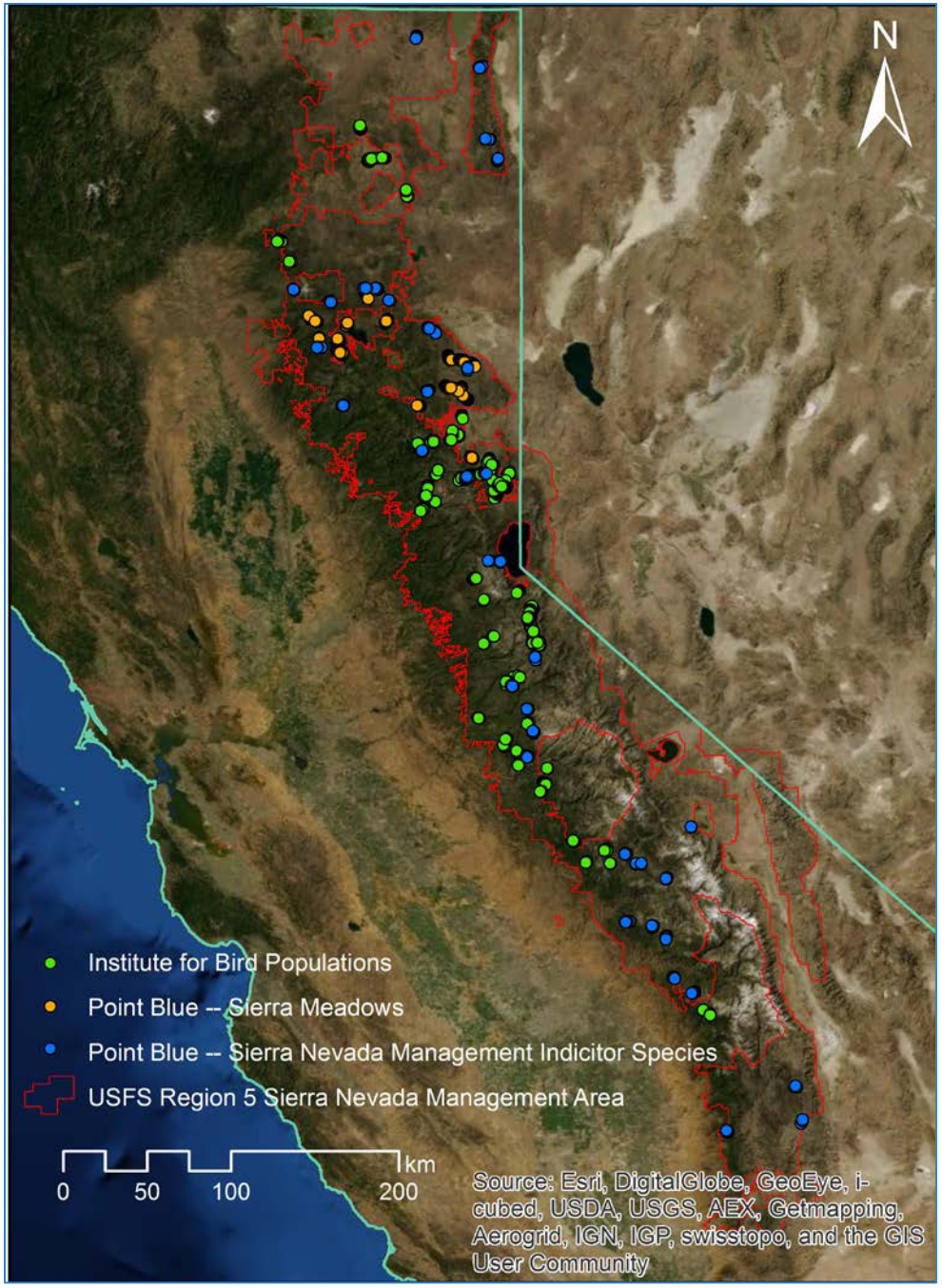
Sample

- 3 projects with differing study designs, spatial extents, & protocols
- 1242 point count locations on 171 transects
- stream channel generally present
- 2010–2012



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Focal Species

- 14 species
- represent diversity of meadow types, elevations, and regions
- strong association with meadow or riparian habitat
- appropriately surveyed with passive point count methods
- 34% of all detections in dataset

Wilson's Phalarope
Wilson's Snipe
Red-breasted Sapsucker
Calliope Hummingbird
Willow Flycatcher
Swainson's Thrush
Warbling Vireo
Wilson's Warbler
Yellow Warbler
MacGillivray's Warbler
Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
Black-headed Grosbeak

