Forest Management to Reduce Woody Biomass: Wildlife Responses

Woody Biomass Utilization Workshop
May 25, 2010

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Mitigating crown fire hazard:

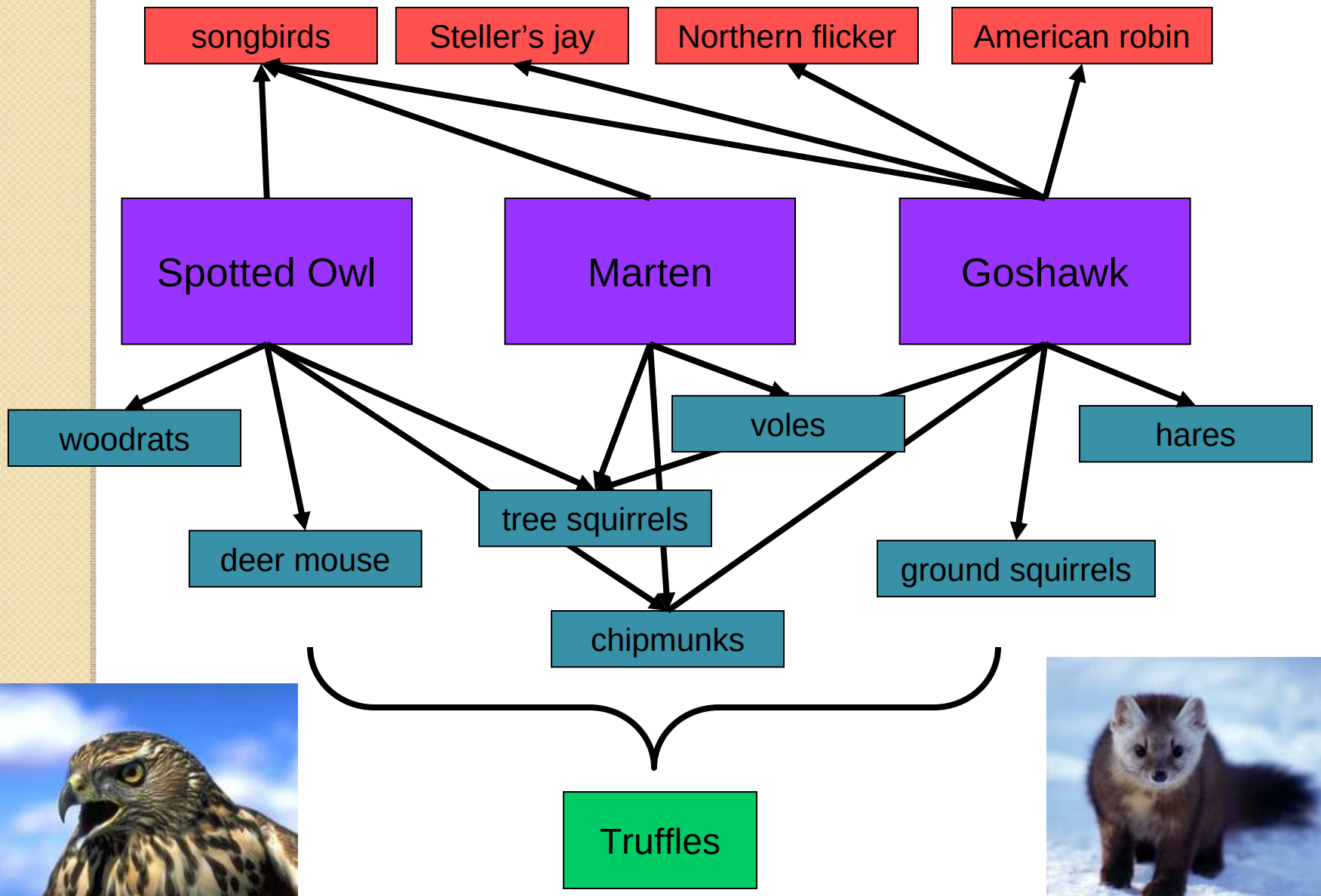
- Reduce ladder fuels
- Raise height to crown base
- Space crowns of overstory trees

Fuel treatment goals in conflict with wildlife habitat management goals?

Typical residual stand structure

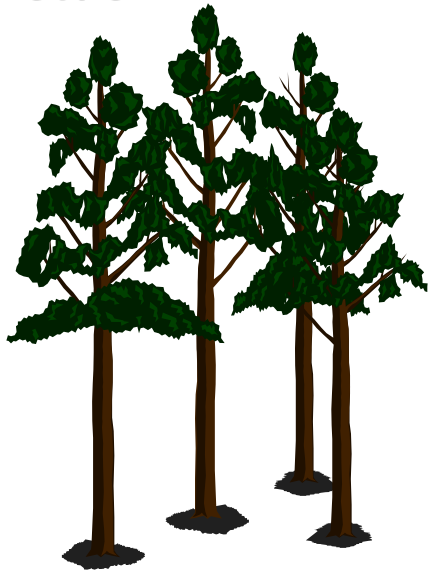
Historical structure (1929)

Wildlife Community Interdependencies



Role of Wildlife in Forest Ecosystem Restoration and Resilience

Potential Effects of Fuels/Biomass Reduction on Wildlife Habitat



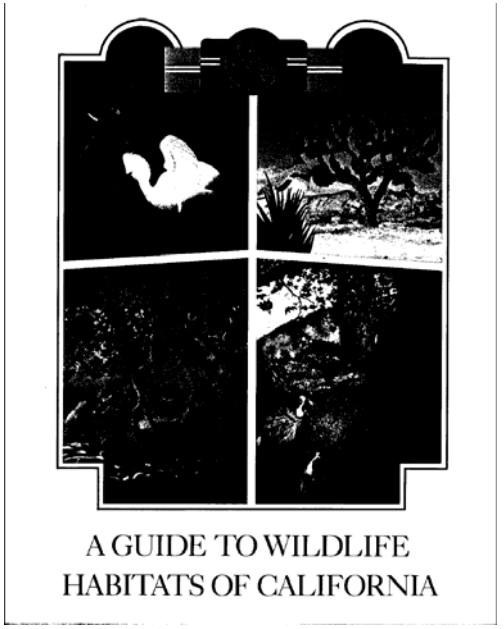
- **Habitat change..**
- Trees and deadwood
  - Canopy layering and complexity
  - Snag and log densities and quality
- Ground cover and complexity
  - Shrub and herb composition, cover, vigor
  - Fungi diversity and abundance
- Special habitat elements
  - Nest trees, roost sites, large logs, food resources, cover from predators, cool microclimate

Potential Direct Effects of Fuels/ Biomass Reduction on Wildlife Species

- **Disturbance**
  - Frequency and intensity of treatments can affect the ability of some species to persist in the short term or long term even if habitat conditions remain favorable

Existing Assessment Tools Insensitive to Habitat Changes

- Historical research primarily based on even-aged management systems and models depict linear seral progression of forest growth and structure
- California Wildlife Habitat Relationships (CWHR) database system provides suitability ratings for vegetation conditions for vertebrate in California
- Suitability ratings based on vegetation type, canopy closure class (n = 4), and diameter class (n = 6)
- Current forest management varied in type, intensity, and frequency of treatment
- Insensitive to changes in understory and partial overstory removal treatments



