

Understory Community

Describe understory vegetation community of oak and eucalypt woodlands

Species richness and diversity indices

Estimated Percent Cover, Strata, and Tree Diameter

OBJECTIVE 1/ANALYSES

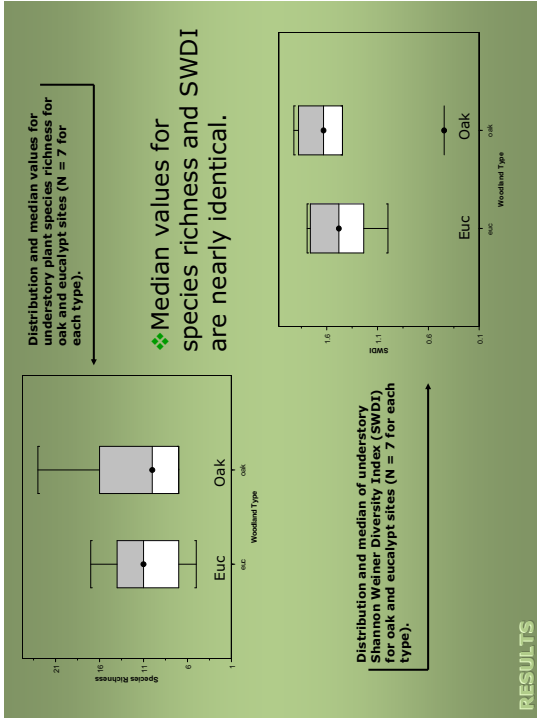
Comparative Ecological Value of Coastal Live Oak and Australian Blue Gum Woodlands



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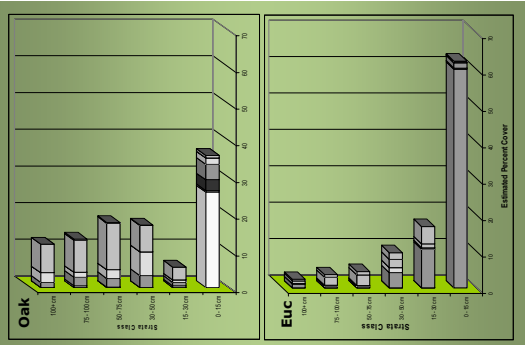


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Percent Cover by Strata Class

- ❖ Oak sites dominated by:
 - Forbs and Shrubs
 - 30 cm – 100 cm strata classes
- ❖ Eucalypt sites dominated by:
 - Eucalypt Debris (~56% cover)
 - Forbs 15-30 cm strata class



Objectives

- 1) Describe bird and understory communities
- 2) Are woodland types similar in species composition?
- 3) Is there a relationship between species and structural components of each woodland?
- 4) Do particular species identify with oak or eucalypt woodlands and, if so, which species occurred in oak and which species occurred in eucalypt?

OBJECTIVES

Vegetation Surveys

- 14 circular sites
 - ➔ 7 Oak and Eucalyptus stands
 - ➔ 3 nested plots/site
 - ➔ 3 line transects/plot



For each 1 m²/line transect:

- Identified each plant
- Estimated percent cover
- Measured height (cm)

For each plot:

- Counted number of trees
- Measured diameter at breast height



DATA COLLECTION

RESULTS

Understory Indicators

Do species occur preferentially in oak or eucalyptus habitat?

Indicator Species Analysis

- Uses relative abundance and relative frequency
- Assigns indicator values ranging from 0 to 100

OBJECTIVE 3/ANALYSIS

Relative Tree Densities

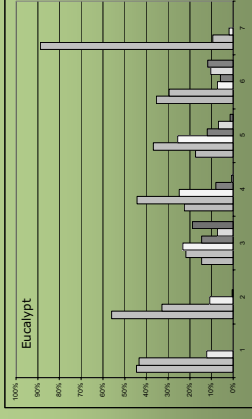
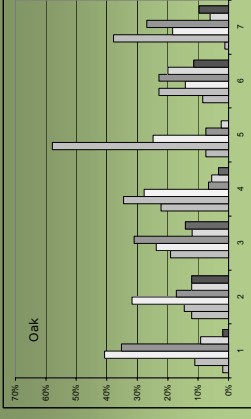
❖ Oak dominated by:

- 20 – 50 cm classes

❖ Eucalypt dominated by:

- 0 – 20 cm classes

Diameter at breast height (DBH)



