Sierra Nevada Adaptive Management Project
CA Spotted Owl Team

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Photo by Sheila Whitmore
Owl Team Research Objectives

• To assess the potential effects of SPLATs on spotted owl territory occupancy and reproductive success.
  – Identify explanatory variables having the strongest relationship with the response variables.
  – Consider all relevant explanatory variables (e.g. amount of pre-existing habitat within an owl territory).
  – Estimate the effect size of any important explanatory variables.
Key Definitions

- **Territory**—site that is actively defended by a single owl or a pair of owls (i.e., owls responding to vocalizations during surveys).

- **Territory Center**—location(s) within an owl territory which owl activity is centered upon (nest site, roost sites).

- **Territory Size**—a circle with radius of \(\approx 1100\) meters around the territory center.
Data Collection

• History of occupancy and reproduction for each owl territory during the course of the SNAMP study (considers both SNAMP study and Eldorado study).

• Individual owl capture-recapture histories.

• Habitat data for each owl territory, including pre-treatment data for territories that overlap SPLATs.

**Field visit on Tuesday, July 29, 2:00 p.m., Blodgett Forest Research Station. First-hand look at owl data collection.**
Owl Data Collection

• Owls are captured and banded with unique color band and tab combinations.

• Owl reproductive status is assessed with use of feeder mice.

• Conduct “blanket surveys” of entire study area to locate all owl territories.

Photo by Logan McConnell
Habitat Data Collection

- Important variables for describing habitat “quality” of owl territories:
  - Dominant tree size/basal area
  - Canopy cover
  - Understory layer
  - Downed logs
  - Proportion of territory in suitable habitat

- Before and after measurements needed for SPLAT treatments to quantify their effects on owl habitat.

- Standard method needed to map habitat within owl territories:
  - LiDAR will only be collected for Last Chance control & treatment sites; owl study area is much larger.
  - Maps derived from aerial photos should be more accurate than maps derived from LANDSAT satellite data.
Habitat Data Collection

Nested Field Plots
(490 m² and 1960 m²)

• Within the inner circle, we will measure:
  • All trees ≥15 cm dbh.
  • Canopy cover using a densitometer (i.e. sight tube).
  • Understory cover (≤2.5 m above ground) using a cover pole.
  • Downed logs ≥25 cm diameter at large end.
  • Slope and aspect.

• Within the outer circle, we will measure:
  • All trees ≥75 cm dbh.
Habitat Data Collection

Photo by Chris Binschus
Owl Study Areas for SNAMP
Last Chance Owl Study Area

Legend
- Owl territory center
- Owl territory
- Pine Nut treatment
- Last Chance treatment
- Owl buffer area
- 2008 Fires

Distance Scale: 0 1.25 2.5 5 7.5 10 Kilometers
Last Chance Owl Study Area

Sailor Flat area

Robinson Flat area

Smoke from recent fires

Photos by Sheila Whitmore
Example: Map of BKJ OE territory
# 2008 Results on Last Chance Owl Study Area

<table>
<thead>
<tr>
<th>Territory ID</th>
<th>Social Status</th>
<th>Repro Status</th>
<th># Fledglings</th>
<th>Male</th>
<th>Female</th>
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<td>Resight</td>
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<td>Recapture</td>
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<td>Resight</td>
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<tr>
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<tr>
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<td>Pair</td>
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</table>
2008 Nest Tree (OAKFL) on Last Chance Owl Study Area

Photos by Tom Anderson
2008 Nest Tree (LASTC) on Last Chance Owl Study Area

Photos by Sheila Whitmore
### Projected Sample Sizes

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Treated Owl Territories</th>
<th>Untreated Owl Territories</th>
<th>Planned SPLATs</th>
</tr>
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<tbody>
<tr>
<td>Last Chance</td>
<td>4</td>
<td>7</td>
<td>Last Chance, Pine Nut</td>
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<tr>
<td>Eldorado Density</td>
<td>4(+)</td>
<td>24(-)</td>
<td>O'Leary's Cow, Big Grizzly (?)</td>
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<tr>
<td>Eldorado Regional</td>
<td>5</td>
<td>10</td>
<td>Hartless Ridge, Hey Joe, Misfire</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>13</strong></td>
<td><strong>41</strong></td>
<td></td>
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</table>
Data Analysis

• Territory occupancy:
  – Use Program MARK for analysis.
  – Provides estimates of territory colonization (γ) and territory extinction (ε) probabilities.
  – Can include covariates in analysis (e.g., habitat variables, treatment effects)

• Reproductive output:
  – Use PROC MIXED in SAS software.
  – Can include covariates in analysis.
Model Development for Data Analysis

• We will specify a set of candidate models to explain variation in territory colonization ($y$), territory extinction ($\varepsilon$), and reproductive output. Models will be based on previous research and expected effects.

• Candidate models will be ranked using AIC; the most parsimonious model(s) are selected.

• Example: territory extinction is a function of the amount of pre-existing habitat within a territory and the amount of habitat removed during treatment.

$$\text{territory extinction} = B_0 + B_1 \times \text{(amount of pre-existing habitat)} + B_2 \times \text{(amount of habitat removed during treatment)}$$

• Identifying the set of candidate models provides an opportunity for IT participation.