Uncertainties are a barrier to forest management to achieve multiple objectives

- Wide-spread forest management occurring to…
  - Reduce the risk of high intensity wildfire
  - Generate woody biomass for energy
  - Enhance forest health and carbon sequestration
- Management needs to thread a finer needle
  - Thresholds for maintaining species with various needs and vulnerabilities
  - Options and trade-offs for achieving multiple objectives ecosystem diversity, forest health, fire safety

Interdisciplinary Research is Key

- The juxtaposition of ecological responses – wildlife, vegetation, fuels, fungi, fire – can only be determined with sufficient precision to inform stand and landscape scale management when studied together
- Ecological responses a function of many factors, management being just one of them - strict replicates not possible – need for multiple studies carried out in a similar manner

Dimensions of Ecological Sustainability

Wildlife:
- Population dynamics
- Habitat diversity
- Species richness

Tree Health:
- Growth, Mortality
- Disease/pest incidence

Carbon:
- Net Primary Productivity
- Biomass pools
- Carbon Carrying Capacity

Water:
- Yield, Quality, Timing

Soils:
- Nutrient capital
- Physical structure

Fire
- Risk, Hazard

Disturbances

Wildfire

Climate

Biotic Agents

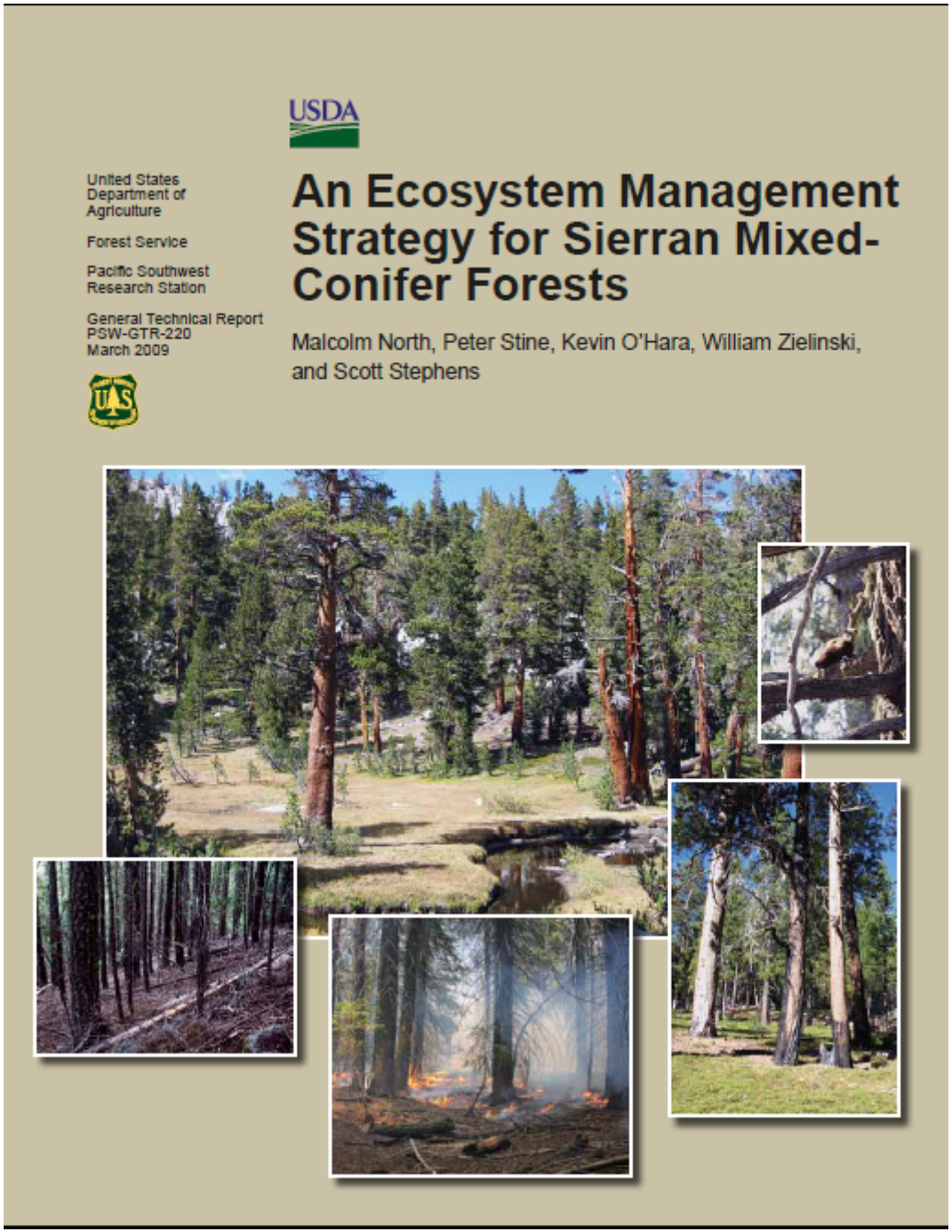
Mechanical

Past Research in Sierra Nevada

- Fire and Fire Surrogate Study
  - Blodgett Experimental Forest
    - birds and small mammals
- Replicated in other areas in California and across the country
- Small scale – too few in California to provide definitive results on wildlife responses

Ecosystem Management Emphasis

- US Forest Service
- Pacific Southwest Research Station
- GTR-220
- March 2009



Nearly Completed Research

- Plumas–Lassen Study
  - Group selection and DFPZ
  - Barnett @ PRBO - songbirds
  - Kelt @ UC Davis - small mammals
  - Keane @ PSW – Calif. Spotted owl & goshawk
  - Some elements nearing completion
- Lake Tahoe Basin Studies
  - Fuels/biomass reduction &ecological restoration
  - Manley @ PSW – songbirds, small mammal, truffles
  - Murphy et al. @ UNR – ants
  - North @ PSW – vegetation and fire
  - Pavlick @ Mills – plants
  - Some elements nearing completion

On-going Research

- SNAMP Studies
  - Fuels/biomass reduction
  - Battles , Stephens, Barrett @ UCB – vegetation, fire, fisher
  - Manley @ PSW – songbird & small mammal response
- Stanislaus Experimental Forest
  - Restoration of historical structure
  - Knapp and Manley @ PSW – vegetation, soils, songbirds, mammals, truffles
- Sagehen Experimental Forest
  - Ecological restoration and fuels reduction
  - Battles and Stephens @ UCB – vegetation, fire
  - Guttierrez @ UMN – spotted owl response
  - Manley @ PSW – songbird & small mammal response

Lake Tahoe Basin Fuel Reduction and Wildfire Prevention Strategy

- 14,291 acres treated between 2000-2006 by all agencies
- 68,000 acres proposed for treatment over the next 10 yrs