RESULTS

Understory Indicators

Oak Sites

- **Bracken ***
(*Pteridium aquilinum*)
- **Hedge Nettle***
(*Stachys ajacoides*)
- Italian Thistle*
(*Carduus pycnocephalus*)
- Ripgut Grass*
(*Bromus diandrus*)
- **California Blackberry***
(*Rubus ursinus*)
- **California Coffeeberry****
(*Rhamnus californica*)
- **Common Snowberry****
(*Symphoricarpos albus*)
- **Poison Oak***
(*Toxicodendron diversilobum*)

Eucalypt Sites

- Common Chickweed**
(*Stellaria media*)
- **Miner's Lettuce***
(*Claytonia perfoliata*)
- **Stickey Monkeyflower***
(*Mimulus aurantiacus*)

* $p < 0.05$
** $p < 0.10$

Bold text => Natives

RESULTS

Understory Composition

Are sites similar in plant species composition also similar in woodland type?

Mantel's Test

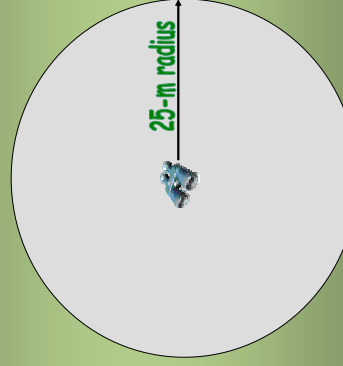
- Tests the correlation between similarity matrices



OBJECTIVE 2/ANALYSIS

Bird Surveys

- 10 minute fixed radius point counts
 - ✓ Identify Species
 - ✓ Count
 - ✓ Behavior
- Two Data Sets
 - ✓ Breeding Birds
 - ✓ Singing
 - ✓ Building nests
 - ✓ Food to nests
 - ✓ All Birds



(Same as vegetation sites)

DATA COLLECTION

Understory Composition

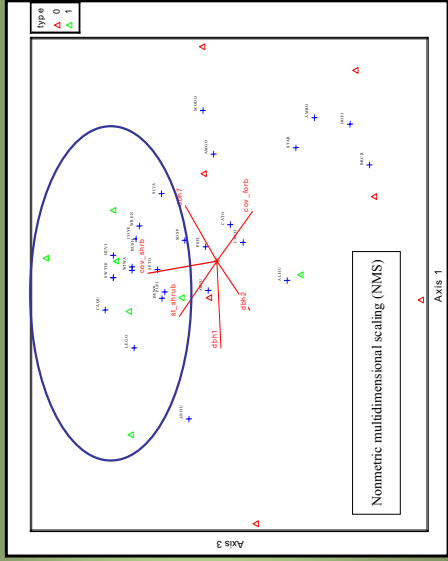


Understory Plants

Mantel's correlation = 0.15
 $P = 0.0004$

RESULTS

Linking Birds and Structure



RESULTS

Bird Community

Describe breeding bird community for oak and eucalypt woodlands

Species richness and diversity indices

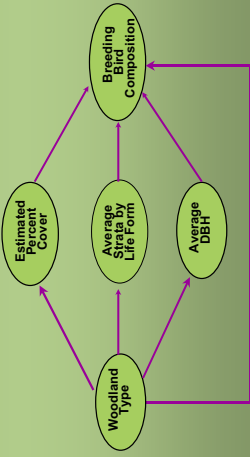
OBJECTIVE 1/ANALYSIS

Bird Composition

Are sites similar in species composition also similar in structure?