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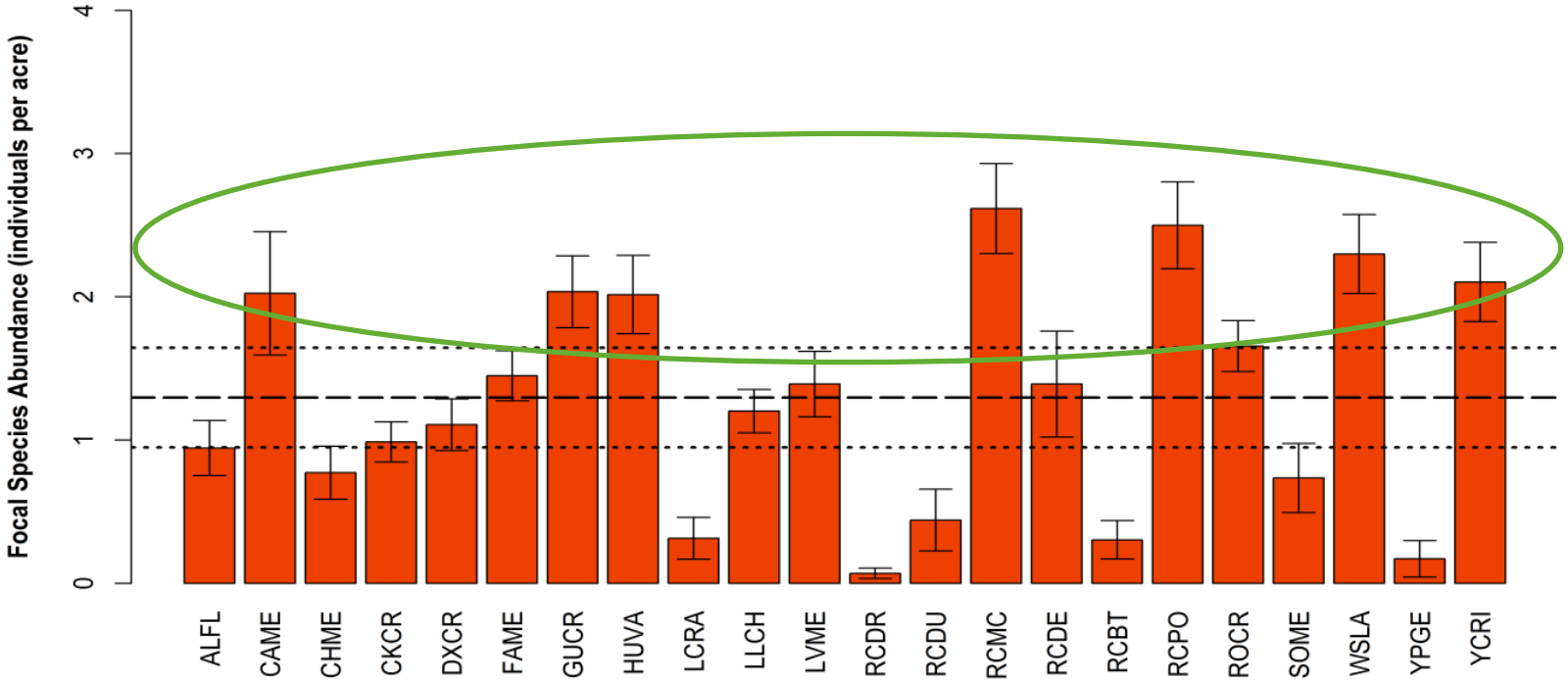
Large Disparity in Bird Habitat between Meadows

What Are the Drivers of meadow bird abundance and diversity?



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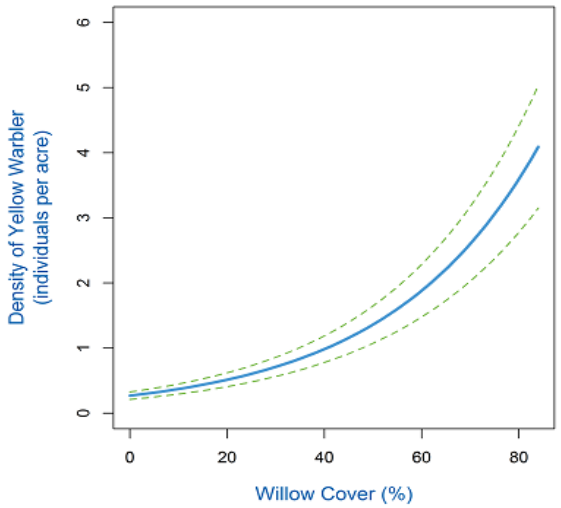
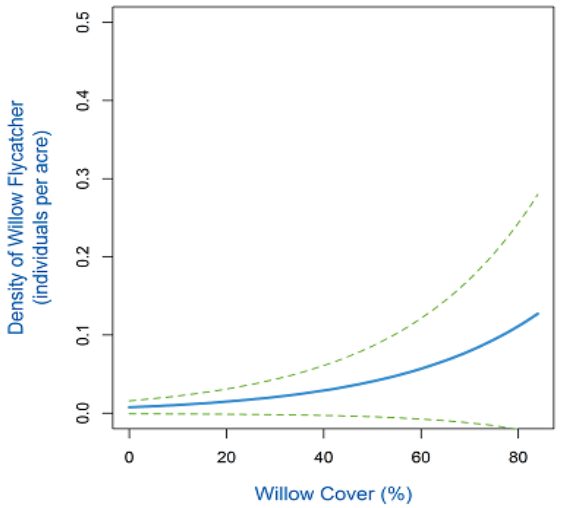
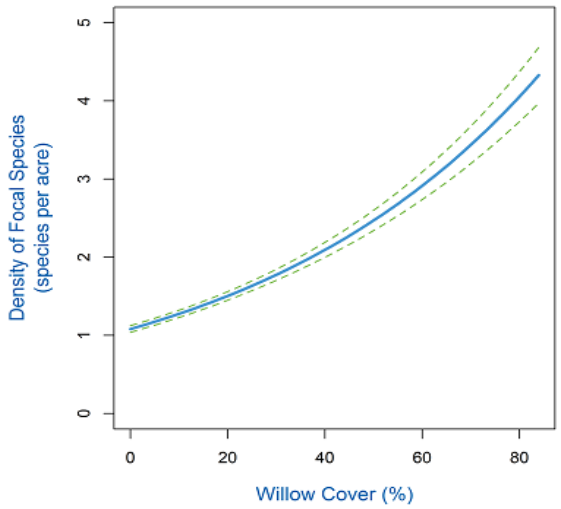
Habitat Associations *willow cover*