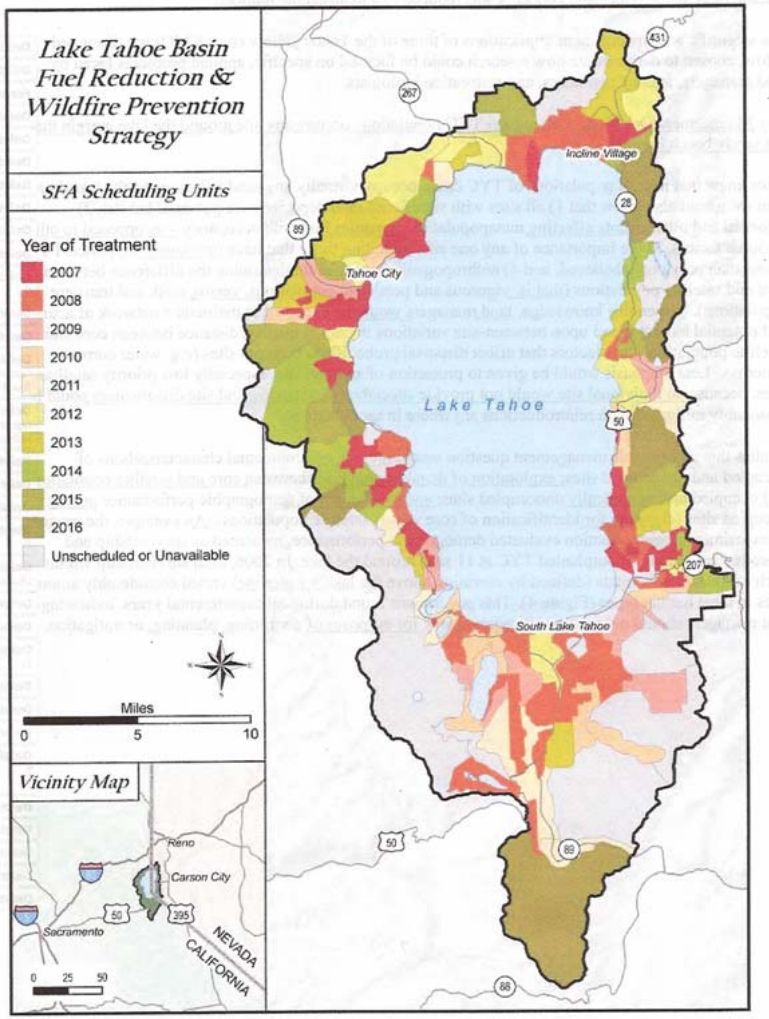
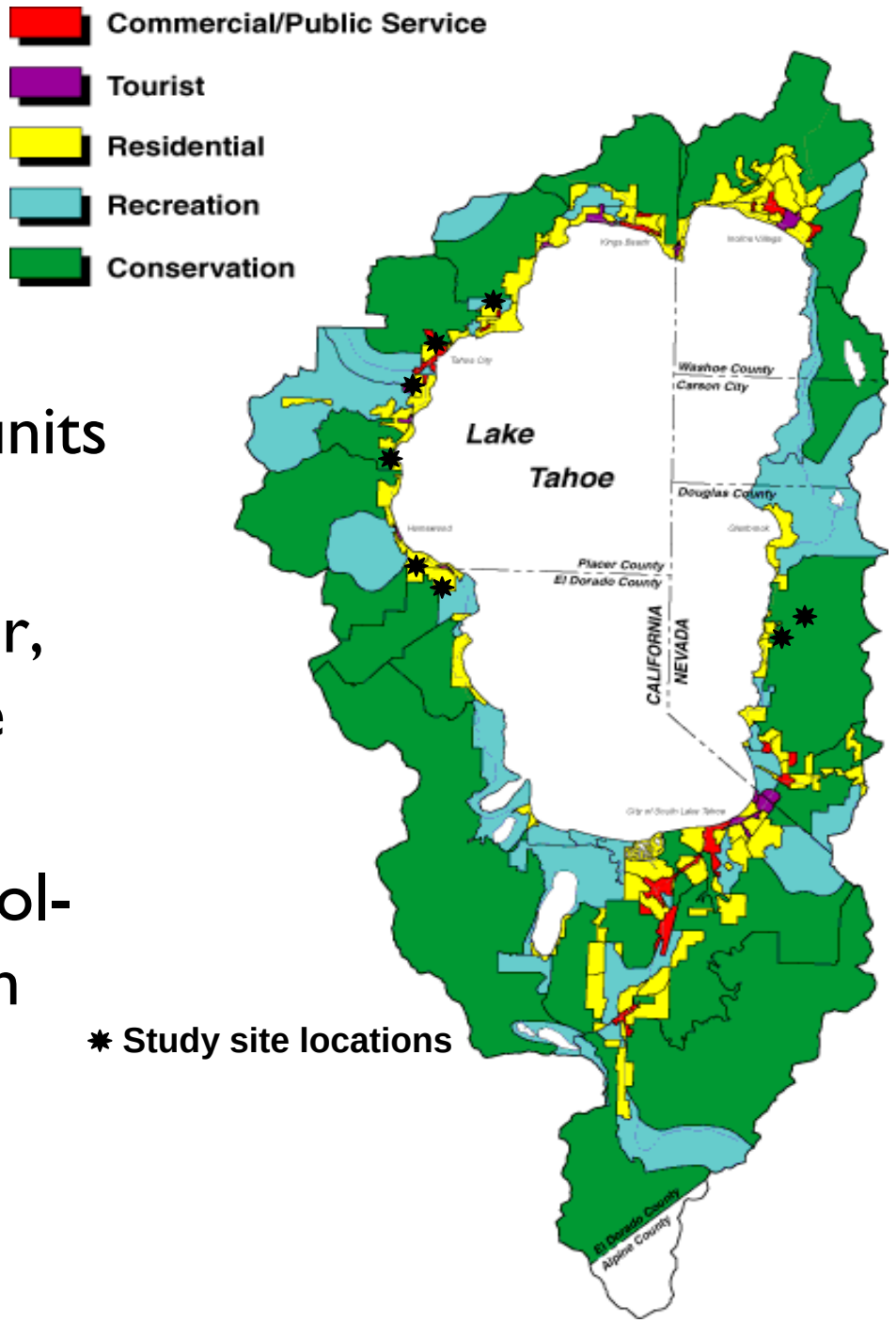