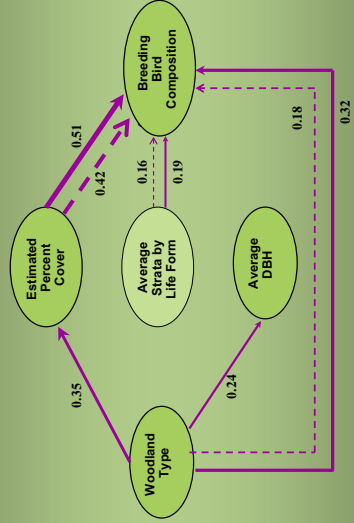
Mantel's Test

Tests the correlation between similarity matrices



OBJECTIVE 2/ANALYSIS

Breeding Birds



RESULTS

Breeding Birds

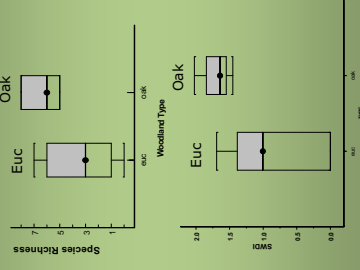
Species
Individuals

Oak	28
Euc	148

Richness
Exclusivity
Individuals

Oak	Euc
22	12
16	6
85	63

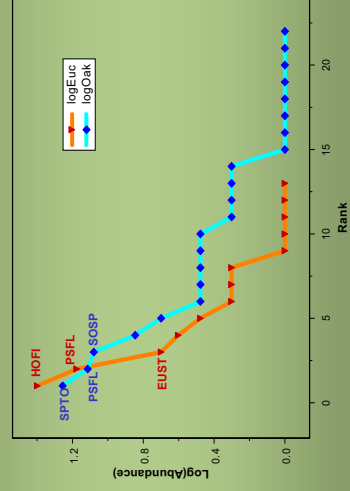
Median values for species richness and Shannon Weiner Diversity Index are dissimilar.



RESULTS

Two sample t-test statistically significant: $P < 0.05$

Breeding Bird Dominance Diversity Curve



RESULTS

Comparisons

- ❖ Sax 2002
 - Found bird and understory richness nearly identical
 - Species composition differed between woodlands
- ❖ Fox and McKay 1981
 - Presence of understory plants in Australian eucalypt woodlands affect species richness and composition
- ❖ Lerner and Stauffer 1993
 - Found migrating Blackburnian Warblers avoided non-native forests (i.e. eucalypts) in wintering grounds of Columbia
- ❖ Yirdaw and Luukkanen 2003
 - Found no inhibitory effects of eucalypts on understory species and herbaceous species in Ethiopian Highlands

Bird Indicators

Do species occur preferentially in oak or eucalyptus habitat?

Indicator Species Analysis

- Uses relative abundance and relative frequency
- Assigns indicator values ranging from 0 to 100

OBJECTIVE 3/ANALYSIS

Recommendations

- ❖ Add new sites to confirm results
 - Elkhorn Slough Watershed
 - Other locations
- ❖ Evaluate breeding bird successes or source/sink habitats
- ❖ Identify sites with specific conservation value
 - Eucalypt sites => metapopulations, monarch refuges, remnant chaparral communities

Bird Indicators in Oak Woodlands



Spotted Towhee
IV = 72
P = 0.04

Oak Titmouse
IV = 65
P = 0.05



Dark-eyed Junco
IV = 78
P = 0.03



California Quail
IV = 71
P = 0.01

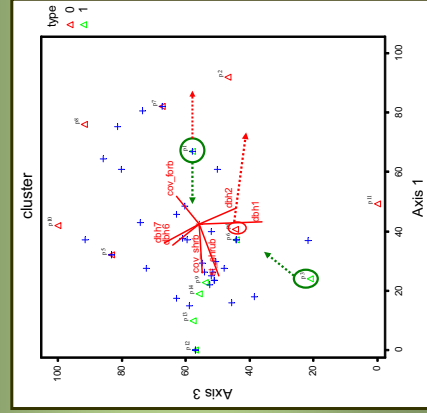


RESULTS

O = Overall Community Indicators, B = Breeding Bird Indicators

Monitoring

- ❖ Continue to monitor sites
- ❖ Changes can be plotted to reflect movement towards or away from "oak - iness"



MONITORING

Bird Indicators in Eucalypt Woodlands

European Starling

IV = 71
P = 0.01



* No breeding bird indicators

RESULTS



Photo: Institut National de la Recherche Scientifique

Conclusions

- ❖ Multivariate techniques are effective tools for providing rigorous inferences into the ecological value of Coastal Live Oak and Eucalyptus Woodlands.
- ❖ These techniques offer powerful monitoring and trend analysis capabilities.
- ❖ Study shows distinct compositional differences between oak and eucalypt sites.
- ❖ **Plants**
 - ✓ Richness and diversity nearly identical
 - ✓ Structurally different (i.e. oak more complex)
- ❖ **Breeding Birds**
 - ✓ Richness and diversity differ significantly
 - ✓ Oak sites tend to harbor woodland specialists
 - ✓ Eucalypt sites more likely to harbor nuisance species

Acknowledgements

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Elkhorn Slough National Estuarine Research Reserve

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Elkhorn Native Plant Nursery

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