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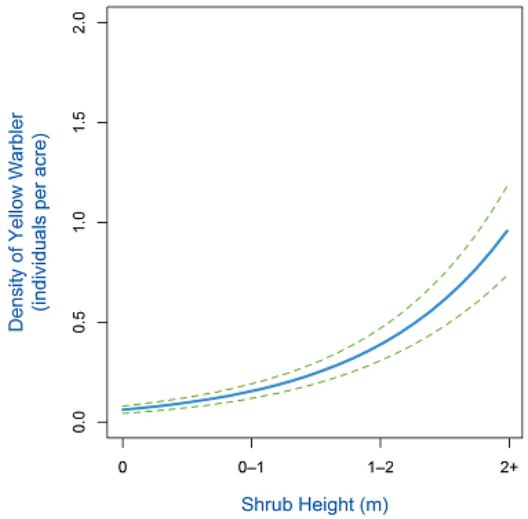
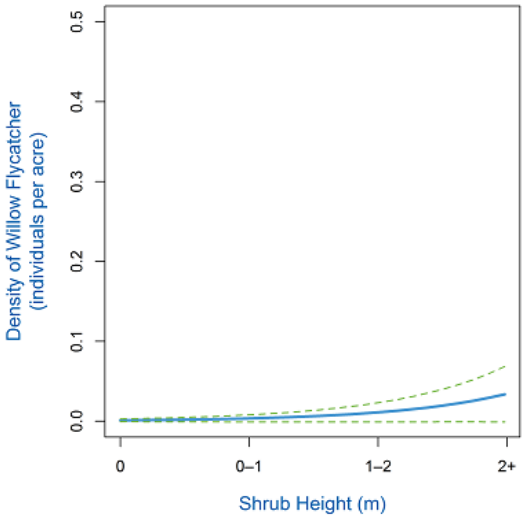
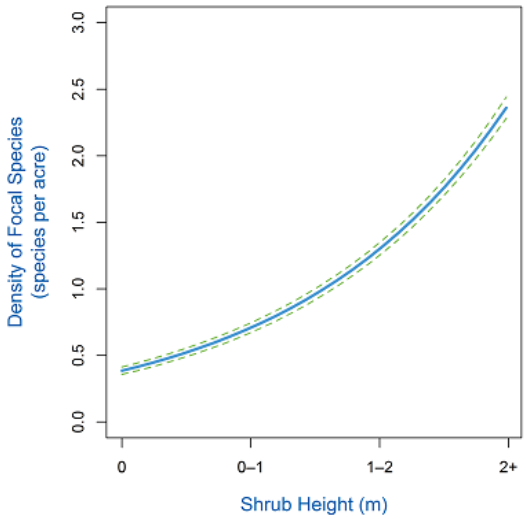
Habitat Associations *shrub height*







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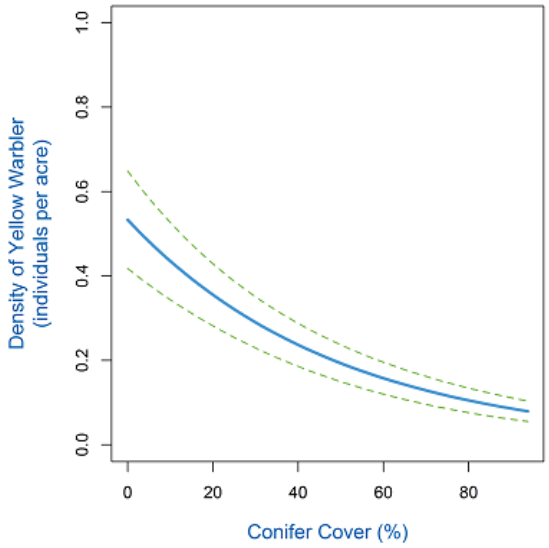
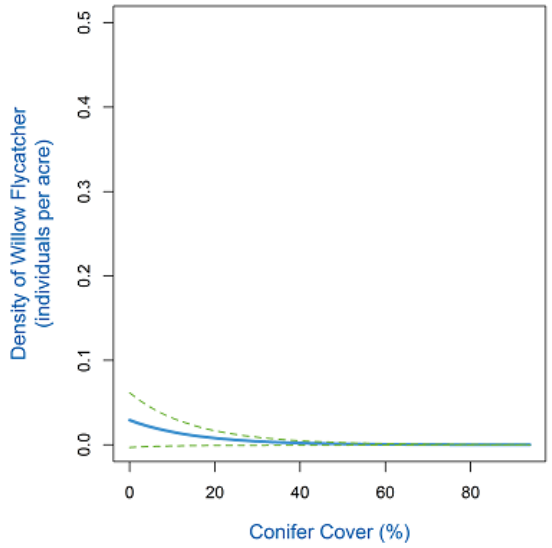
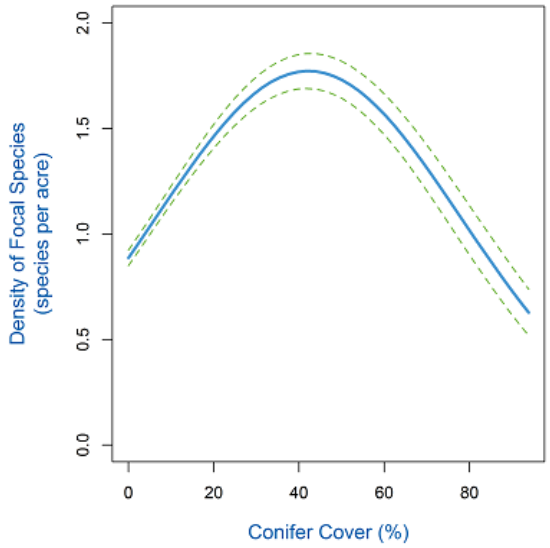
Habitat Associations *conifer cover*







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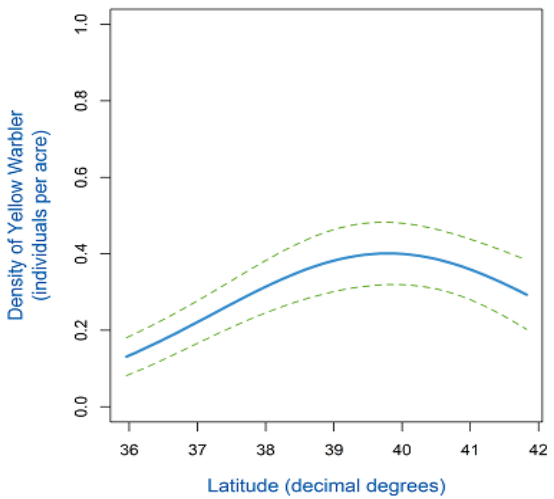
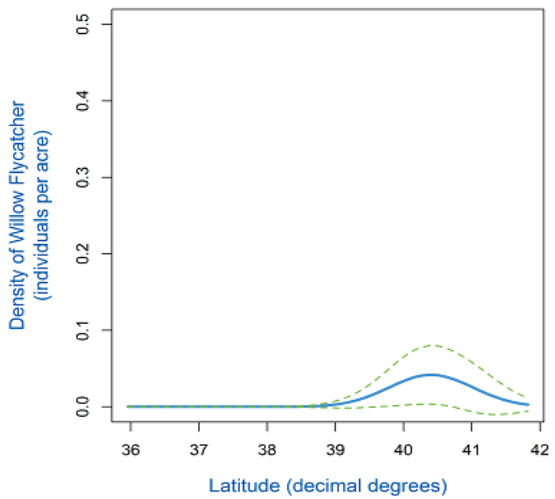
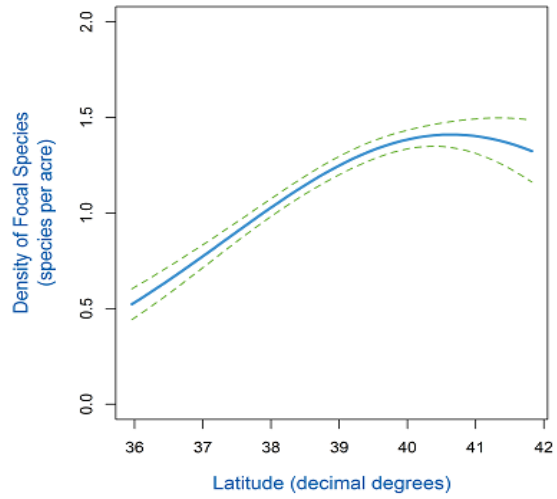
Habitat Associations *latitude*