Figure 9. Ten-year proposed project schedule map

Lake Tahoe Study Sites

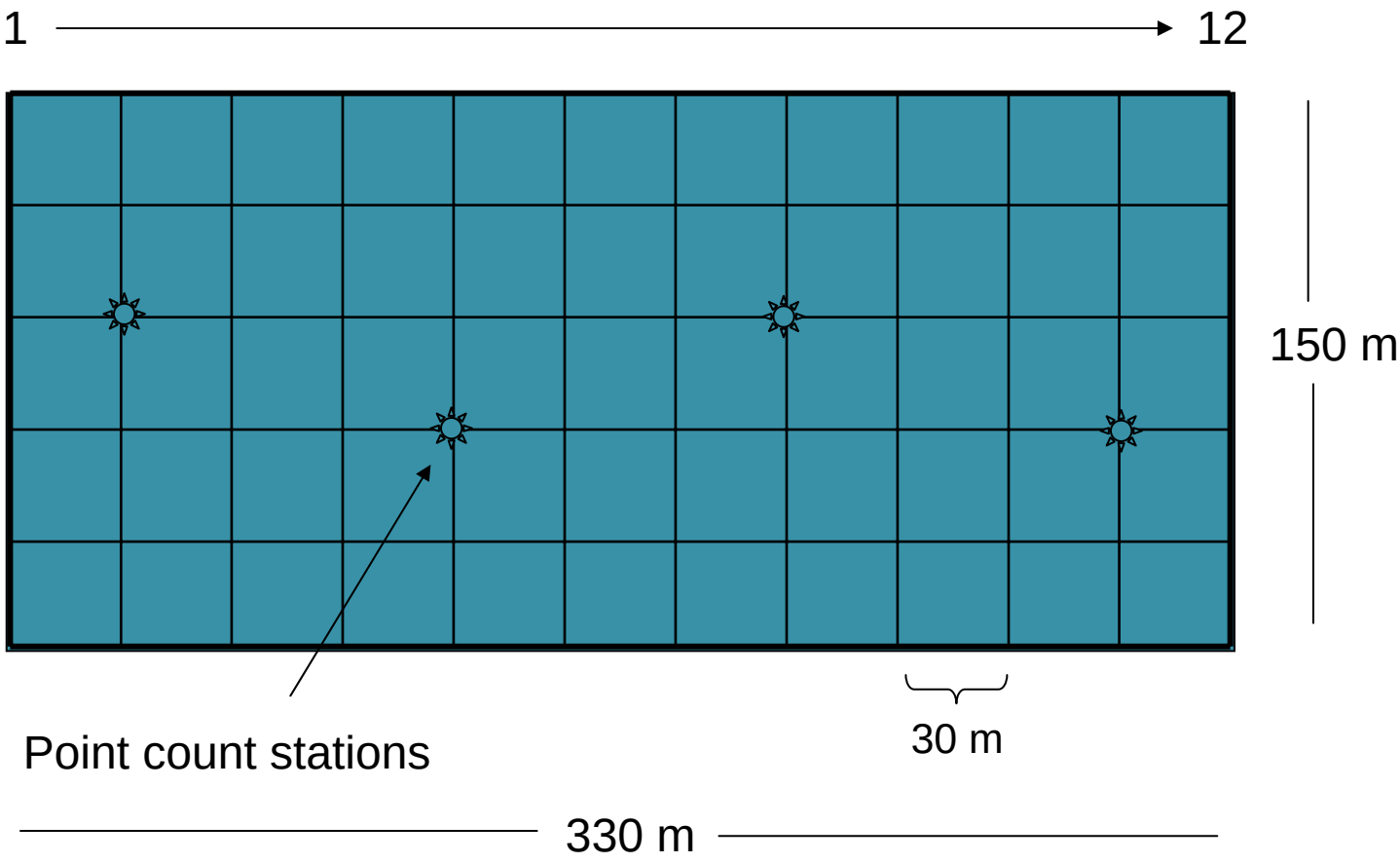
- 8 paired treatment units
- 6,300-7,200 ft
- Sierran mixed conifer, white fir, Jeffrey pine vegetation
- Before-After-Control-Impact (BACI) design
- 20 more sites being established



Integrated Sample Plot

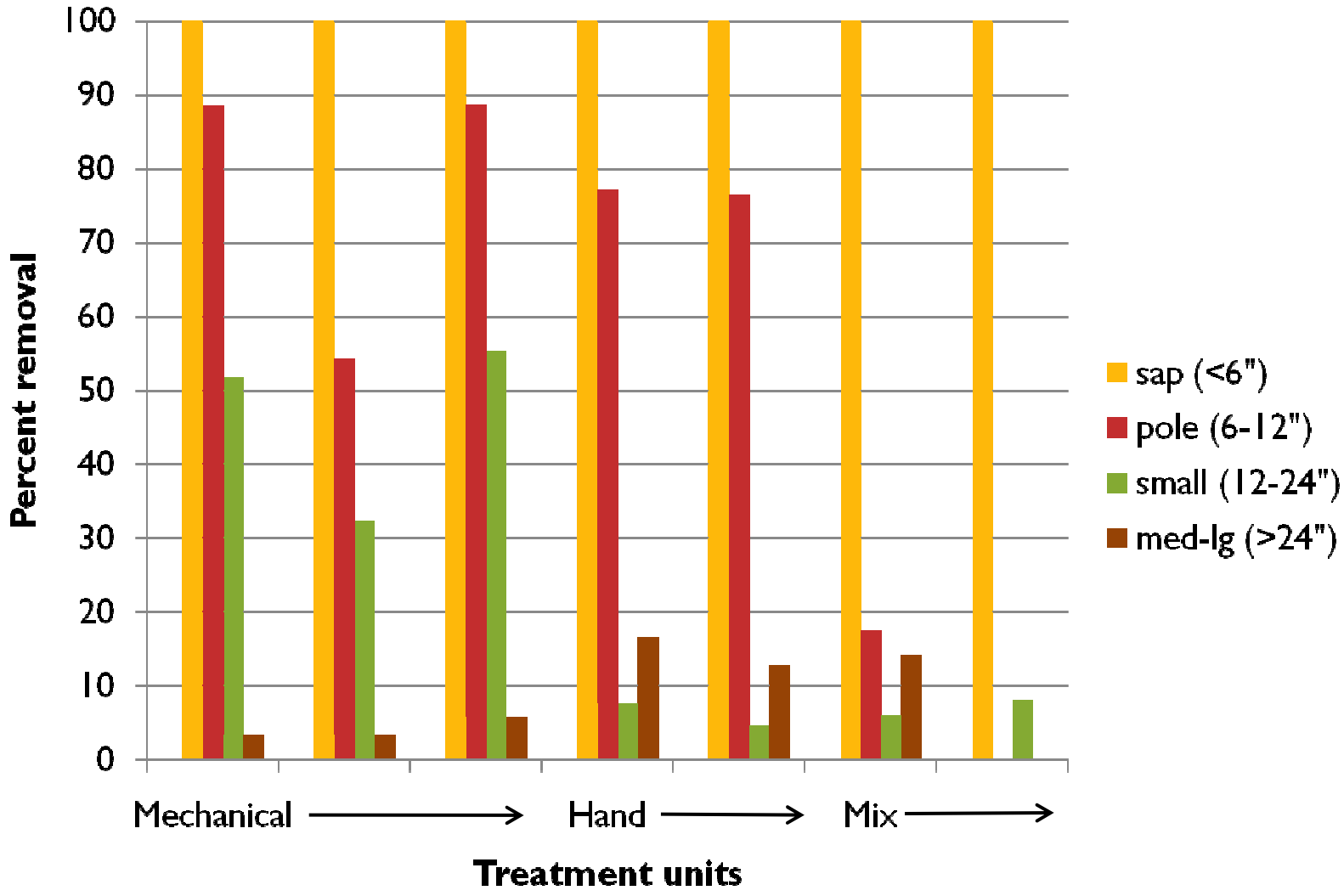
20 sm mammal sp.

