Purpose of this Study

• Determine the abundance and species diversity of birds in both eucalyptus and oak groves
• Use this information to form a preliminary assessment of eucalyptus for bird habitat
• Use results as an impetus for further population/banding studies

Why use Birds as an Indicator Species?

• Birds are part of a large, diverse taxonomic order
• Easy to count both by ear and by sight
• Birds are charismatic megafauna; people are interested in what happens to them
• Birds are cool!

Oak, Eucalyptus, and Singing Birds

Or the effects of exotic versus native forest cover on abundance, composition, diversity, and evenness of avian species

Diana Kyo Wakimoto, UC Santa Cruz

Methods in the Field

• Surveys of lots in Fall and Spring of 2003 and Spring of 2004
• Walk slowly length of transect (~10 minutes)
• Count all birds seen or heard

Field Sites

• Paired sites of eucalyptus and oak
• Four small paired sites of oak and eucalyptus were surveyed in spring 2003 and fall 2003
• Four small paired sites and three large paired sites were surveyed in spring 2004

Data Analysis

• Rarefaction curves for sampling effort using EcoSim 7.0 (Gottelli and Entsminger 2001)
• ANOVA for differences in species abundance levels between habitat types
• Shannon-Weaver indices for diversity (H value)
• Evenness (equitability) indices (J value)
Rarefaction Curve Spring 2004-
Small Lots

Sampling effort sufficient to determine composition of woodlots

Summary Results - Spring 2003

Eucalyptus
Abundance: 430
Richness: 37 species
Shannon-Weaver: 2.93
Evenness: 0.831

Oak
Abundance: 473
Richness: 38 species
Shannon-Weaver: 3.03
Evenness: 0.831

Overall Number of Species

Diversity Indices (H)

Evenness Indices (J)

None of the overall results are statistically significant (P > 0.05)
Spring 2003 - Results of ANOVA

- Oak
- Song Sparrow
- Spotted Towhee
- Bewick's wren
- Bushtit

Summary Results for Fall 2003

- Eucalyptus
  - Abundance: 125
  - Richness: 22 species
  - Shannon-Weaver: 2.44
  - Evenness: 0.788

- Oak
  - Abundance: 101
  - Richness: 18 species
  - Shannon-Weaver: 2.36
  - Evenness: 0.816

Fall 2003 - ANOVA Results

- Eucalyptus
  - Abundance: 257
  - Richness: 32 species
  - Shannon-Weaver: 2.75
  - Evenness: 0.793

- Oak
  - Abundance: 145
  - Richness: 22 species
  - Shannon-Weaver: 2.59
  - Evenness: 0.838

Summary Results Spring 2004

- Small Tracts
  - Eucalyptus
    - Abundance: 125
    - Richness: 22 species
    - Shannon-Weaver: 2.44
    - Evenness: 0.788

  - Oak
    - Abundance: 101
    - Richness: 18 species
    - Shannon-Weaver: 2.36
    - Evenness: 0.816

Summary Results for Large Tracts

- Spring 2004
  - Eucalyptus
    - Abundance: 135
    - Richness: 23 species
    - Shannon-Weaver: 2.73
    - Evenness: 0.870

  - Oak
    - Abundance: 129
    - Richness: 26 species
    - Shannon-Weaver: 2.64
    - Evenness: 0.810

Spring 2004 (small tracts) ANOVA results

- Eucalyptus
  - Total abundance
  - Pacific-slope flycatcher
  - European starlings

Fall 2003 - ANOVA Results

- Eucalyptus
  - European Starlings

Summary Results for Large Tracts

- Spring 2004
  - Eucalyptus
  - Oak

Summary Results Spring 2004

- Small Tracts
  - Eucalyptus
  - Oak

Summary Results for Large Tracts

- Spring 2004
  - Eucalyptus
  - Oak
Effects of size and woodlot type on Total abundance

Spring 2004 (large tracts) ANOVA results

Eucalyptus

California quail

house finch

Effects of size and woodlot type on Total abundance

P = 0.0001

Bewick’s Wren Effects of Woodlot and Season

P = 0.0273

European Starling Woodlot & Season effects

P = 0.0508

Effect of size and woodlot type on abundance per plot

P = 0.0110
Species only found in one type of woodlot (not statistically significant but interesting)

- Found only in eucalyptus: American kestrel, sharp-shinned hawk, tree swallow, Northern mockingbird, cedar waxwing, red-winged blackbird
- Found only in oak: red-shouldered hawk, yellow-rumped warbler, ruby-crowned kinglet, golden-crowned sparrow, house finch
- Results from pooling all seasons and woodlots

So what do we know from this observational study?

- Both oak and eucalyptus are utilized by many species of birds
- Abundance values and H values are often higher in eucalyptus, but oak has higher J values
- The two woodlot types share many of the same species, although there are some significant differences

Areas for further research

- Need to do banding and population studies to determine if the habitats are source/sinks
- Look at landscape-level dynamics
- Experimental studies, manipulations

Conclusions

- Eucalyptus are not dead-zones for birds
- Eucalyptus have equivalent species richness, diversity and evenness to oak
- This study is a starting point for more research on the topic of eucalyptus effects and management

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Anecdotal observations about eucalyptus tracts

Big Sur Ornithological Lab reports gumming at the base of the bill on yellow-rumped warblers

PRBO reports catching fewer birds in mist-nets set in eucalyptus than expected by chance alone