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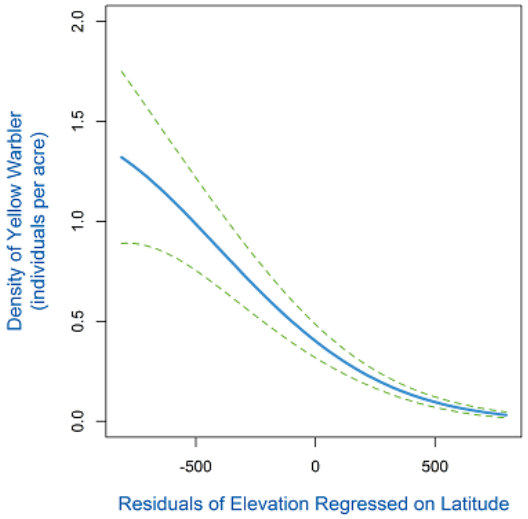
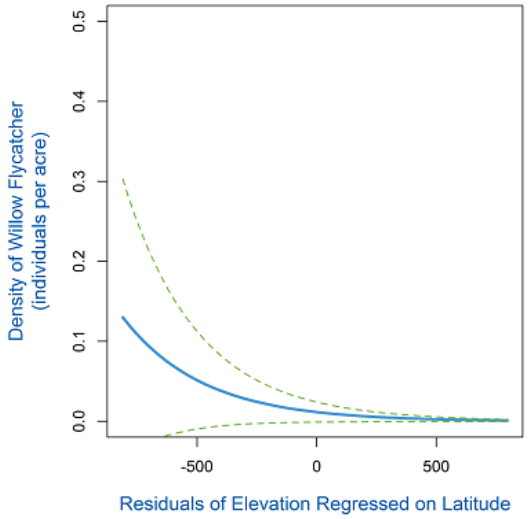
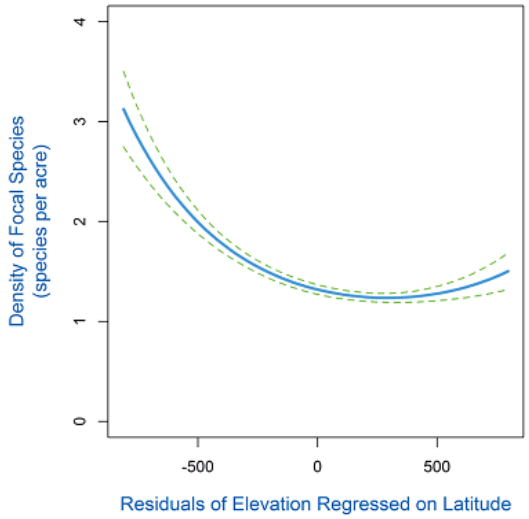
Habitat Associations *elevation*







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Keystone Habitat for Birds in Post-breeding period

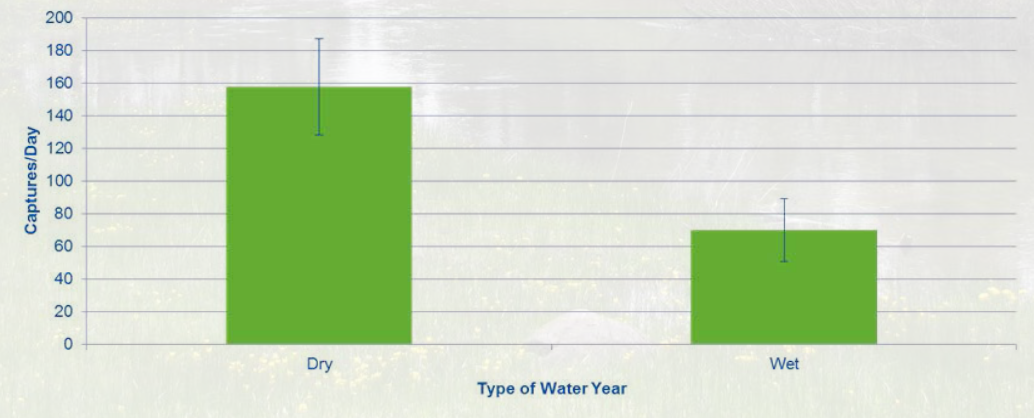
Used by the majority of species that breed in Sierra

Molting and migration staging

Dominated by young inexperienced birds

Prey abundance peaks in meadows later in year

Potential buffer against drought conditions



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Can We Restore Degraded Meadow Habitat?