- 12.4 ac plot, 72 grid points

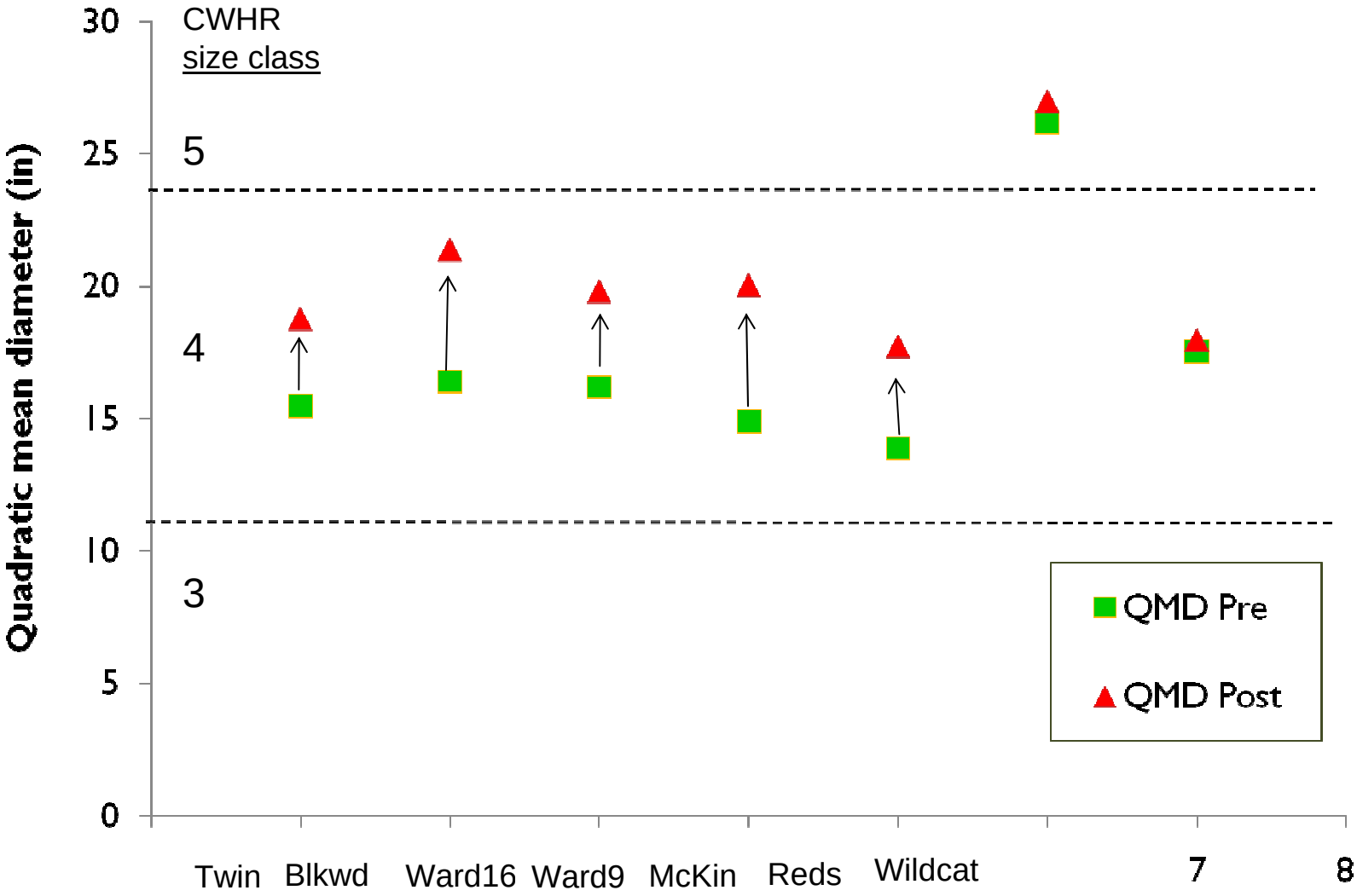


79 bird species

Changes in Forest Structure

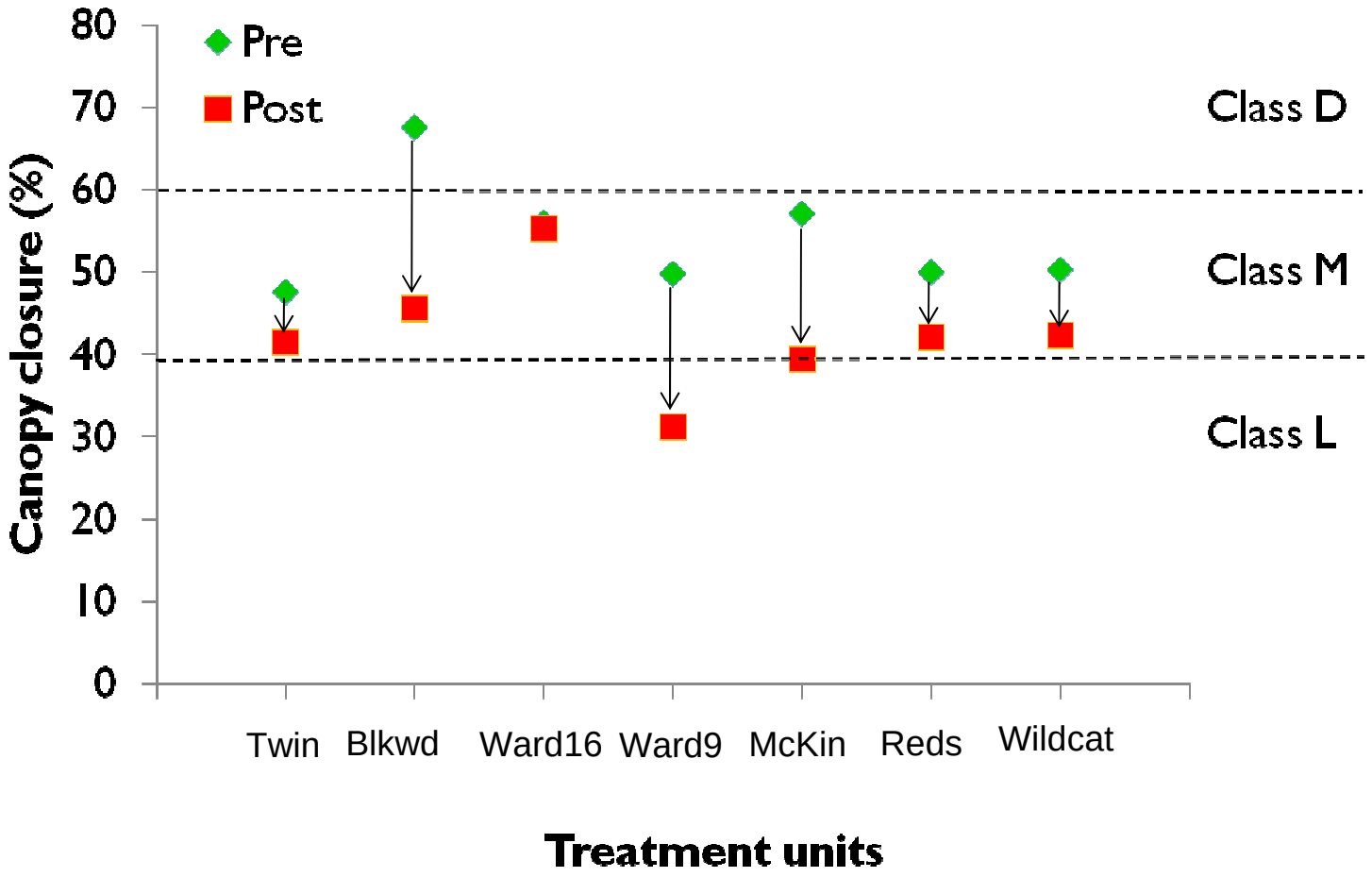


No Change in Average Tree Diameter

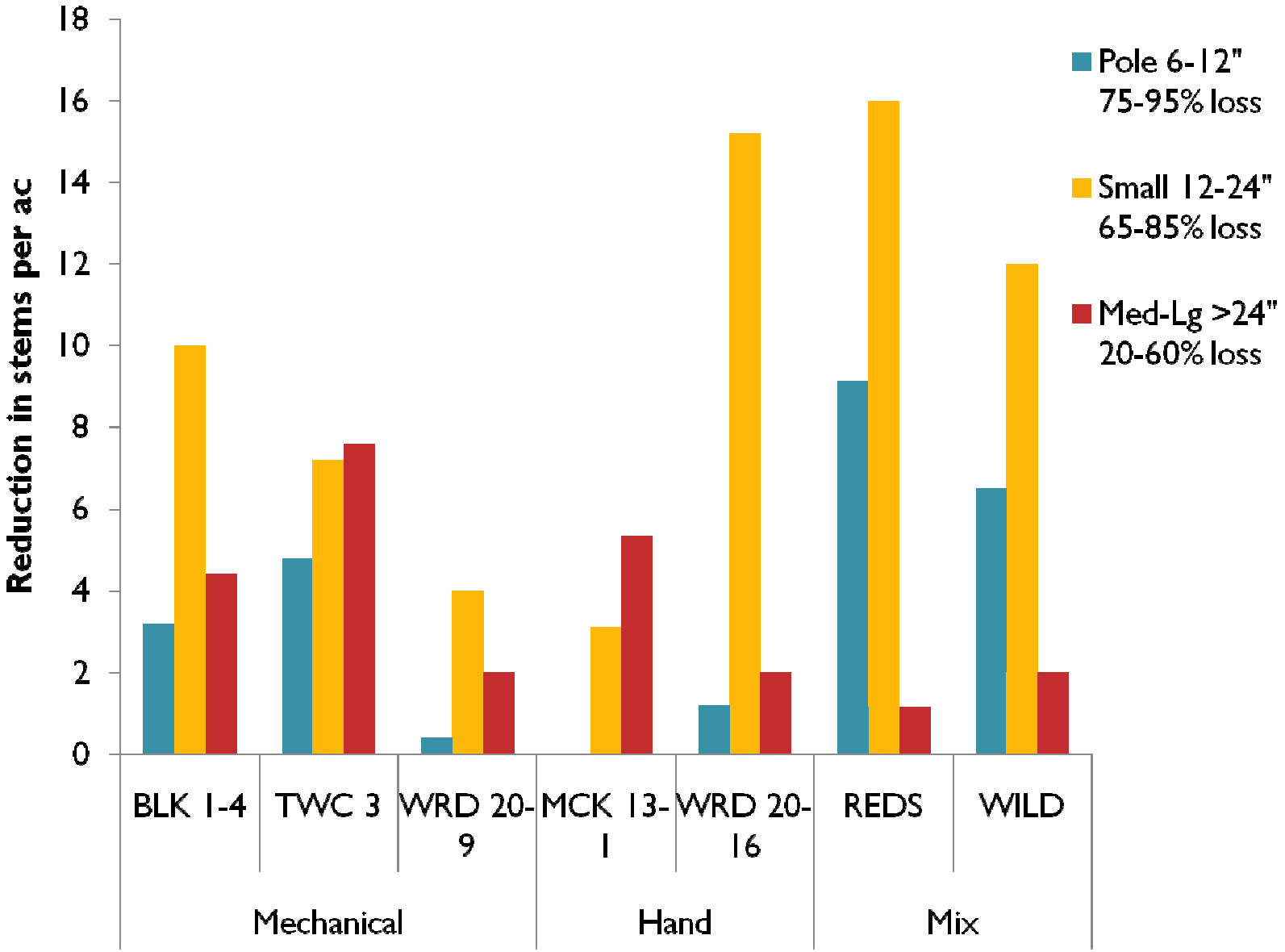


CWHR Canopy Closure Class

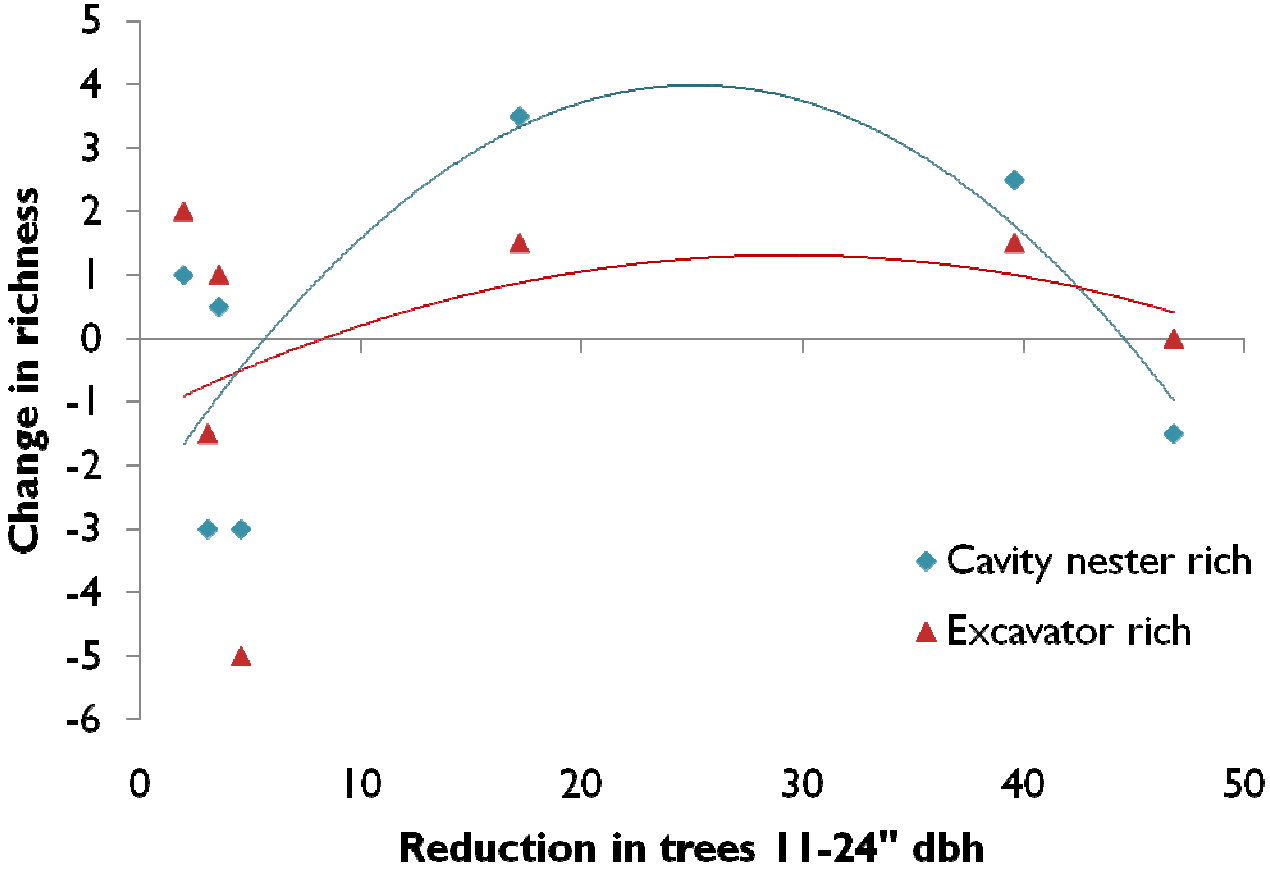
- Target was ≥ 40% CC
- Two sites changed CC class