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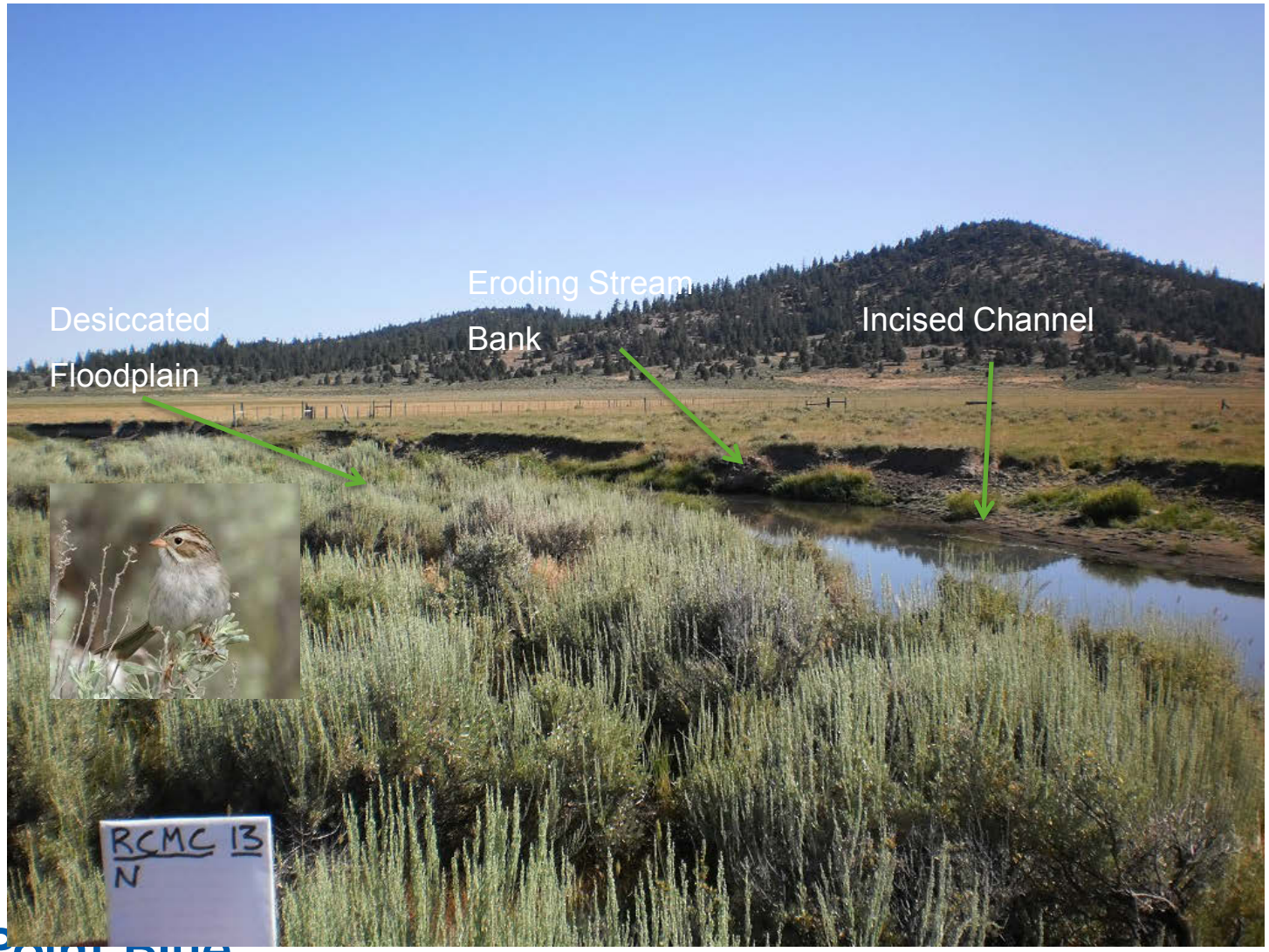
Degraded Meadow



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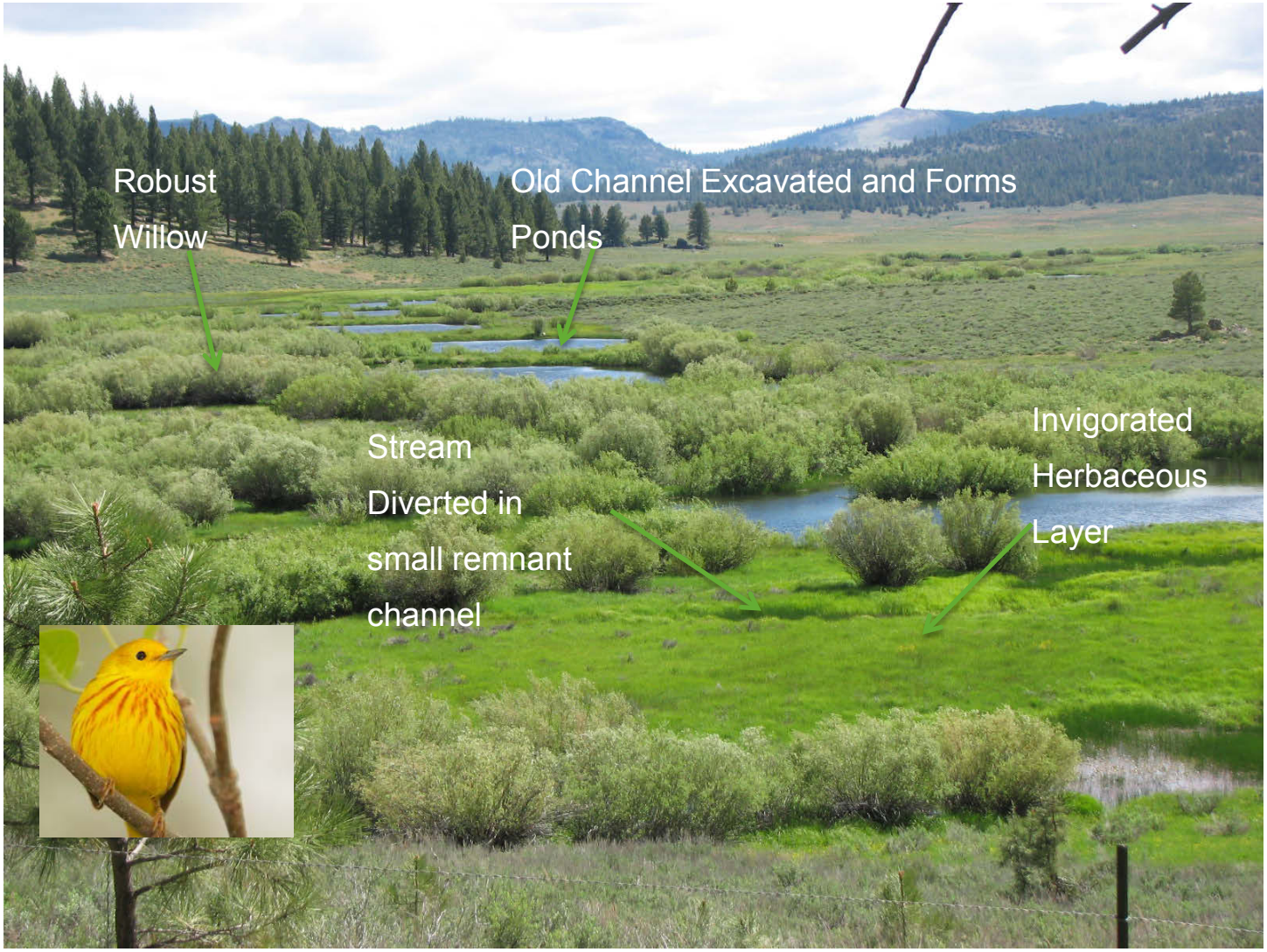
Restored Meadow