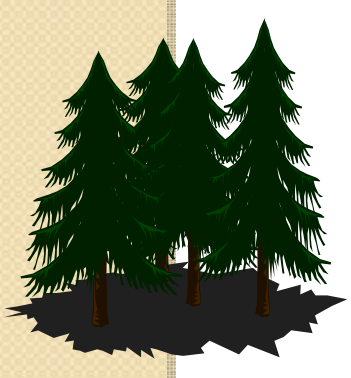


Reductions in Snag Density

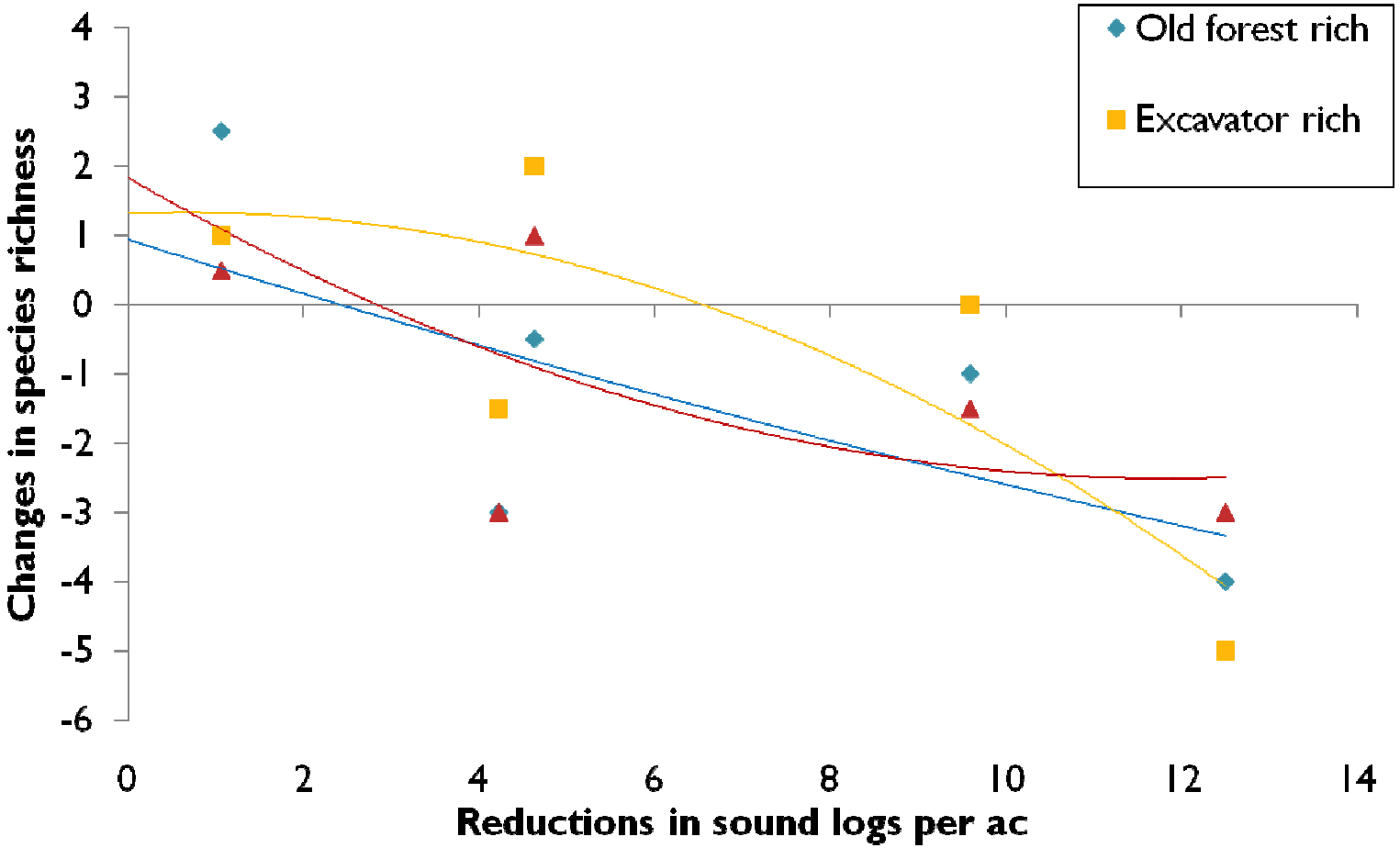


Bird Species Richness & Tree Density

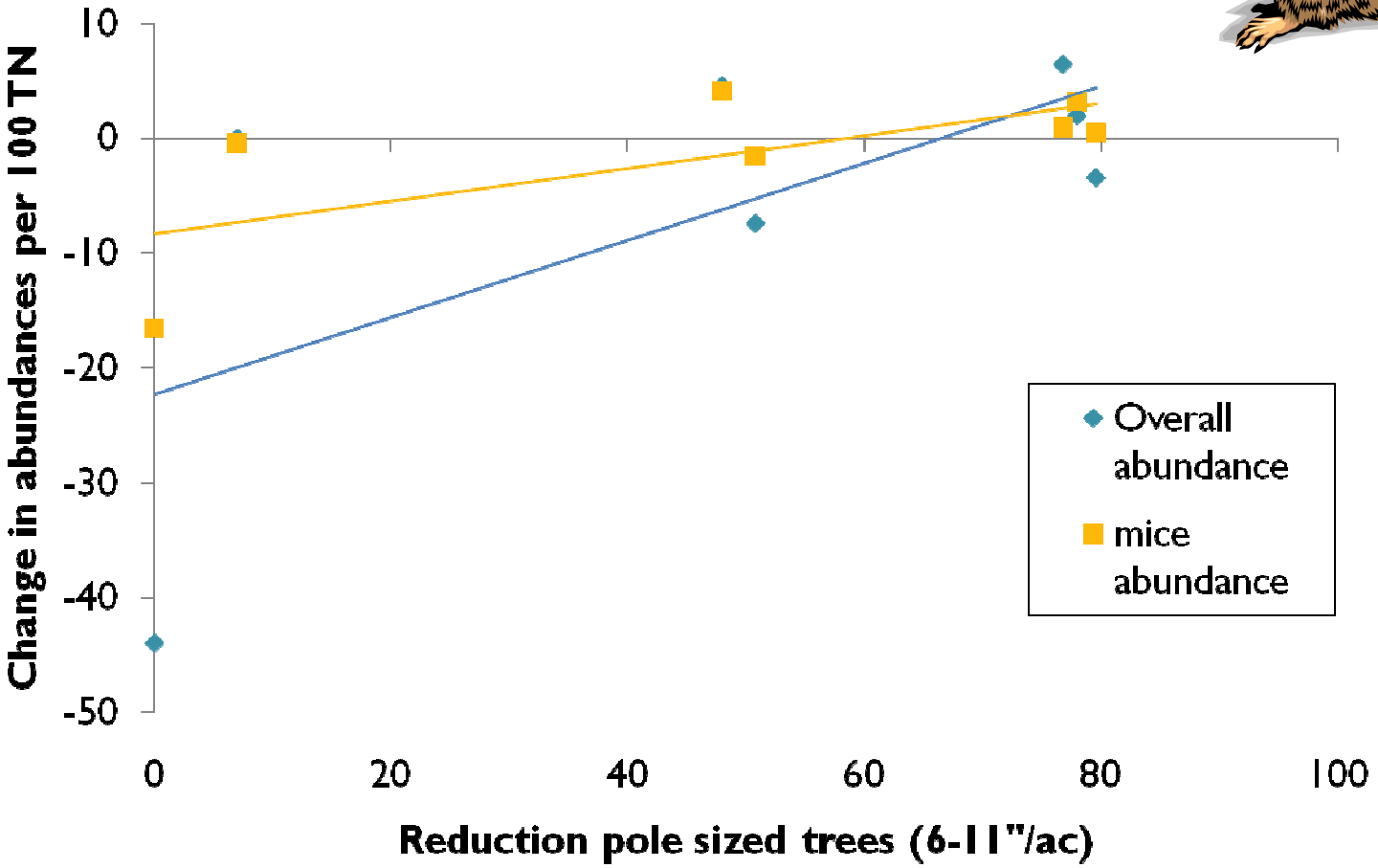




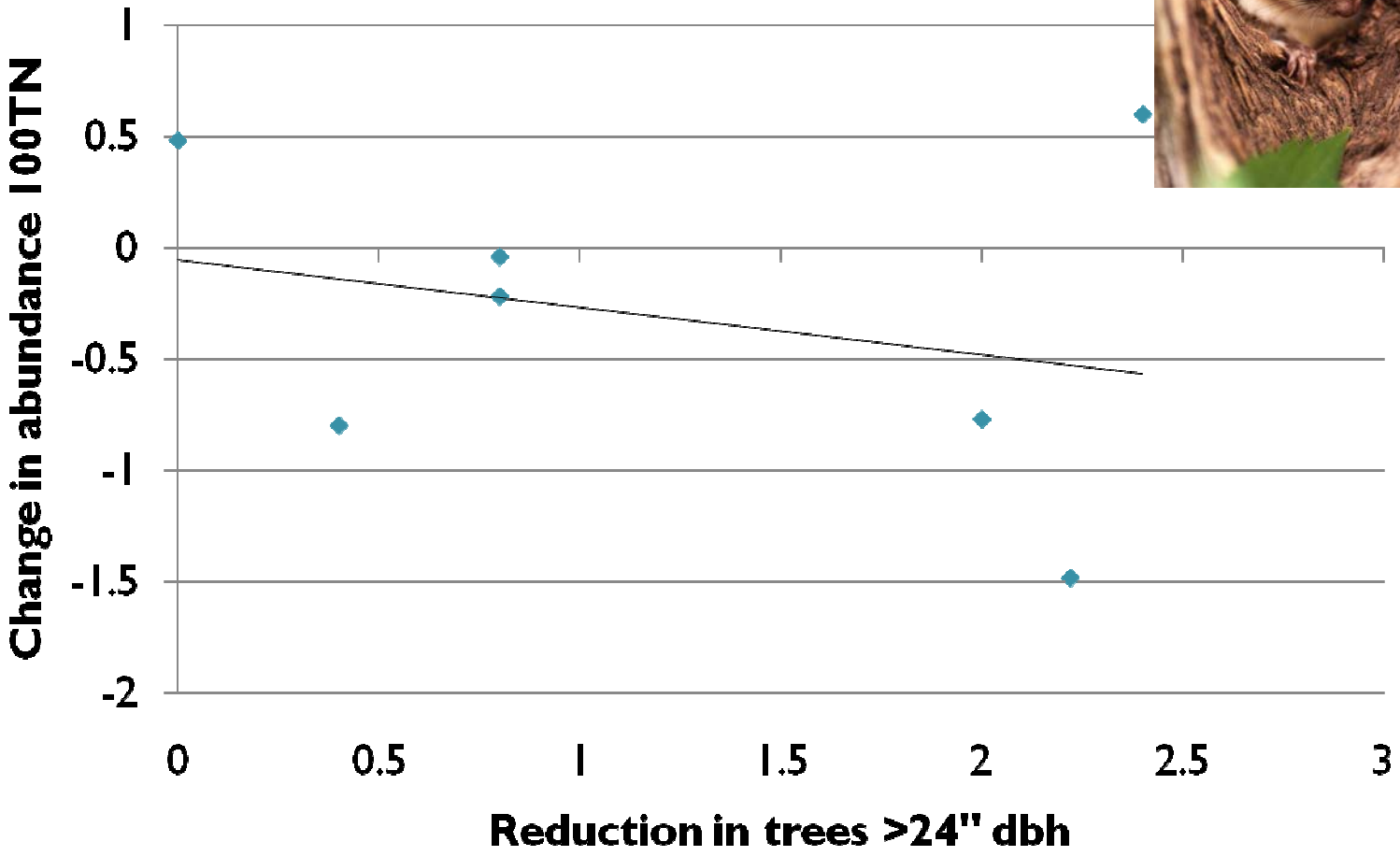
Old Forest and Excavator Bird Species Richness & Logs



Small Mammal Abundance & Pole Tree Density



Northern Flying Squirrels & Med-Lg Tree Density



Summary of Findings

- Substantial changes were observed in bird and small mammal community composition and abundance as a result of fuel reduction treatments
- Less intensive treatments had primarily positive responses – more intensive treatments had primarily neutral or negative responses
- CWHR would not predict any of the observed changes

Summary of findings cont.

- Moderate reductions in pole and small diameter trees can have positive effects on birds and small mammal species - mice, tree squirrels, cavity nesters and excavators
- Declines in larger snags and logs negatively a wide range of bird and small mammal species

Management Implications

- Fuel treatments can have a positive effect on bird and small mammal community diversity depending on how they are designed
- Thresholds of change from positive or neutral to negative responses can be discerned for various species and species groups
- It is clear that research can inform how to design forest fuels treatments that can old-forest associated species while reducing fuels and restoring forest ecosystem function