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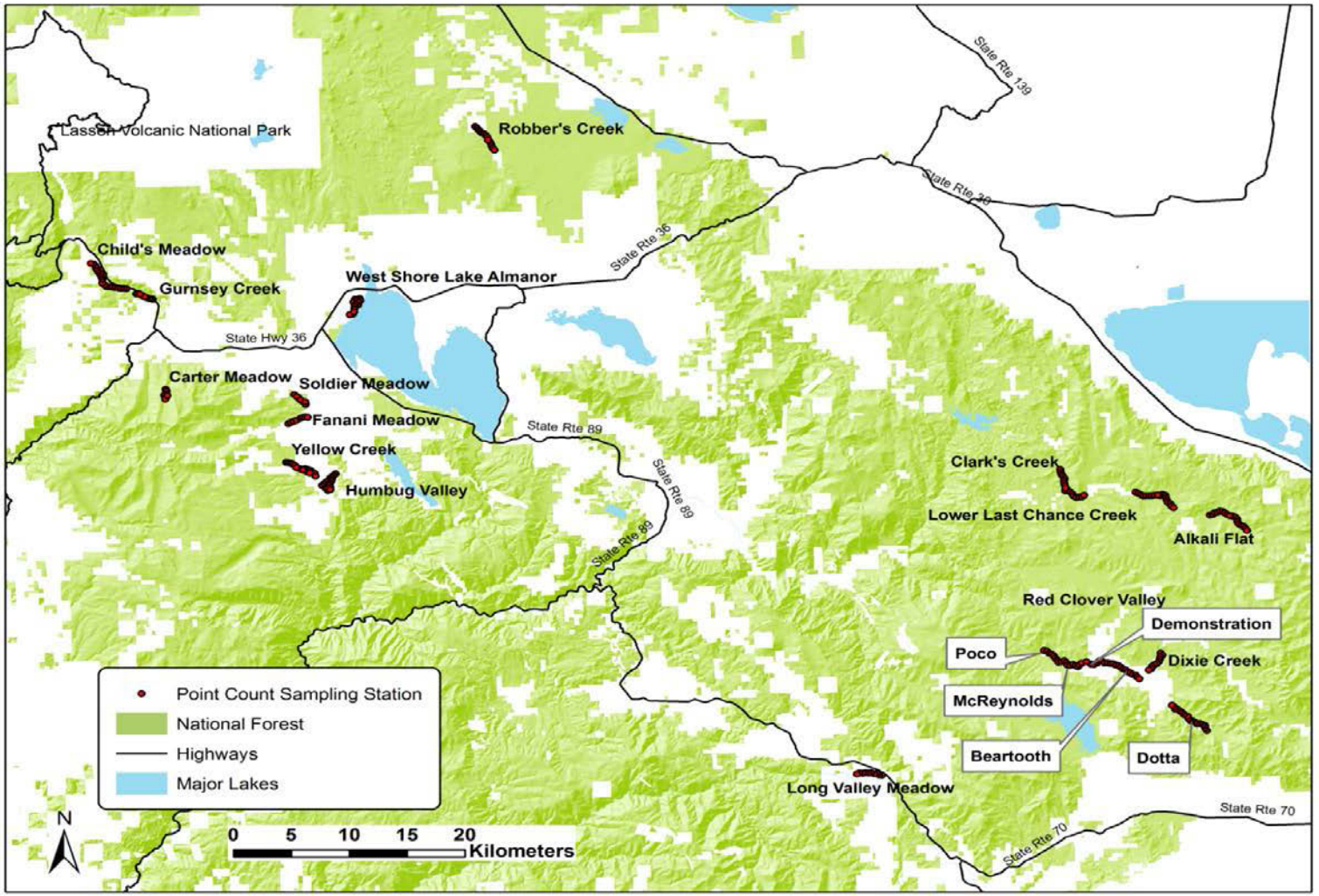
Meadow Restoration Bird Sites



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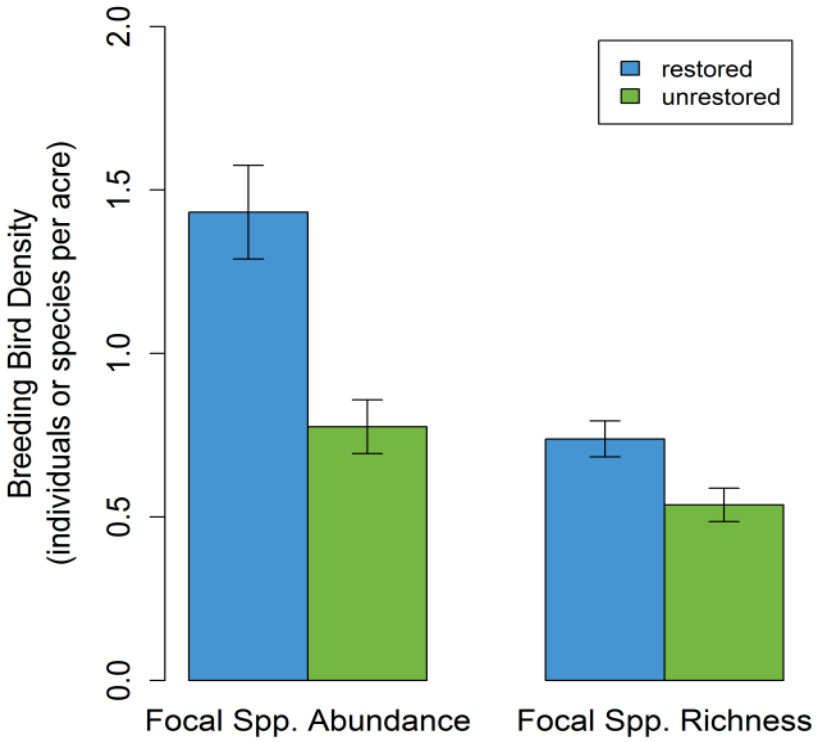
Restoration Increases Richness and Abundance of Meadow Birds

Bird response to meadow restoration 2 – 7 years post-restoration



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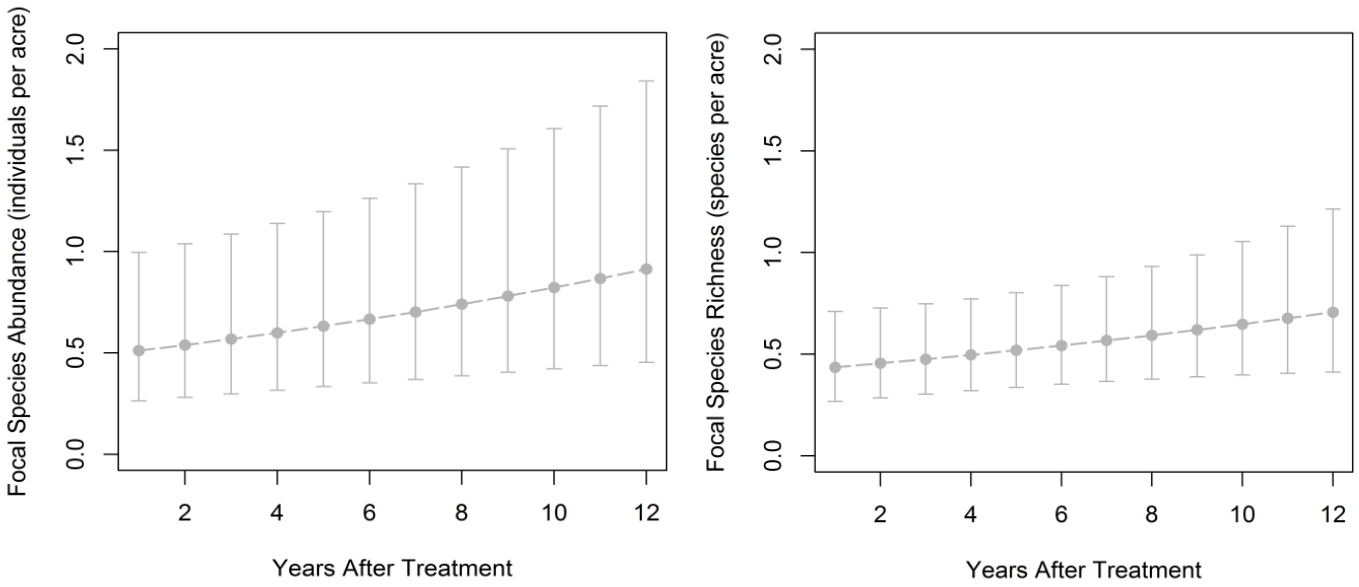
Increase Continues at least 12 years Post-restoration



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Restoring Floodplain Function is Fundamental

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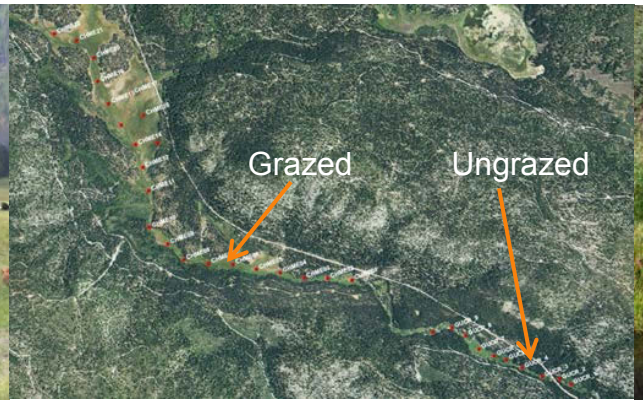
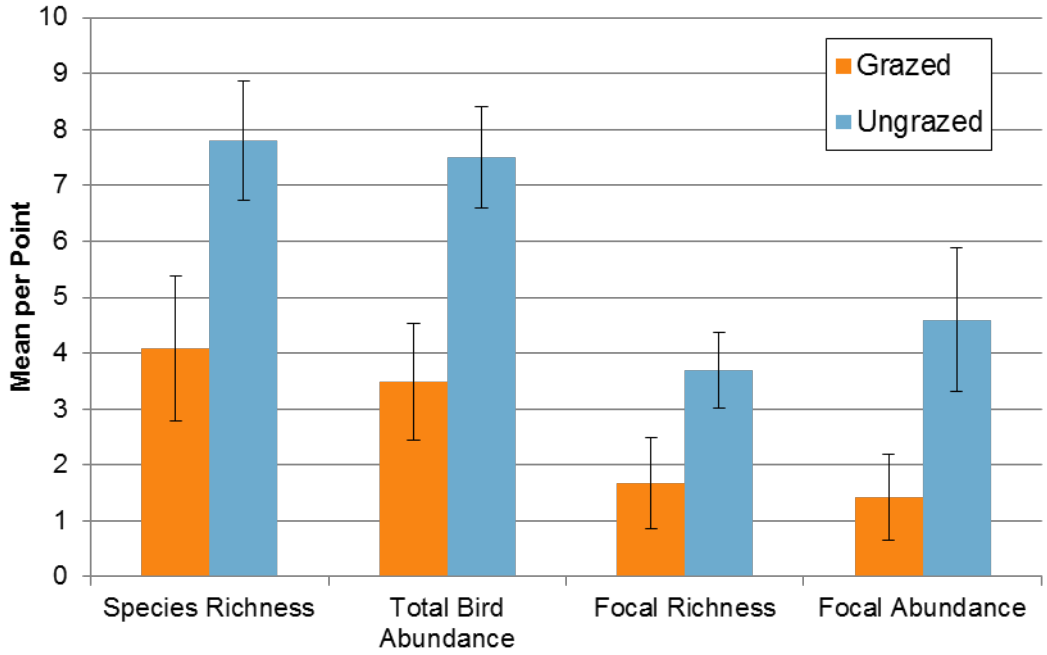
Grazing Can Degrade Meadow Bird Habitat





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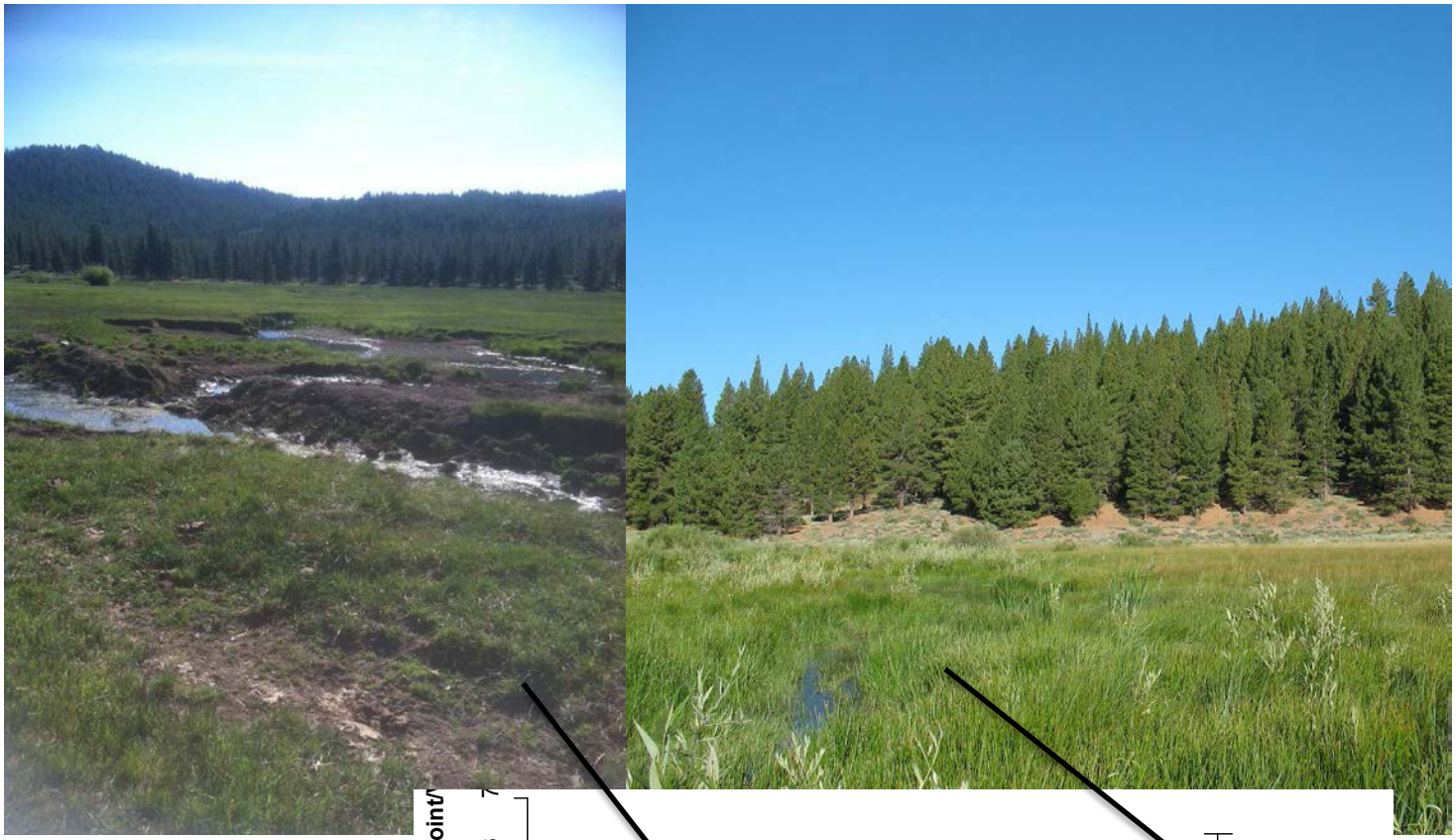
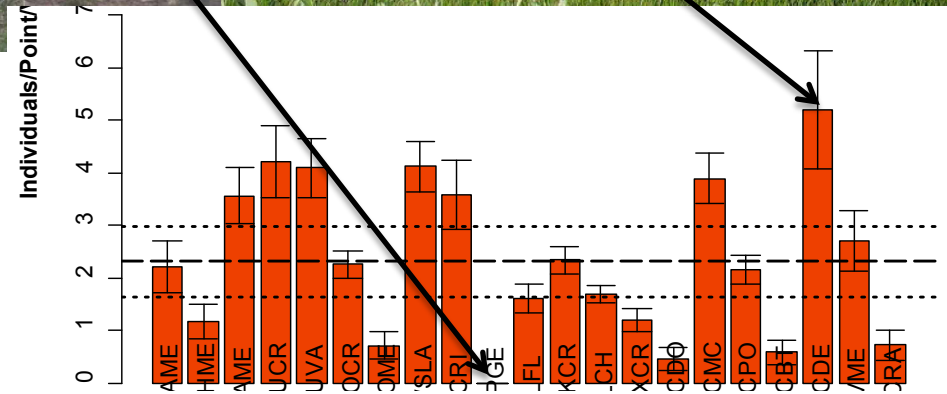
How You Graze Matters





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Restoration Rec's

- Restore floodplain function
- Increase riparian deciduous shrub volume
- Meadow-conifer edges support richness, but remove encroaching conifers

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Restoration Rec's

- Prioritize hydrogeomorphic types that support riparian shrubs
- West-slope watersheds
- Consider climate change
  - too wet, too high, too far north?…maybe not in the near future
  - lowest elevation meadows may be most vulnerable (Kershner 2014)

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Climate Change Poses a Major Threat

Climate water deficit is predicted to increase dramatically

Meadows can't easily migrate upslope

Larger meadows are at elevations below future snowpack line

Better habitat in north where snowpack is predicted to be hit hardest

Extreme flood events (rain on snow) can unravel meadow channels

Healthier meadows = more resilient to climate change

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